DOUBLE-SIDED SUPPLEMENT MAP: THE WORLD

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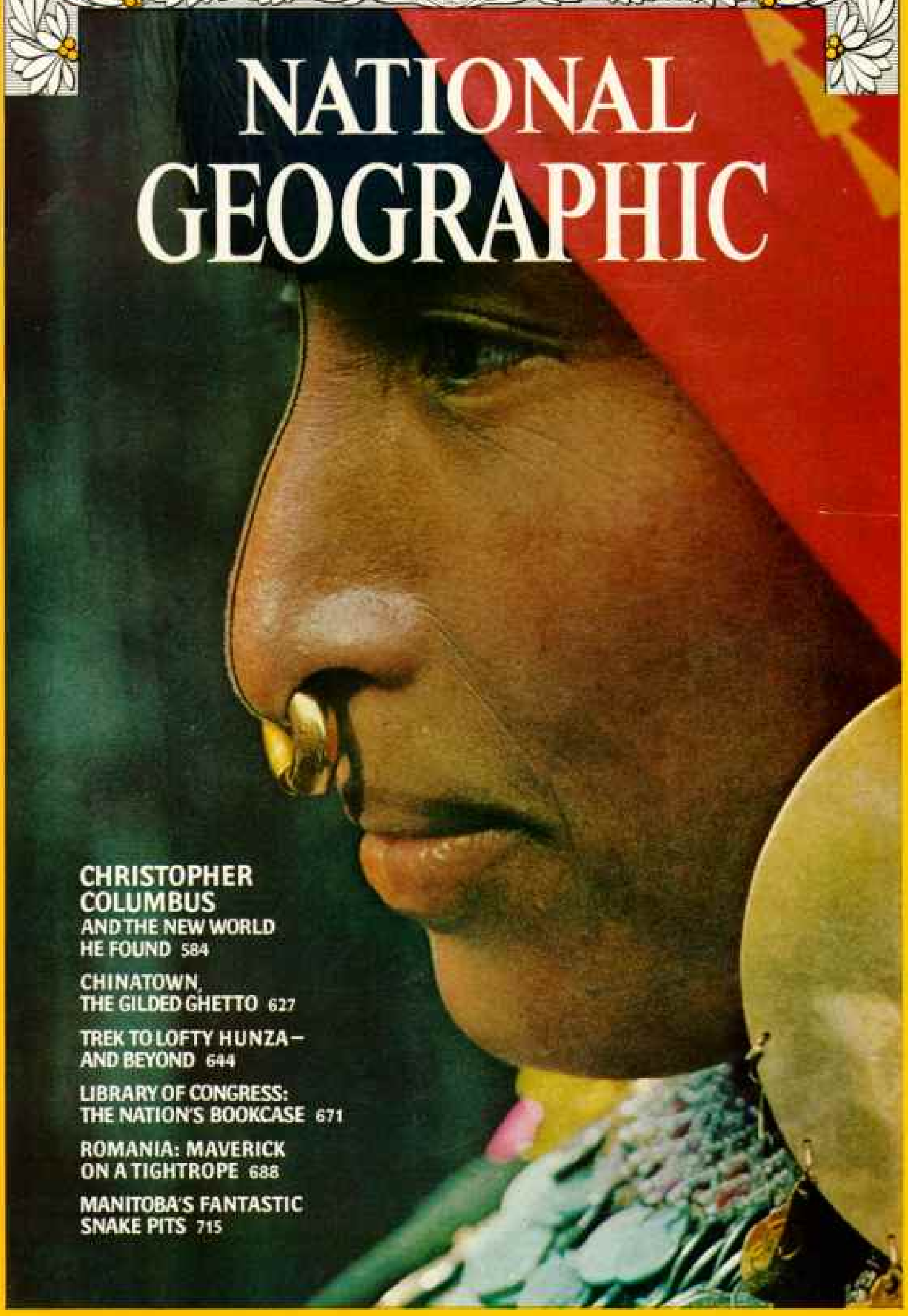

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A GREEK PHILOSOPHER said it: "Nothing is permanent except change."

We editors and cartographers who live continually with maps face that fact and challenge almost daily. A case in point: the new National Geographic Map of the World, distributed as a supplement to this issue.

Compare it with our previous world maps and you'll note that the United States has been moved noticeably to the left. Asia is far too significant a landmass to be split down the middle, as map makers have done for decades so that the Americas could appear in the center of the sheet. By "rotating" the globe a quarter turn or so, we've kept all the continents intact.

There have been scores of other changes since our last World Map was published in 1970. The Democratic Republic of the Congo, for instance, is now Zaire; Ceylon becomes Sri Lanka; Viet Nam, once shown in two colors, is now a single serpentine stripe of purple.

Political borders have always been among the most restless of man's creations. On the World Map, of necessity, they appear where history last placed them. We've developed a different solution to that problem, though, for the newly published Fourth Edition of the National Geographic *Atlas of the World:* A bulletin will be mailed annually, without charge, to owners of the new Atlas, advising of every significant change in national frontiers, place-names, and political status. Thus the Atlas will keep pace with our changing world—one more instance of the Society's insistence on broadening the base for its primary function: the increase and diffusion of geographic knowledge.

But changing times demand changing educational methods. Maps and magazines alone cannot do the job. The Society is constantly developing new audiovisual programs for schools and other educational outlets. More than 50 films are available, running a fascinating gamut from "The American Revolution" to "Animal Behavior." Our greatly expanded filmstrips program now covers dozens of subjects in the fields of science and social studies.

This fall and winter the Society, in association with WQED/Pittsburgh, will televise four National Geographic specials over the nationwide Public Broadcasting Service, through a grant from Gulf Oil Corporation. The first two are "The Incredible Machine" on October 28 and "This Britain" on December 9.

But to get back to this month's double map of the earth: However impressive modern high-speed printing may be, it cannot work miracles. Somewhere in the political world another border or place-name may have changed by the time you receive your magazine. I hope you will accept this philosophically. Share with me instead a certain sense of permanence on the other side: a striking view of earth and seafloor shown in dramatic physical relief.

Here change is measured not by a fleeting military coup or even a "permanent" political alignment, but at the deliberate pace of geological ages. The Rockies, the Mid-Atlantic Ridge, even the shapes of the continents themselves, *do* change—but slowly, grandly enough to support our faith in the basic solidity and order of our planet.

Gilbert M. Grosvenor

NATIONAL GEOGRAPHIC

THE NATIONAL GEOGRAPHIC MAGAZINE VOL. 148, NO. 5

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COVER: *Panama's Cuna Indians still wear the "blessed gold" that so delighted Columbus (pages 590-91). Photograph by Adam Woolfitt.*

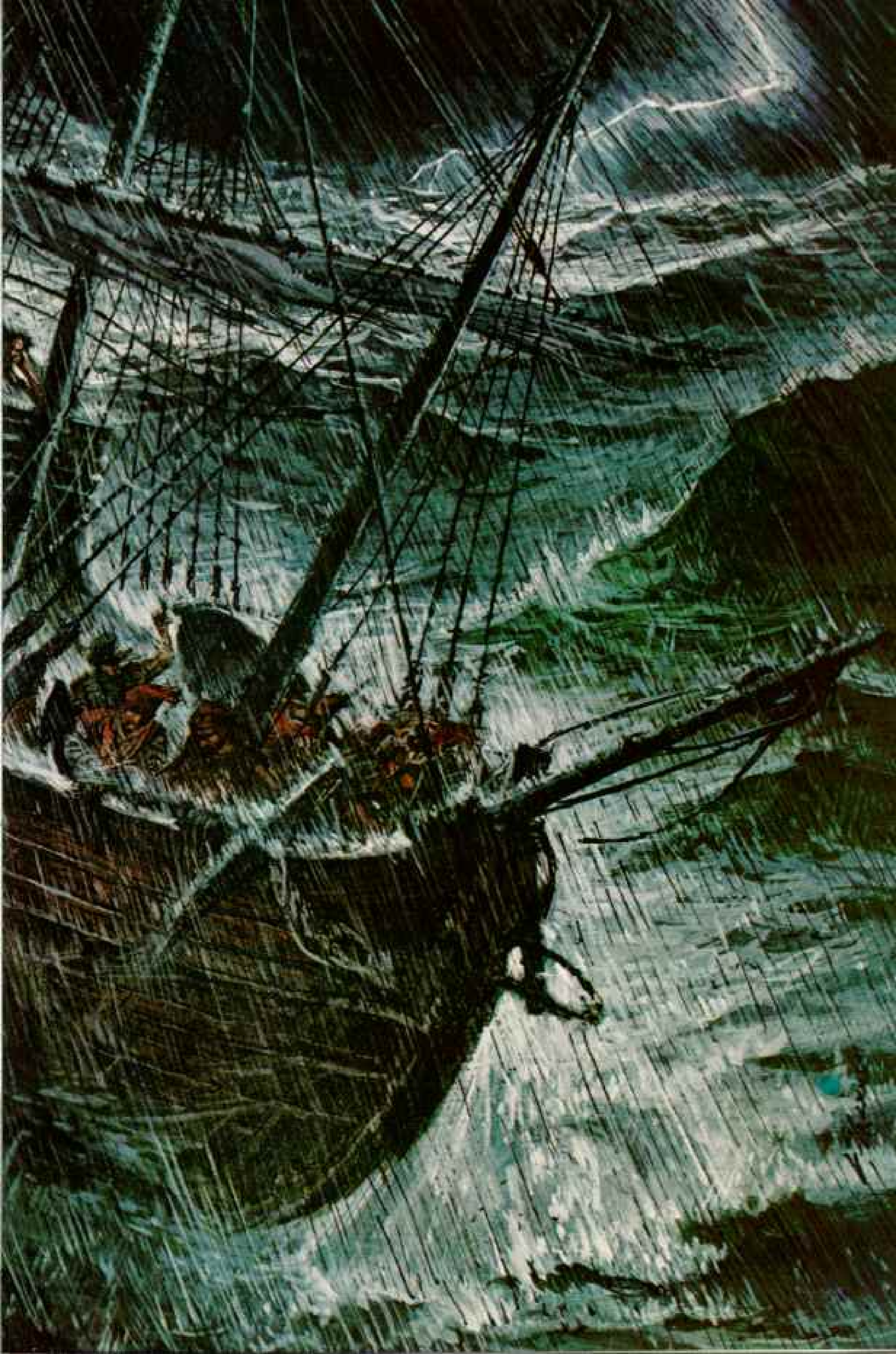
Christopher Columbus and the New World He Found

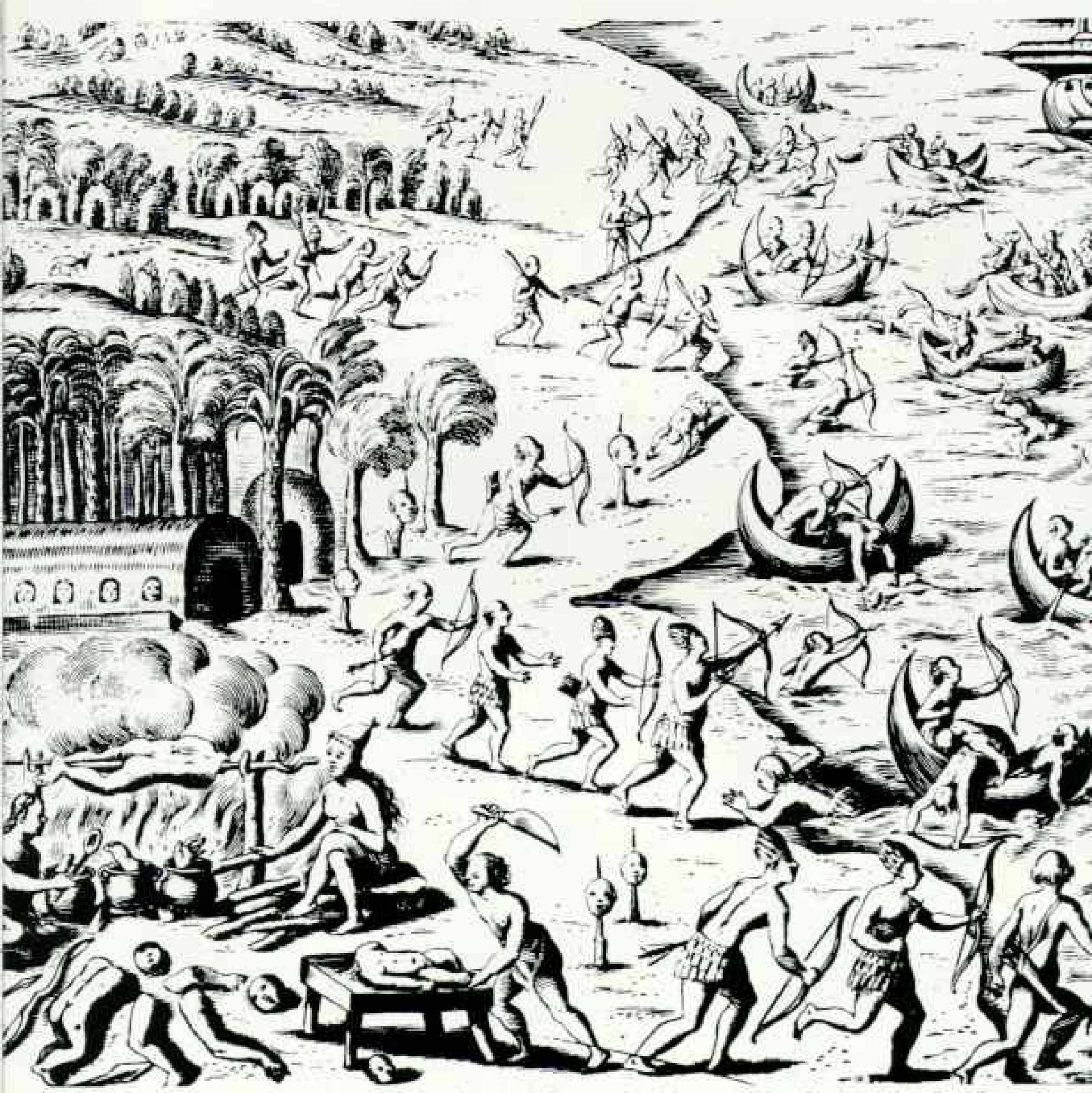
By JOHN SCOFIELD
ASSOCIATE EDITOR

Photographs by ADAM WOOLFITT

Bearing incredible news—they have voyaged westward from Europe and reached the "Indies"—Columbus and his men survive a savage storm. Brave Niña *limps to safety in Portugal. There the Admiral refits, then sails home to Spain and glory.*

LOUIS S. GLANZMAN

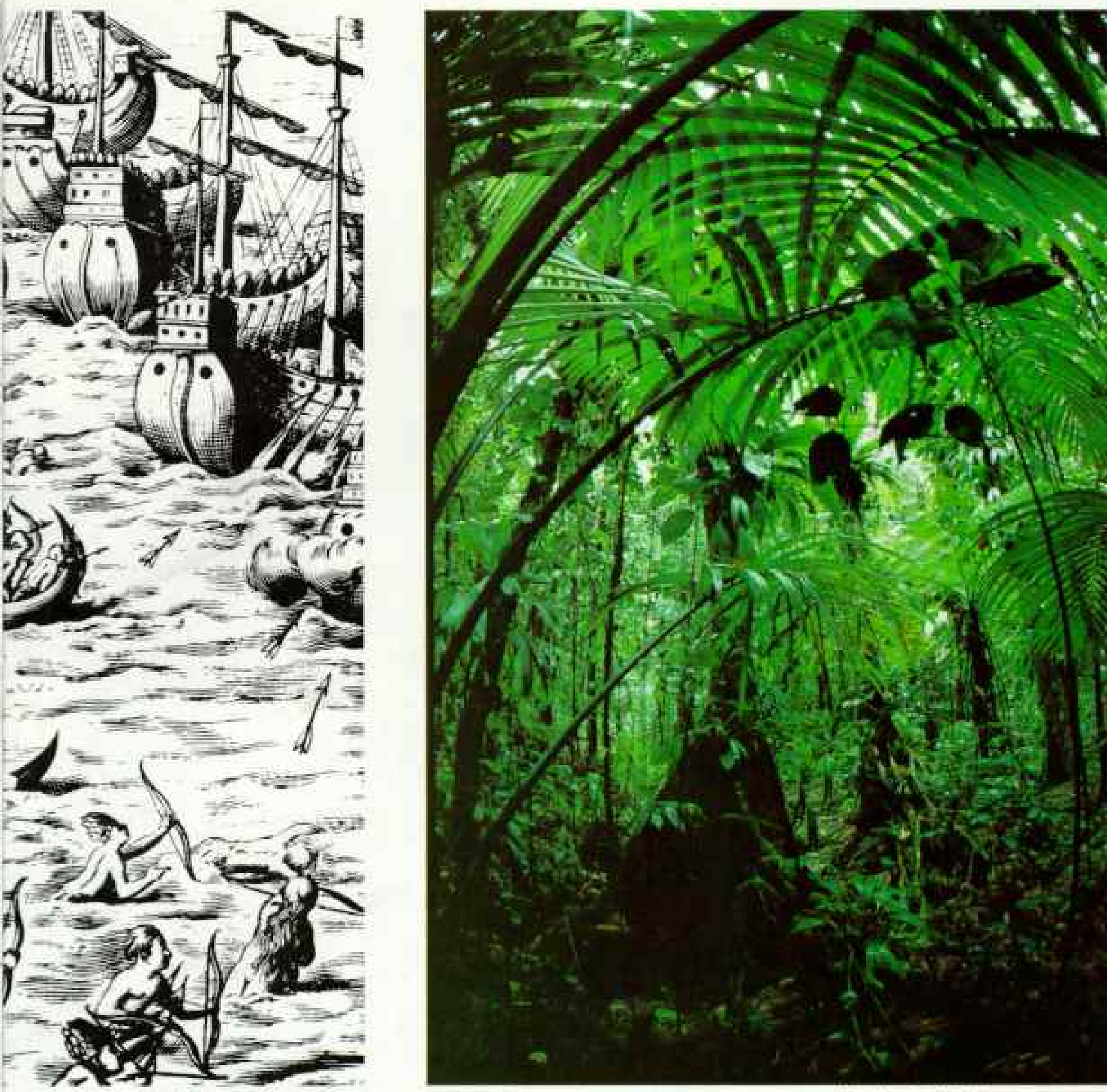




Cannibals attack Columbus's fleet in a fanciful engraving from Plautius, "Nova Typis Transacta

"The air was like April in Castile" in lush new lands where plants flourished in winter and fierce men ate their victims. There were birds "no larger than the end of the thumb" that the men thought were bumblebees. Europeans had never before seen hummingbirds.

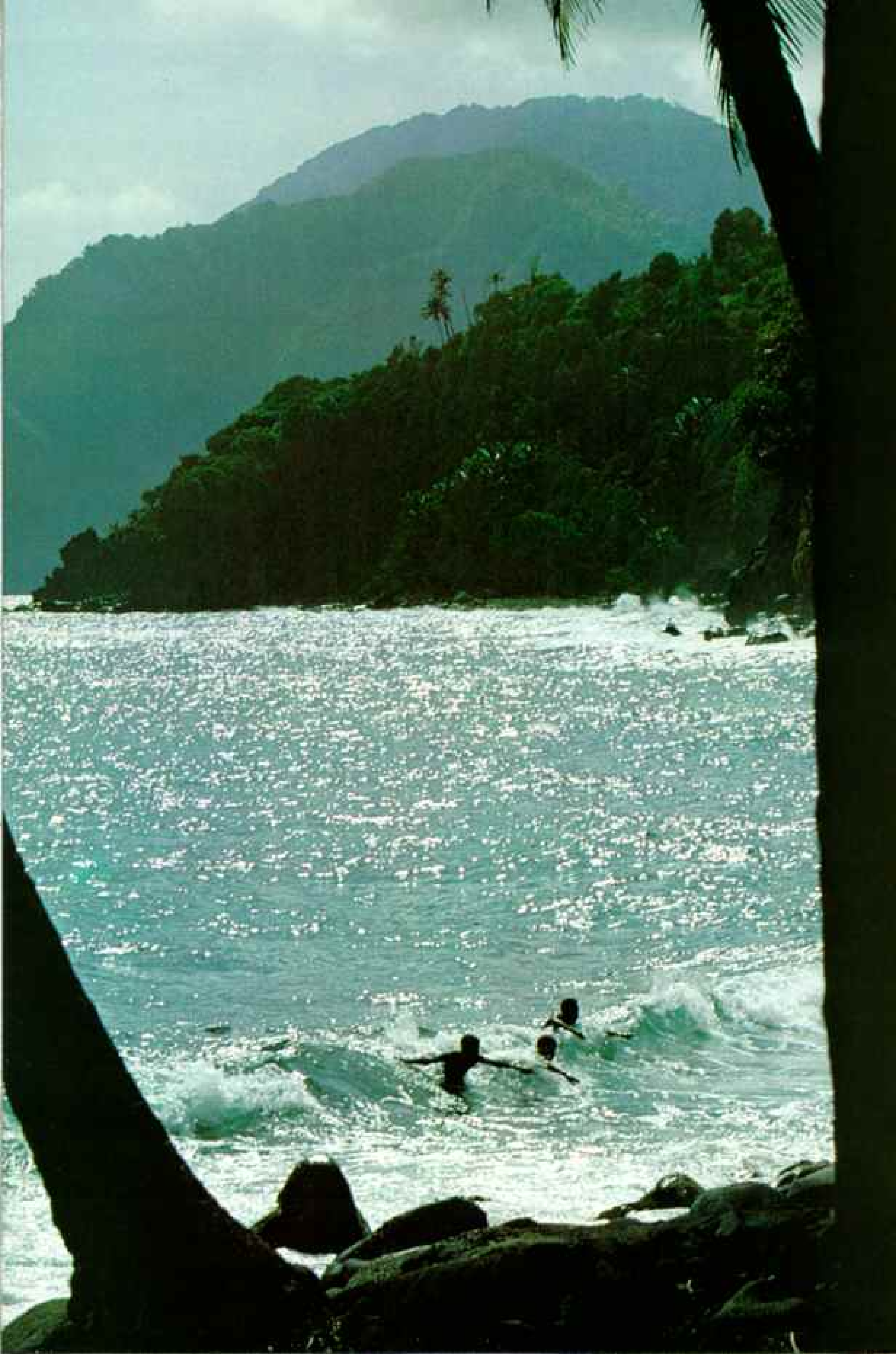
Navigatio," 1621; Library of Congress



Rain forest, Martinique

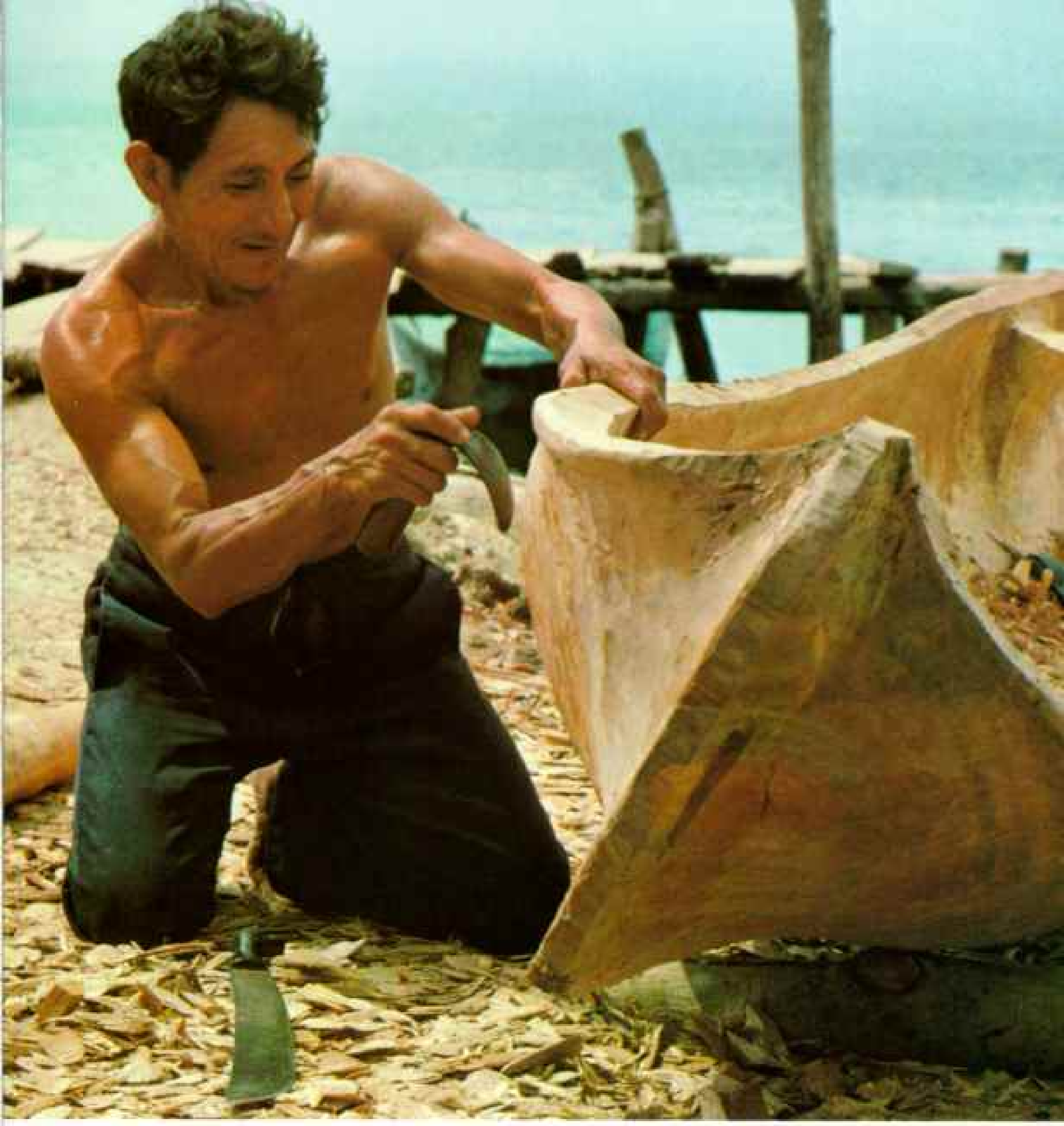
Purple-throated Carib hummingbird, Martinique

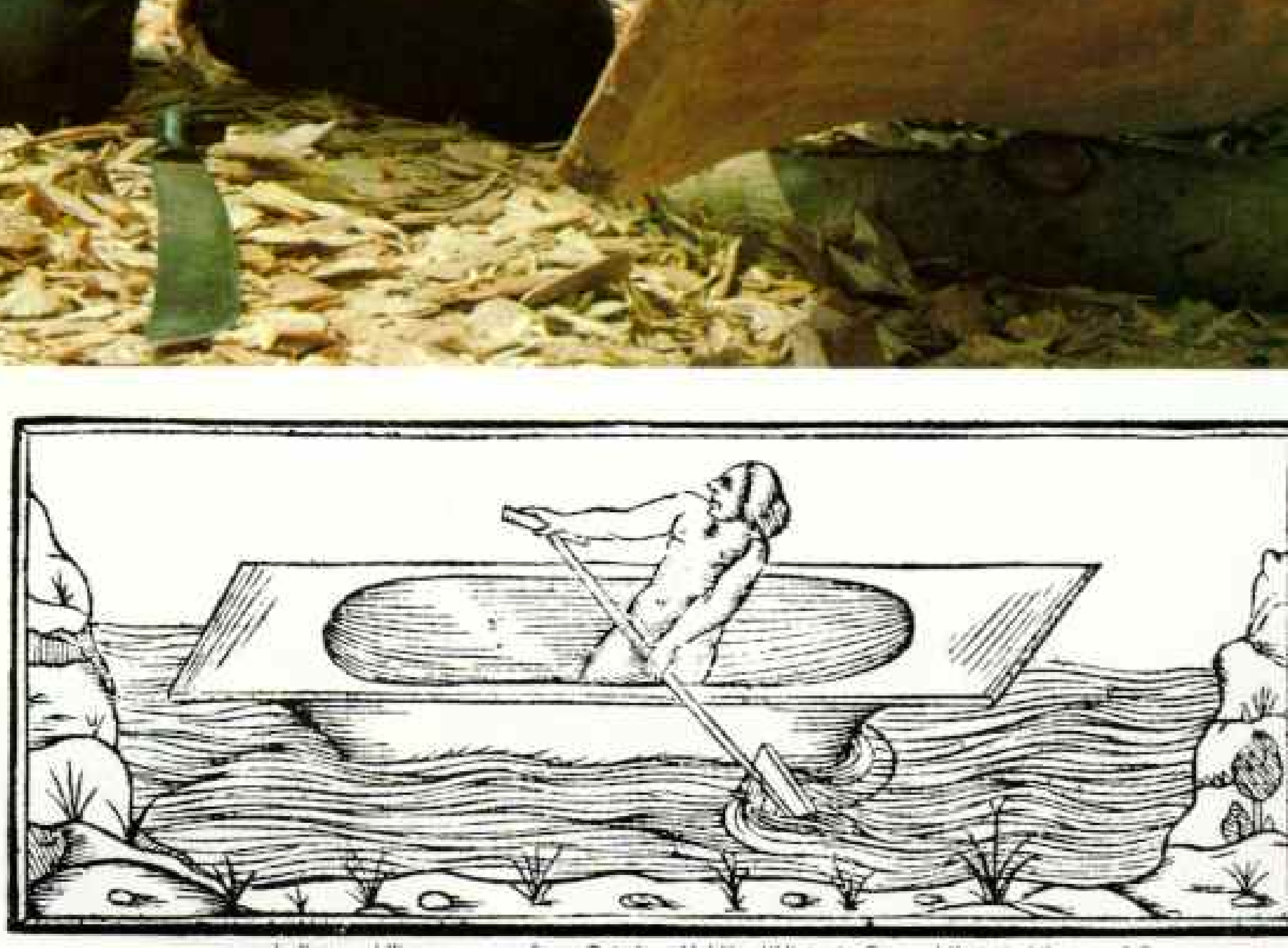
This green paradise,
whose headlands
plunge steeply
into the sea, was
discovered on a
Sunday, so Columbus
called it Dominica.



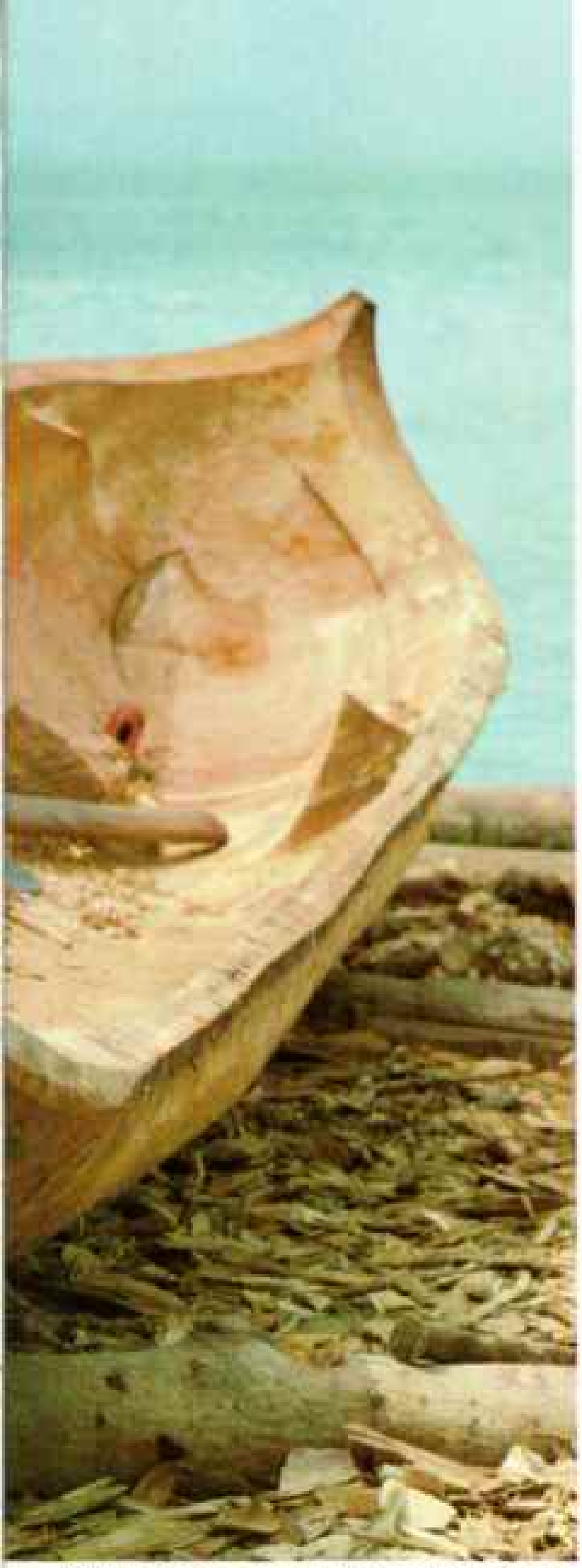
Bird pendant, Gold Museum, Bogotá (above); Cuna Indian with gold nose ornament, Panama

"All of us made merry, not caring any longer for spicery, but only this blessed gold."





Indian paddling a canoe, from Oviedo y Valdés, "Historia General," 1547; Library of Congress



A Cuna shapes a canoe with a steel adz, Panama

Stone ax, Haiti. Collection of Dr. William H. Hodges

"Their knives are stones as sharp as proper knives . . . and with these they hew and fashion their boats called canoes." Some of their dugouts, carved from towering jungle trees, "will carry one hundred to one hundred and thirty men."

CHRISTOPHER COLUMBUS

The Sailor Who Gave Us the New World

First Voyage: WESTWARD TO CIPANGU!

ON THE 45TH DAY, *a Sunday, they saw patches of seaweed that looked as if they had been freshly uprooted.*

On Monday appeared "a white bird called reed tail that does not sleep upon the sea."

Rain fell on Wednesday, without wind. The sailors took this as a sign that land was near.

At sunset six days later an "island" was sighted. It was only a cloud.

The men complained at the length of the voyage and threatened to turn back, whether the captain ordered it or not.

Sixteen more days passed. Then the sailors on one of the ships saw a small board and a stick that had been shaped with a tool. "At these signs everyone breathed again," the log records, "and became joyful."

Land appeared two hours after midnight on the 71st day—distant cliffs, shining in the glow of a blazing moon.

HAD HE TRIED, Christopher Columbus could hardly have chosen a less important scrap of sand and coral for that portentous landfall. The inhabitants—handsome, gentle people "the color of Canary Islanders, neither black nor white"—wore only paint and swam out to the ships' boats with offerings of parrots, spears, and bundles of cotton. They called their island Guanahani.

Confident that he had reached some part of Japan, Columbus gave thanks that God had guided him to the Indies. He named the island San Salvador, for the Holy Saviour. He called the people *los Indios*, and promptly made plans to enslave them.

A simple white cross, rising beside incredibly blue Bahamian waters, marks the little bay most scholars accept as the one where Columbus and his ecstatic crewmen first

Signs of land increase daily. Imaginations are tuned to discovery pitch. Columbus thinks he sees a light. Finally, the cry comes: "*¡Tierra, tierra!*—Land, land!" Now, as then, the moon silvers one of the cliffs of San Salvador (**facing page**), where Columbus stepped from the Old World to the New.

stepped ashore on October 12, 1492. Here on the island's western side, where a break in the reef gives access to sheltered waters, *Niña, Pinta,* and *Santa María* could have set their anchors in comparative safety.

Another monument, placed in 1891 (long before Samuel Eliot Morison had patiently retraced Columbus's routes and identified his landing places*), stands above the cliff-hung eastern shore, fenced off from the heaving Atlantic by a reef fanged with coral. No mariner in his right mind would go near it.

I said as much to a grizzled, amiable islander who was helping me dig my automobile out of a sand trap a few hundred yards short of the marker. "That's not right," he said emphatically. "No, sir. This is the place. The footprint proves it."

The *what?*

"Yes, sir. The footprint over there, Columbus's own, in the rock beside that cross."

We freed the car and the old man resolutely went back to his work, hauling bucketfuls of sand one at a time to where a house was being built a mile or so away. "You'll see it," he said as I started out on foot through knee-high salt grass.

I found nothing that even faintly resembled a footprint in the wave-sculptured rocks along that windswept shore. But every islander I asked assured me it was there, though to a man they admitted they hadn't seen it lately. "I fancy it was in sand at first," one explained. "Then it turned to stone."

SAN SALVADOR, where dusty new-cut roads herald the coming of a retirement colony to be called (could it be anything else?) Columbus Landings, was only the first of many stops as I retraced the wanderings of the tortured, paradoxical genius whose relentless pursuit of a mistake forever altered the course of human history.

Columbus's error had nothing to do with the shape of the earth. He knew it was round; so did most educated men of his time. But they couldn't agree on another question: How big? And of all the wrong answers, Columbus's was perhaps the worst.

Poring over a mishmash of authorities that included the Greek geographer Ptolemy, 14th-century theologian Pierre d'Ailly, and Marco Polo, Columbus concluded that the earth was only 16,200 nautical miles around at the Equator, and that Europe and Asia together, measured from the Canary Islands to Japan, spanned 13,500 of those miles. Thus he shrank earth's circumference by a quarter, and stretched Europe and Asia by more than 3,000 miles.

THE NEXT STEP was obvious. Let stubborn mariners continue trying to struggle round Africa so they could sail east to the Indies with their spices and to Cipangu—Marco Polo's name for Japan—with its pagodas roofed with purest gold. Twelve thousand miles? Fifteen thousand? *He* would head west for a mere 2,700 miles—2,400 if he took the shorter route, along latitude 28° N., to reach Japan. Why, that was less than the distance from one end of the Mediterranean to the other. Sailors had been making *that* milk run for two thousand years!

I often wonder how history might have turned out if the advisers to the Portuguese king, to whom Columbus first tried to sell his scheme, had convinced him of his error. Surely they tried to tell this bullheaded Genoese that not less than 10,000 nautical miles lay between westernmost Europe and Asia. But, like Ahab in his fanatic pursuit of the white whale, Columbus would not be swayed. Never mind the details. Give me the ships and I'll get to the east by sailing west.

If the Portuguese would have none of it, how about their up-and-coming rivals, the Spaniards? The 33-year-old Columbus set out for the court of Ferdinand and Isabella.

For seven years Columbus belabored the monarchs with petitions, requests for audiences, and entreaties from every influential friend he could muster. But his price was high for a kingdom still trying desperately to rid itself of Moslem domination: Not just one ship but three; not merely a reward if he reached the Indies but also a title, a coat of arms, and a tenth forever of all the wealth

*No writer can follow in the wake of Columbus without giving due credit to this other Admiral of the Ocean Sea, whose biography of the discoverer ranks second only to the one written by Columbus's son Ferdinand. In all but a few instances I have followed Admiral Morison's interpretations of the sometimes confusing original documents and accepted his identifications of routes and landing places.

that would accrue to Spain if he should find a short route to the Orient.

Always the queen listened sympathetically —Columbus seems to have had a way with the ladies, royal and otherwise—but her advisers countered, probably with the same arguments the Portuguese had used.

Shortly before his proposal was turned down for the third time, Columbus took part in an event that, had he but known, augured a turning point in his fortunes. Joyfully he marched behind Ferdinand and Isabella's troops as they entered the Alhambra of Granada, last stronghold of the Moors in Spain. But then came the ultimate blow. At an audience before both sovereigns, Columbus was sent packing, flatly and finally.

Or was it so final? The discouraged Columbus had barely mounted his horse when the keeper of the king's purse, Luis de Santángel, went to the queen. "He was much astonished," Columbus's biographer-son Ferdinand recorded, "to see that Her Highness, who had always shown an enterprising spirit for things of gravity and importance, should lack it now for an undertaking of so little risk." It was a bold speech, and Santángel ended it even more boldly. If the problem is money, he added, I'll provide it myself.

Some sudden instinct must have told the queen that Santángel was right about this personable Italian and his crazy Enterprise of the Indies. If it succeeded, it could signal a new dawn for Spain, free now of Moslem rule and united, through Isabella's marriage with Ferdinand, under the banners of Castile and Aragon.

In one of those strange about-faces that have created so much of human history, Isabella countered Santángel's proposal by suggesting she put up her own jewels as security, though she never actually pawned them, popular fables to the contrary. Quickly the queen dispatched a messenger to summon Columbus back. . . .

WHEN THE ADMIRAL departed Guanahani, he was sure that the next island would be not only the home of the King of Japan, to whom he carried a letter of introduction from the Spanish monarchs with a blank space to be filled in when he learned the ruler's name, but also a source of the gold he so eagerly sought. The Indians had pointed onward, as they would continue to do when asked where their few gold ornaments came from. Always the next island, the next range of mountains. For two weeks *Niña*, *Pinta*, and *Santa María* threaded the central Bahamas, somehow managing to keep from disaster in this unknown, unpredictable maze.

I've sailed those waters myself, in a boat only about a third as deep as *Santa María*. I had an engine as well as sails, and charts, and even a little experience. But there were still uncertain moments. I blundered hard aground occasionally, and twice I was put wildly off course by currents I had no way of knowing were there. Yet Columbus, who had never seen a coral reef in his life, or one of the Bahamas' strange banks, where you can be out of sight of land in seven or eight feet of water —water studded with coral heads ready to rip the bottom out of your boat—never had an incident worth recording.

SAILING SOUTH TO CUBA—surely *this* was part of the Grand Khan's domain—Columbus wishfully misunderstood the Indians' attempts to tell him where their gold came from and sent a mission far inland to "a most noble port, called Zaiton." Here, he was sure, dwelt the Emperor of China. The envoys returned with reports of nothing more than a few palm-thatched houses and a few hundred Indians. But they had seen one wondrous thing: people breathing acrid smoke through tight rolls of leaves. It was Europe's first meeting with tobacco.

Disappointed at Cuba's lack of gold and "spicery," Columbus turned eastward with *Santa María* and *Niña* (*Pinta* went off scouting for gold in the southernmost Bahamas) and sailed across the Windward Passage. The mountainous landscape that rose before him reminded him of Spain in May. When his men caught fish "like those of Castile," Columbus could not resist naming it La Isla Española—The Spanish Island. Divided now between Haiti and the Dominican Republic, it remains so to this day: Hispaniola.

He was also disappointed that he saw no elephants. Aristotle had theorized that animal

life would be similar along the same parallel anywhere on earth. This Spanish Isle, the Admiral figured, lay directly across the Ocean Sea from Guinea, to which he had voyaged years before. He may have clung to the idea that elephants were there, unseen in the forests, because he named a point on Haiti's northern coast Elephant Cape.

At Acul Bay the shore was crowded with Indians eager to see the strangers and their winged ships. "Those that gave pieces of gold," wrote Columbus, "gave them just as freely as those who offered a calabash of water." From now on there would be little sleep for anyone as islanders flocked overland and by canoe to see these great wonders.

It was now December 23. The voyagers would probably have been content to spend Christmas comfortably at anchor had an Indian from the village of a chief named Guacanagari not arrived with exciting news. The gold, he reported, came from a place called Cibao, which is still a name for central Hispaniola. Columbus jumped to an obvious —and fatefully wrong—conclusion: Cibao was the Indians' way of saying Cipangu.

AT LAST! Before dawn on Christmas Eve, while the night breeze still blows from the land, Columbus hoists his sails. He will spend Christmas with the King of Japan, whose palace is "paved with golden plates . . . a good two fingers thick."

But all that day contrary winds hold them up. An hour before midnight *Santa María* still lies only a few miles beyond the next cape. *Niña* is leading the way. Columbus, dead weary, stumbles aft to his cabin. Exhausted sailors curl up wherever they can; only a boy is left awake to mind the tiller. What is there to worry about? The water is as calm as if it were in a cup.

Just at midnight, so softly that among *Santa María's* 40 crewmen only the boy at the helm feels it, Columbus's flagship slips onto a coral reef. Columbus has let himself fall into the trap that every seaman dreads: *Santa María* lies hard aground on a falling tide. The night wind is again coming from the land, and each gentle swell carries her farther onto the coral, until her seams open and she fills with water.

COLUMBUS must have spent an agonized Christmas blaming himself, blaming others, finding all sorts of excuses. The Indian chief, Guacanagari, "showed great sorrow . . . and quickly sent to the ship all his people with many large canoes" to help salvage everything that could be useful.

By the next day, however, the Admiral had forgotten his grief. "God had brought this to pass so that he would erect houses here and leave Christians among them." Columbus decided to build a fort, using the frames and planking of *Santa María*. He would call it La Villa de Navidad—the Village of the Nativity —because God's will had become manifest on Christmas Day.

The Admiral selected carefully for this first Spanish foothold in the New World: 39 men and, says Ferdinand, "much goods and provisions, arms and artillery, together with the launch of the ship, and joiners and caulkers and all the rest that is necessary to make a settlement in comfort; that is, a doctor, a tailor, a gunner, and the like." On January fourth Columbus guided *Niña* through the reefs and out to sea, confident that he would return from Spain to find La Navidad bulging with gold.

Sailing eastward, Columbus "saw three sirens that rose high out of the sea, but were not as beautiful as they are represented." His "mermaids" were manatees.

Here too, in what is now the Dominican Republic, occurred the first skirmish between Spaniards and Indians. The Admiral ordered a small boat lowered so his sailors could trade for a batch of sweet potatoes. Lurking in the trees as the men reached shore were about fifty particularly fierce-looking warriors.

When the Indians moved toward their weapons—bows and arrows, and clubs made of palmwood—the outnumbered crewmen summoned that peculiarly Spanish audacity that would make possible, over the next century, the conquest of two great continents by a handful of Europeans. "Though they were no more than seven, they attacked the Indians with such spirit that . . . the Indians turned and fled, leaving the greater part of their bows and arrows." Columbus named the place Gulf of the Arrows.

The Admiral declared himself pleased by the affair. When the rest of the islanders hear of it, he mused, they'll think twice about troubling the garrison at Navidad. It was a comforting thought as he turned his two sea-weary ships—*Pinta* had by now rejoined him—"East and a quarter Northeast" for the long, uncertain voyage back to Spain.

THE TRIP HOME was not the picnic the outward voyage had been, though at first the two little caravels flew before fair winds. "The air," noted the Admiral, "very soft and sweet." But day by day the winds rose. *Niña*, lacking sufficient ballast, threatened to capsize. Columbus ordered every empty cask in her hold filled with seawater to keep her steady. On Thursday, February 14—more than a month now since Columbus had left Navidad—*Niña* and *Pinta* lost contact. At dawn, with a storm raging, each thought the other had perished.

Many were the vows made aboard *Niña*, as the seas mounted, if only the Blessed Virgin

THEVET; "SINGULARITEZ," 1558; THE BRITISH LIBRARY

By Columbus's own reckoning, he was in the area of Cathay. *Santa María*'s surgeon examined some roots, and declared they were Chinese rhubarb. Surely, then, this was China. It was actually Cuba.

Here the Spaniards saw Indians who lit one end of a rolled leaf and inhaled the smoke through a nostril (**above**). Tobacco. In little more than a hundred years Western Europe was puffing away.

Near Santiago, in today's Dominican Republic, tobacco leaves mature in the sun (**upper right**), and at a roadside stall a pottery "Indian" (**right**) smokes a pipe—a device unknown to the aborigines.

would see them safely back to Spain. The men drew lots to select one who would promise to make a pilgrimage of thanksgiving to the shrine of Santa Maria de Guadalupe. Columbus drew the pea marked with a cross. Finally all hands, except for a few terrified and unbaptized Indian captives, vowed to walk barefoot to the first shrine of the Virgin they might reach.

On the next day the seas dropped briefly, and a crewman glimpsed land. Columbus guessed they had fetched one of the Azores, still nearly 900 miles from home.

Not knowing for sure where he was, he could only claw away from those deadly rocks and stay clear until matters improved. It was Monday morning before the ship could approach land and get an anchor down. The islanders confirmed the Admiral's judgment. *Niña* had raised Santa Maria, southernmost of the Azores. (See **The Political World,** one side of the double supplement map included with this issue.)

Ashore the mariners found a village's small shrine—hardly what they had planned on when they made their vow. But a promise is a promise. Columbus prudently allowed only half the ship's company ashore at a time to attend Mass. The Portuguese captain of the island, suspicious of the Spanish "smugglers," promptly clapped the shivering mariners into jail.

By the time Columbus got under way again, days had been wasted in rescuing his men from the officious Portuguese, and two or three anchors had been lost to suddenly shifting winds. The delay would put poor *Niña* squarely in the path of another even more terrifying storm. And, to add to his worries, *Pinta* was still missing.

Barely afloat, *Niña* limped to an anchorage off Lisbon on March 4, 1493, after surviving "so terrible a storm that they thought they were lost because of the seas which came at them from two directions, and the winds that seemed about to raise the caravel into the air" (pages 584-5). Miraculously, the battered little ship came in on one remaining sail; all the others had been ripped to shreds.

Columbus's weariness must have been quickly dissipated, though, by the welcome of the Portuguese when they learned that he had been to the Indies. "The people that went to the caravel were so many that you could not even see the sea, so full was it of the launches and skiffs of the Portuguese."

On March 13, with a new suit of sails, Columbus weighed anchor for Spain. Two days later *Niña* lay snugly at anchor off Palos, in the Rio Tinto, whence his little fleet and its anxious crews had set sail more than half a year before. And—another miracle! —behind her by only a few hours came *Pinta*, riding the same rising tide. She had missed the Azores, as she had also probably missed the second terrible storm.

MOST OF THE SAILORS had been recruited in Palos and the neighboring towns. Everyone in the region must have flocked to the river to see the Indians, to welcome sons and husbands home, and to nod enviously when they learned that some of the men had stayed in the Indies. They would be amassing gold enough to make their families wealthy for life!

Columbus had sent a letter to Ferdinand and Isabella from Lisbon, but there was no guarantee that it had been forwarded; the Portuguese monarchs weren't, after all, too happy that the Spanish had beaten them to the great prize. So from Palos he dispatched another. Three weeks later, in Seville, he had a reply from Barcelona, 500 miles away. Columbus had only to read the salutation to feel a surge of joy.

"Don Cristóbal Colón," it began, "our Admiral of the Ocean Sea and Viceroy and Governor of the islands discovered in the Indies." And, as if that were not enough, "do not delay in your going back."

So there it was! Resounding titles already his, and another voyage in the bag. Elated, Columbus set out for Barcelona.

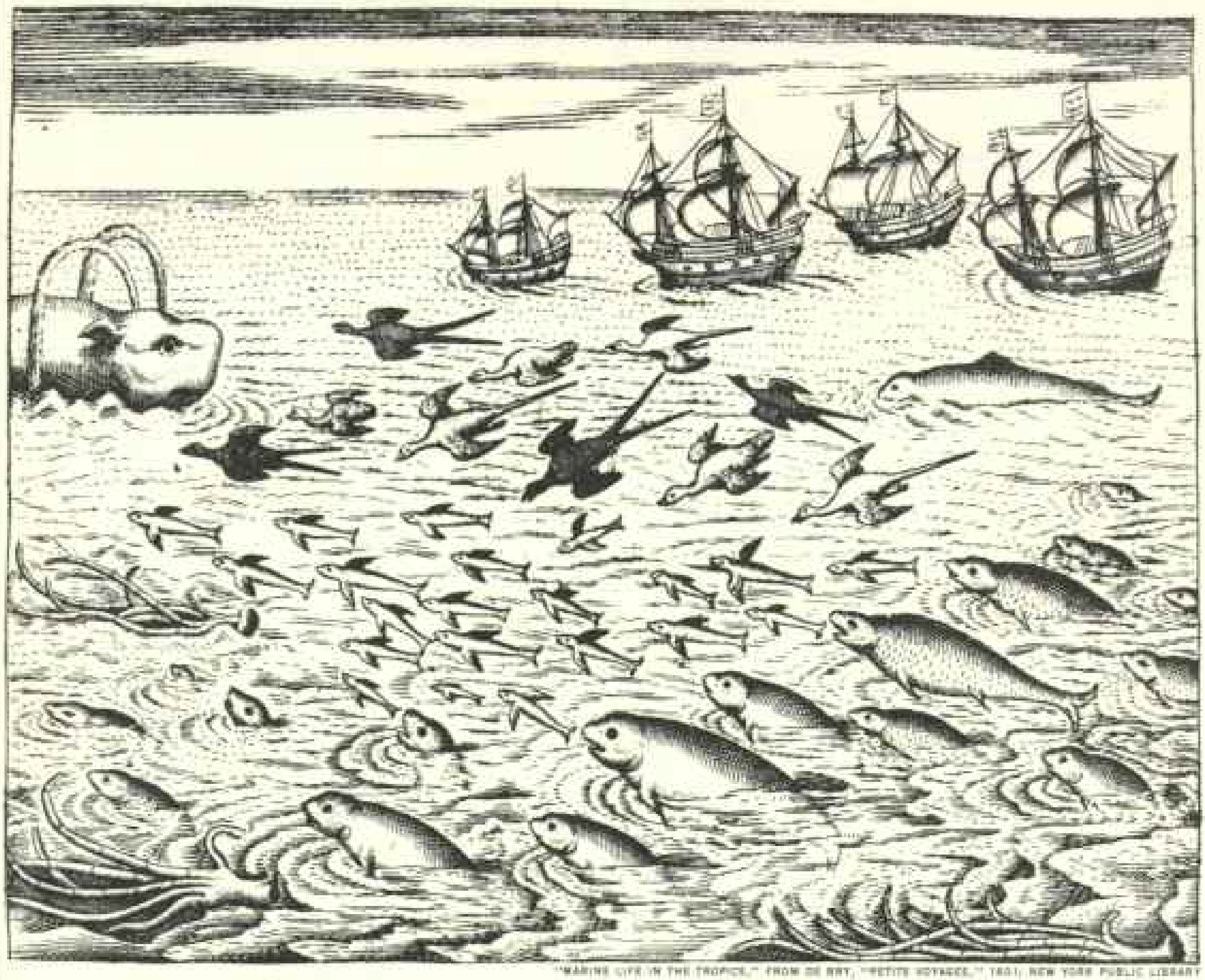
What a procession that must have been! The Admiral, now wearing clothing suitable to his station, rode ahead, followed by one of his officers, a retinue of servants, and six of the Indians. All the way across Spain countryfolk and townsmen alike flocked to see the great man, and to gape at his heathen captives, at the parrots in cages, the golden masks, "and many other things never before seen in Spain nor heard of." * * *

Second Voyage: TRIUMPH, THEN TRAGEDY

FERDINAND AND ISABELLA probably received the Admiral and his Indians in the Tinell, the great audience hall that now echoes emptily to the footsteps of tourists, and "when he went to kiss their hands, they rose to meet him, as for a great lord, and . . . made him sit down at once." That same day they made plans for a second voyage.

Triumphant now (never again would there be a time like this), Columbus made his way back across Spain. The route took him to Madrid, then to the Monastery of Guadalupe to fulfill the vow he had made during the storm off Santa Maria.

In little-changed Guadalupe, worshipers still look up at the miracle-working image, reputed to have been fashioned by Saint Luke himself, before which Columbus prayed. Walking the town's medieval streets at dusk,



"MARINE LIFE IN THE TROPICS," FROM DE BRY, "PETITS VOYAGES," 1601; NEW YORK PUBLIC LIBRARY

Imaginations ran rampant after Columbus and other early explorers returned from distant seas. A whale with ears has two spouts. Scissor-tailed frigate birds, tropic birds, and flying fish convoy a school of porpoises and seals.

Columbus returned to Spain from his first voyage in absolute triumph, greeted with titles and promises. The stubborn son of an Italian weaver had reached the Indies by sailing west; here were gold and "Indians" to prove it. He had confounded his critics, but he made the mistake of too often reminding them of it. Three more voyages lay ahead, but his fame was already at flood tide. Beyond lay humiliation and defeat.

I found myself almost persuaded that time here has in fact stood still. Those farmers returning late from their fields—weren't they really Columbus and his companions astride their mounts? And the women clustered at the well, eyeing a little knot of men as they

chattered. Were they the Indians Columbus brought to this holy place to be baptized?

From Guadalupe the procession may have wound through remote Medellin, where the eight-year-old son of a family boasting "little wealth but much honor" would surely have come running to see the great man pass. Could this sight have kindled in young Hernán Cortés the hard flame that would one day lead him to topple the Aztec Empire?

Then on to Córdoba, to bid farewell to his mistress, Beatriz Enriquez de Harana. Poor Beatriz! She was so often in Columbus's thoughts. On his deathbed he would charge his legitimate son, Diego, with seeing that the "mother of Don Fernando my son, is given enough to live comfortably . . . because it weighs heavily on my soul." But how could the Admiral of the Ocean Sea, Viceroy and Governor of the Indies, whose first wife had been a noble lady of Portugal, wed the daughter of a peasant? He managed to forget that his own parents were a weaver and the daughter of a weaver.

The grand fleet—17 ships, once again including *Niña*—assembled at Cádiz, a busy port that still contrives to give the feel of bygone days. Cavelike ship-chandlers' shops breathe out the beguiling scent of tarred rope. Inside lie tall black anchors and brass lanterns and piles of earthenware jars whose pattern can have changed little since 1493.

How the village bumpkins recruited for Columbus's crews must have gaped at this rollicking scene! Sidewalk restaurants teemed with sailors spouting a dozen languages. Perhaps then, as now, there were two price scales, modest enough if you ate your fried squid or crisply broiled sardines standing at a counter; more if you insisted on a chair and table. Musicians would have wandered about then, too, plucking out tunes to earn a meal. And the girls—so much friendlier than the ones the sailors had left at home!

IN THE COURSE of a smooth three-week voyage from the Canary Islands, Columbus pioneered a route still used by modern yachtsmen. His Indian guides had told him of the magnificent islands that lay in a ragged arc southward from Hispaniola. And, superb seaman that he was, he intuitively slipped southward to a region where, says an early English translation of the first comprehensive history of the New World, "the Northenorthe-east wynde was . . . full with them, and . . . fresshely folowed the sterne of theyr shyppes." (See the insets showing winds and currents on **The Physical World,** a supplement to this issue.)

At dawn on Sunday, November 3, 1493, a lookout on "Naughty Mary"—the flagship *Marigalante*—sighted land, high and richly cloaked with forest (pages 588-89). It still bears the name Columbus gave it, Dominica, for the day of its discovery.

It was as well that the Admiral elected not to land. Dominica was peopled by Caribs, slave-raiding warriors his terrified Hispaniolan guides had warned him about on the first voyage. Our word "cannibal" stems from their name. And alone in the Caribbean, Dominica still *(Continued on page 609)*

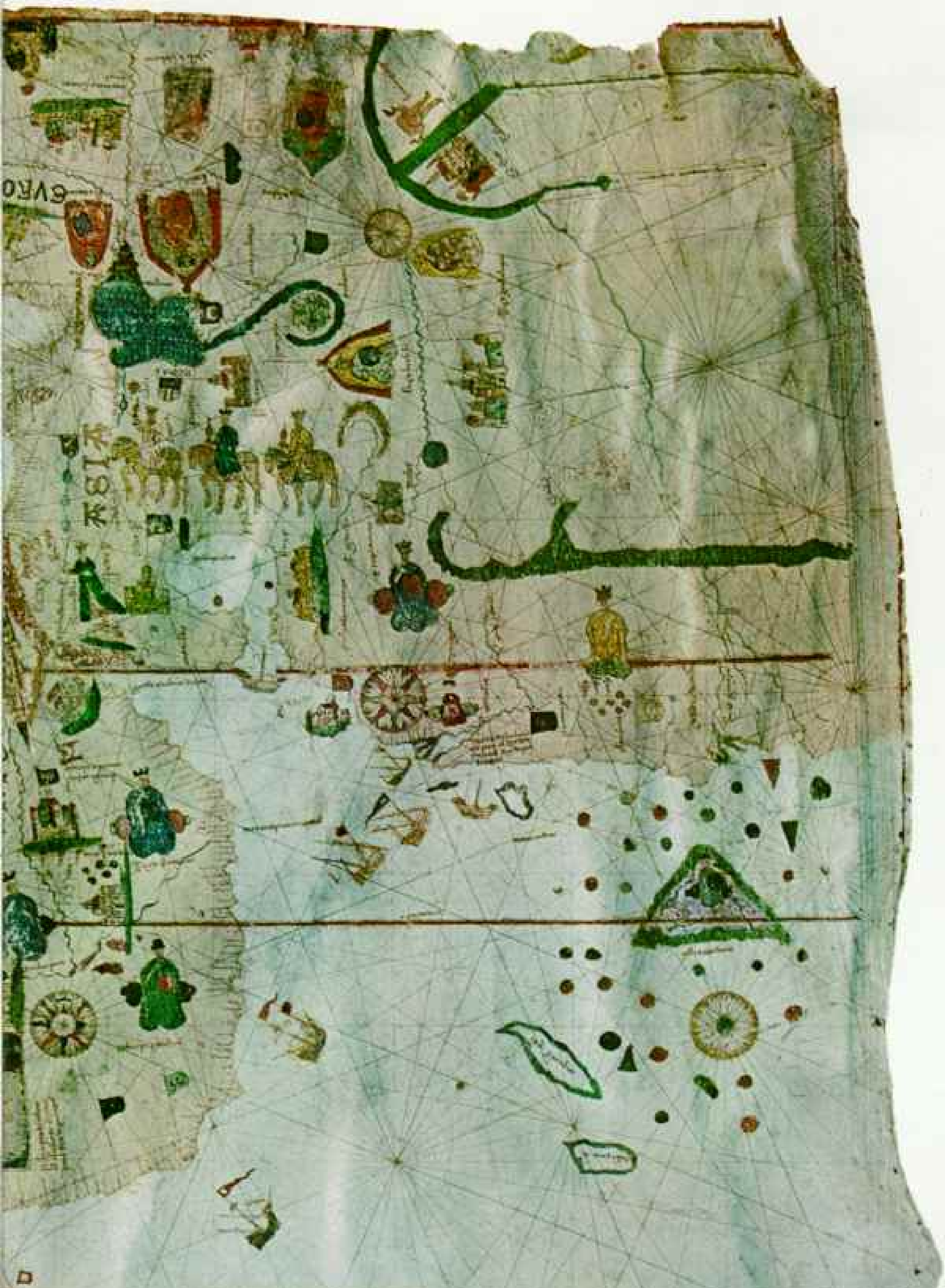
Goaded to revenge, Indians destroy La Navidad, first Spanish settlement in the New World. The men Columbus left on Hispaniola's north coast had quickly turned to pillage, kidnapping women and extorting gold. Identification of the fort's site still eludes archeologists. LOUIS S. GLANZMAN

The world Columbus knew

THIS FIRST MAP to show the American mainland bears the date 1500, but may have been completed as much as four years later. It was drawn by Juan de la Cosa, a shipmate of Columbus on the second voyage. As green as life, and with St. Christopher —Columbus's patron saint—as a centerpiece, the New World, left, beckons to Europe and Asia. They appear pale and cluttered with tradition; the Three Kings ride out of Asia en route to Bethlehem. Five English flags fly off the North American coast, indicating that de la Cosa may have had access to the chart of John Cabot, who voyaged there in 1497.

Mounted on an oxhide some 3 by 6 feet, the parchment chart was found in a Paris shop in 1832. Later put up for sale, it brought a bid of only a few hundred dollars. The Queen of Spain raised that —one account says by only $8—and got the map, now a treasure beyond price.

De la Cosa's map portrays the world as the geographers of Columbus's time perceived it. For views of the earth as we know it 475 years later, see the double-sided map, **The Physical World** and **The Political World**, a supplement to this issue. NAVAL MUSEUM, MADRID



OPPOSITE PAGE FOLDS OUT

(Continued from page 602) numbers Caribs among its inhabitants.

Appropriately, it was a Sunday when I visited the island's isolated Salibia Indian Reservation. Morning Mass had ended in the tiny church, where the altar is built in the form of a traditional dugout canoe. Now perhaps a quarter of Salibia's 900 or so inhabitants were gathered around a playing field to watch two of the tribe's seven cricket teams vie for the league championship. There was no mistaking that these were Indians: high cheekbones, coppery skins, straight black hair. The players wore crisp white uniforms and proper leg guards, and there was restrained applause for every scoring play. It was all very civilized and polite—far from the Carib behavior Columbus encountered.

And he found it soon enough.

Stopping at Guadeloupe (the monks had asked that an island be named for their holy shrine), Columbus's men came on ample evidence of the Carib's beastly habits, though the cannibals themselves had fled. In the abandoned houses were roasts and stews of human flesh, and pitiful Arawak captives, the boys castrated and fattened for the pot, the girls kept to produce more boys, which the Caribs particularly savored.

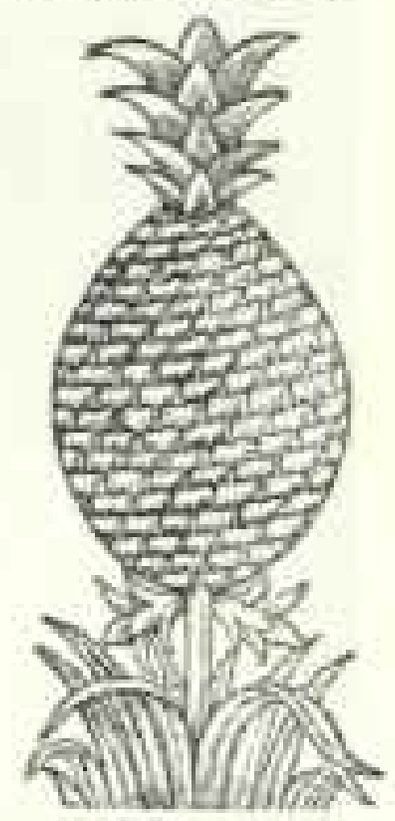
LA GRANDE ANSE, where the fleet anchored, must have presented a brave sight. The Admiral's 17 vessels lay beyond a reef where the surf still bursts creamily across the entrance, while small boats loaded with Europeans eager for their first contact with this strange new world shuttled to and fro. The beauty of the land must have overwhelmed these men from the dry hills of southern Spain.

I went to La Grande Anse to see the waterfall that Columbus and his men had marveled at (**facing page**)—a gossamer double strand that seems to drop directly out of a volcano's cap of clouds. As the fleet had approached, the men, as sailors do, laid wagers on what it might be. A thread of snow? You're mad, man! Fifty maravedis it's a road.

"It was the most beautiful thing in the world," recorded Dr. Chanca, the fleet surgeon, when Columbus's flagship had come closer, "to see from what a height it fell and from how small a place should fall so great a body of water."

Instead of having lunch that day in nearby Trois Rivières, I bought a ripe golden pineapple and ate it atop a great wave-polished boulder at La Grande Anse. It seemed an appropriate meal for the place where Europeans first tasted this most delectable of the New World's garden of gifts.

Guadeloupe's very lushness laid the first trap for the voyagers. A band of sailors lost itself in the forest. Columbus sent out four search parties of 50 men each, and nearly lost them too. Days slipped by before everyone could be rounded up.



FROM GUEDO Y VALDÉS, "HISTORIA GENERAL," 1535. LIBRARY OF CONGRESS

Now Columbus quickened his pace toward Hispaniola. Those water casks and oil jars he had left behind at Navidad must be overflowing with gold.

At an island the natives called Ayay (Columbus christened it Santa Cruz—today's St. Croix) occurred another fight with the Indians, in which one European and an Indian were mortally wounded. The little National Park Service Museum in Christiansted, St. Croix's charmingly Danish-flavored one-time capital, treasures a six-inch-high clay figure that may record an islander's impression of that fateful meeting. Wearing a strange three-cornered headdress, the statuette is unlike any other Carib artifact I saw. And it was found near Salt River Bay, today's name for the battle site.

"There's no way to prove it," a museum attendant ventured, "but it could be an Indian's impression of a helmeted Spaniard."

From that fight stemmed another incident that foretold much about how the Europeans would treat the natives of their newly discovered world. A swashbuckling gentleman-volunteer named Michele de Cuneo captured a "most beautiful Carib girl" in the melee, and the Admiral presented her to him as a slave.

Once in his cabin with her, she being, as the Spanish chroniclers were fond of saying of the Indians, "naked as their mothers bore

COLLECTION OF DR. WILLIAM H. HODGES, HAITI

"I gave them a thousand nice things," wrote Columbus, and the Indians gave him their gold. Among Columbus's presents were hawkbells, possibly including this one (**above**), found in the area of Navidad. Tied to falcons' legs (**top**), such bells revealed the locations of straying birds.

His greed awakened, Columbus demanded of each adult an annual tribute: enough gold dust to fill four hawkbells. Pay or perish. Many Indians fled, but the Spaniards tracked them down with dogs. Thousands ended their lives with poison. In 1492 an estimated 300,000 aborigines lived on Hispaniola. By 1496 a third of them were dead. Less than a decade later the first black slaves arrived to take over the Indians' oppressive burdens.

them," Cuneo's mind strayed to matters other than military. But the maiden defended herself so successfully with her fingernails that, Cuneo ruefully recorded, "I wished I had never started.

"But to tell you the end of it," he concluded, "I seized a rope and beat her well. She cried out in such a way that you would not believe it. Finally we reached an agreement. . . ."

The Admiral hurried on, spurred by the happy vision of a fort filled with gold. A day's sail short of the harbor where he had left his men, a shore party came upon an ominous portent: two unrecognizable bodies, one with a noose around the neck. Next day they found two more, one heavily bearded.

Arriving off Navidad, the Admiral had lombards fired aboard the ships. No cannon on land sent back answering shots.

"Next day the Admiral went ashore," records Ferdinand, "and felt great sorrow at seeing the fort and the houses in ashes . . . and there was no one of whom to ask questions."

Slowly, as a few Indians fearfully returned, Columbus pieced together the story. Trouble had erupted over those two most explosive issues: women and gold. Kidnapping Indians and extorting the precious metal they were too lazy to find for themselves, roving Spaniards had strayed into the territory of another chief, one Caonabó. Here was no gentle Arawak like Guacanagari. Caonabó put the marauders to death, then descended on Navidad (pages 603–4). The fort and the Spaniards' houses were burned to the ground and the surviving settlers hunted down one by one.

MEDICAL MISSIONARY William H. Hodges has devoted much of his spare time for the past 16 years to a patient, scholarly search for the site of that ill-fated settlement. "La Navidad may have been here," he told me, indicating a spot on the map near Cap Haïtien that now lies more than two miles from saltwater. It was first pointed out as the Château de Colomb—"Columbus's Fort"—in 1797 by the great French historian Moreau de Saint-Méry. Subsequent scholars dismissed it as being too far from the sea.

It would be unfair to summarize Bill's reasoning in a few paragraphs; he will

certainly tell the whole story himself some day. Briefly, though, he has traced changing shorelines and the fickle meanderings of rivers over the nearly 500 years since Columbus landed in what is now northern Haiti to show, to my satisfaction at least, that Moreau's site was on the sea in 1492.

A low mound, only recently cleared of tangled brush, marks the site. New cultivation—the hardscrabble gardens of pitifully poor Haitian farmers—has exposed a curious horseshoe-shaped depression along three of its sides. "We know La Navidad had a stockade, and a moat," Bill told me.

It was hard not to read into the mound a parallel with the sketchy accounts left by Columbus and his fellow explorers. And, unlike other contenders, it lies (as Columbus says La Navidad did) a league and a half—about five miles—from the reef where *Santa María* came to grief. That is one distance the Admiral would surely have known accurately, after the many trips it took to unload and dismantle the flagship and transfer everything to shore.

Over the following weeks Bill acquired many exciting bits of evidence from Haitians living nearby. First, a small boy brought him a crushed but intact hawkbell (left). A few days later another boy appeared with a blanca—a thin coin made of silver heavily alloyed with copper—that had turned up in a nearby field. It bears a crown and the initials "FY"—the monogram of Ferdinand and Isabella. Columbus's journal of the first voyage repeatedly mentions both bells and blancas, which the Indians eagerly accepted in exchange for gold. Since then, half a dozen more of each have turned up.

But even in the face of this seeming bonanza, Bill has resisted the temptation to shout "I've found it!" Other equally promising sites that also lay along that now-vanished shoreline must be looked into. Sooner or later, though, here or somewhere close by, I'm sure this dedicated weekend archeologist will answer what seems to me the most exciting question in colonial American archeology: the exact location of the first significant European foothold in the New World.

The Viking outposts in the far north had been virtually forgotten by 1492. If they were dead ends, however, Navidad was a beginning that pointed inexorably to the conquest of the whole New World. No other settlement I can think of set so much in motion as did that ill-starred little fort on the north coast of Hispaniola.

COLUMBUS IMMEDIATELY decided to replace Navidad, but its loss marked a grim turning point in his career. Henceforth there would be few triumphs; the agonies would be many.

The second attempt to establish a colony failed almost as miserably as the first. Columbus was an explorer and (we might as well face it) an adventurer, eager to be off again in quest of gold and other unknown lands. How he must have chafed at the long delay in finding a new site east of Navidad, in off-loading his by-now grumbling colonists, in planning a city that would last for all time. It would be called Isabela, for the queen.

While some of the men put up houses, "small as the cabins we hunt birds from at home," the Admiral set others to laying out a spacious plaza, to be fronted with a church, a fortress, and other buildings of limestone. He also occupied himself with expeditions to the interior in search of gold mines and then, leaving his brother Diego in charge, with a voyage to the "mainland of the Indies"—the south coast of Cuba.

Columbus returned five months later with no significant amount of gold and only one new land to add to his discoveries, an island the Indians called Jamayca. At Isabela he found his brother Bartholomew (fortunately a better administrator than Diego or the Admiral himself), newly arrived from Spain.

The brothers spent the next year and a half in a hopeless effort to salvage Isabela. The Indians broke into open revolt. Disease swept the ill-chosen, insect-ridden site. Food ran short, as did the "unlimited" gold the settlers had expected. Before leaving for Spain in March of 1496, the Admiral named Bartholomew governor and ordered that the capital of the New World be moved in his absence. The building of Santo Domingo, which still stands as one of the supreme monuments of Spain's colonial adventure, was begun that year or the next.

* * *

Third Voyage: HOME IN DISGRACE

NEARLY TWO YEARS passed in Spain before Columbus could put to sea again. Three ships would proceed directly to Hispaniola with supplies and colonists, some of them recruited from Spanish jails. Three other ships would take a more southerly route, hoping to beat the Portuguese to a huge land that many cosmographers believed lay athwart the Equator.

The ships spent eight agonizing days in the July heat of the doldrums, with "the wine and water barrels . . . bursting their hoops; the bacon and salt meat . . . roasting and rotting." But the men survived, as thousands of other windship sailors have done since then, until "an Eastsoutheaste wynde arose, and gave a prosperous blaste to . . . [the] sayles." Nine days later, and two months since Columbus had cleared Spain, a lookout sighted Trinidad.

Perhaps here, finally, would be representatives of the Grand Khan! Columbus was chagrined to find only more naked Indians. He decided to make the best of it by starting to trade for gold, and had his men display "vessels of polished copper, and other things that shone."

The Indians seemed unimpressed, so the Admiral tried another tack. He ordered a drummer to play, and the ships' boys to dance. This was too much for the poor Indians; they responded with a shower of arrows.

The Admiral could see to the northward a mountainous shoreline—the coast of present-day Venezuela. A few days later, on the Paria Peninsula, a bony finger of land that pokes due east toward Trinidad, Europeans stepped ashore on the American mainland for the first time since the Vikings had discovered it 500 years earlier.

Only chattering monkeys greeted the Spaniards. Columbus's sense of drama was too strong for him to waste a show without a proper audience, so the formal ceremony of taking possession of the "land of Paria" awaited another day and another anchorage, where the explorers found enough Indians on hand to make it worthwhile.

Gradually it would dawn on Columbus that he had discovered more than just another island. "I am of the belief that this is a great continent," he wrote later in his journal, "of which nothing has been known until this day." But he would carry to his death the conviction that this Other World, as he called it, lay somewhere off Southeast Asia.

Had Columbus tarried only a little longer, he would almost surely have discovered the majestic Orinoco; only a huge river could account for the freshness of the Gulf of Paria. But even the dry stores Columbus carried were now on the verge of spoiling; he turned northward straight across the Caribbean to Hispaniola. He made his island landfall on the nose, though it lay 700 miles away and he had for a month and a half been crossing waters and zigzagging along coasts no European before him had ever seen.

When he reached Hispaniola, Columbus found not the rest he desperately needed, but an island seething with discontent. This time it was the settlers themselves; some were in out-and-out rebellion, and all were complaining. Their expectations of riches to be easily gathered from the ground or, better yet, seized from the Indians, had crumbled. There

was little to eat save native fare, cassava bread, sweet potatoes, and corn.

To make matters worse, several hundred malcontents had managed to get back to Spain, where they were spreading every possible tale of Columbus's incompetence—some of them no doubt true, for neither Columbus nor his brothers were great administrators by any man's yardstick.

Ferdinand Columbus recalled how he and his elder brother, then pages at the court in Granada, would be followed through the palace courtyards by a band of hooting tormenters, "crying to Heaven, 'There go the sons of the Admiral of the Mosquitoes . . . who has found lands of vanity and delusion, the grave and ruin of Castilian gentlemen.'"

The king and queen, acting in part because Columbus had asked them to, sent a trusted courtier, Francisco de Bobadilla, to investigate charges that the Columbus brothers were "uniust men, cruel enemies and sheaders of the Spanyshe bludde." Remember, they were Italians, foreigners.

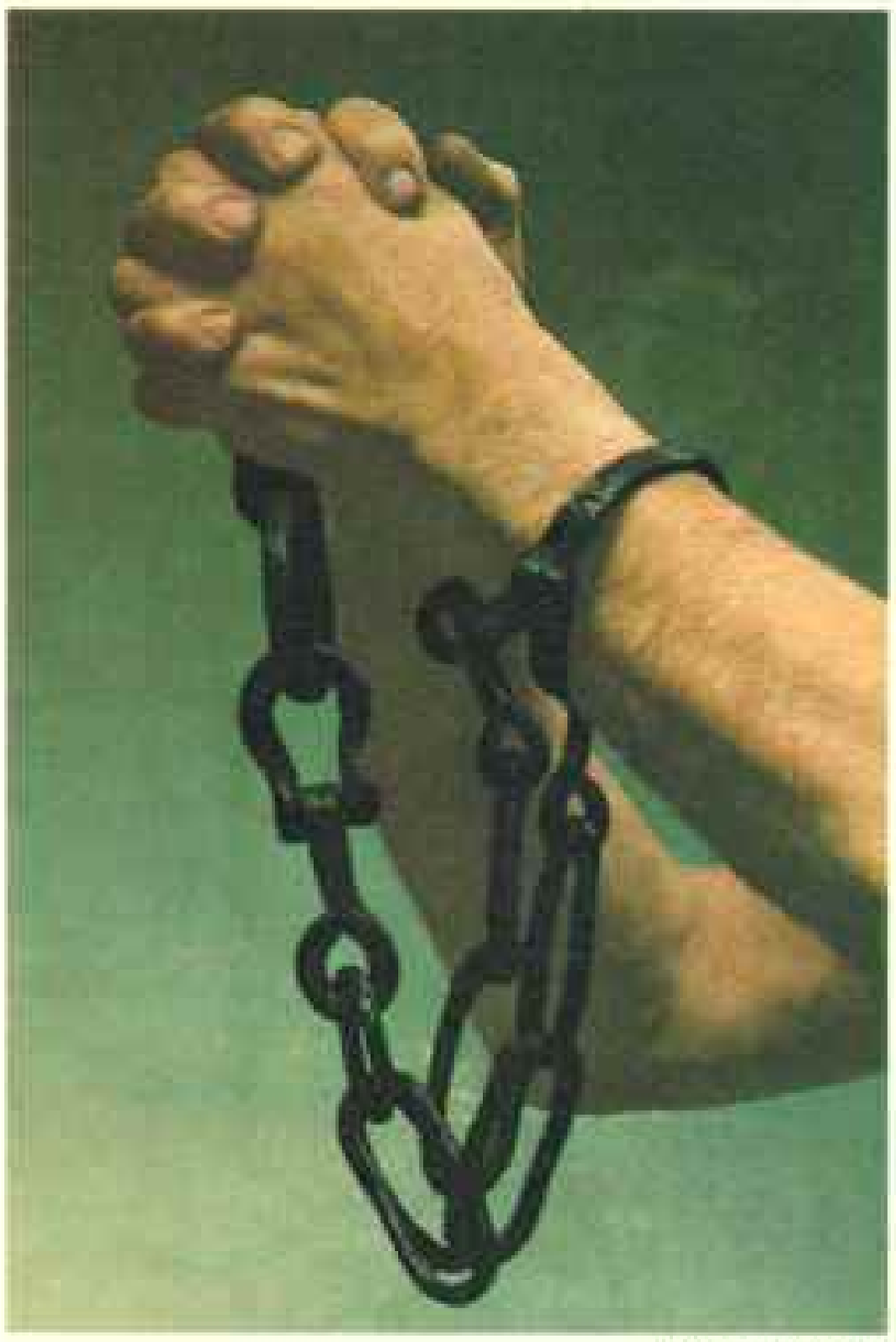
Bobadilla might have acted less hastily had he not reached Santo Domingo just in time to witness a rare but particularly shocking show of toughness on the Admiral's part: the corpses of seven Spanish rebels swinging from a gallows. Five more were scheduled to meet the same end next day. Bobadilla put Diego in chains, and shortly did the same to the Admiral and Bartholomew. All would be sent back to Spain.

On that shameful passage home, the captain offered to have Columbus's bonds removed, but the Admiral refused. "Inasmuch as Their Catholic Majesties had ordered him . . . placed in irons," recorded Ferdinand, he insisted that he remain in irons until the monarchs directed that he be released. Columbus, in fact, so cherished these mementos in later years that he asked that they be buried with him. But there were no chains in either of the caskets alleged to hold his remains. I found them—or at least chains convincingly claimed to be his—hanging in a maritime museum at Pegli, not far from the discoverer's boyhood home in Genoa (right).

Still wearing his manacles, Columbus went to the hospitable monastery of Las Cuevas, across the river from Seville, to lick his wounds and to compose a pathetic letter to the court. What kind of treatment was this for the man who had discovered "more land than all of Africa and Europe, and"—now he was exaggerating shamelessly—"more than seventeen hundred islands . . ."?

Nearly six weeks slipped by before an order came that he be released. With the message came two thousand ducats from Ferdinand and Isabella to alleviate the poverty in which the brothers had been living.

Diego, Bartholomew, and the Admiral were received in the Alhambra of Granada on December 17, 1500. Embarrassed but evasive, the king and queen ordered Columbus's rights and privileges restored. But they said nothing about sending him back as governor of Hispaniola. For six months the Admiral languished at Las Cuevas, wearing the plain brown garb of the friars and writing supplicating letters to the monarchs, to the Pope, to anyone who might put in a good word for him. * * *



NAVAL MUSEUM, PEGLI

Master mariner, minor administrator, the Admiral made many enemies. He was shipped back from his third voyage in chains, perhaps the ones shown here.

Fourth Voyage: RAIN, WORMS, SHIPWRECK

ALREADY FIFTY—an old man by the standards of the day—Columbus would have one more chance. Wearied by his constant pleas and complaints, Ferdinand and Isabella in 1502 got rid of the tiresome old mariner: Let him take four ships and look for that strait he insists he can find, which will let him through to the Indian Ocean. If he can finally get to the *real* Indies, instead of cluttering the map with more useless islands, maybe putting up with him will have been worthwhile after all.

Early in April the fleet slipped its lines from the riverside moorings in Seville. A day or two down the Guadalquivir, he ordered the ships careened where a little beach is still visible below the bluffs. But he might as well have saved himself the trouble; the pitch he smeared on his hulls to protect them from teredos failed completely. In the end, El Alto Viaje—The High Voyage, as Columbus called it—would founder miserably because of worms.

Though the sovereigns had let him keep his now-empty titles of Admiral and Viceroy, he had been replaced as governor of Hispaniola by Don Nicolás de Ovando. Afraid of a face-to-face meeting between Columbus and Ovando, they had forbidden the Admiral to call there on the outbound voyage. But how could they expect Columbus not at least to sail past this island that he had "by the grace of God gained for Spain, sweating blood," and that he loved more than any other?

He hove to within sight of the city he had ordered established there. Already, Santo Domingo had become an impressive assemblage of buildings made of wood and thatch. But Columbus's attention was more on the weather. A hurricane was brewing.

After a lifetime at sea, Columbus must have recognized the traditional "signs": aching joints, fish playing at the surface of the sea, ominous swells, the sky aflame at sunset, a tide higher than normal. And he also knew that Ovando was about to send a fleet of 30 ships back to Spain laden with treasure extorted from the Indians—some of it Columbus's own share of Hispaniola's wealth.

Columbus sent one of his captains ashore to warn of the coming storm. Ovando mockingly read Columbus's message aloud to his retainers. What made this foolish Admiral think he could predict God's weather?

Ovando's ships had been at sea barely two days when the storm burst on them. Columbus, heading in the opposite direction, skillfully managed to save his own little fleet, losing only a ship's boat and some anchors, but 25 of Ovando's vessels went down, most of them with the loss of everyone on board.

Ironically, the only vessel to continue on to Spain carried the Admiral's share of the Indies' gold. It was little wonder, wrote Ferdinand (who, like many of his shipmates, was only a teenager when he sailed with his father on this last voyage), that "those who hated him could . . . say that by magic art he had caused that storm to take revenge . . ."

After the storm abated, currents swept Columbus's fleet westward past Jamaica, and from there northward to Cuba. Finally the wind allowed them to strike southward across the Caribbean and begin their search for a strait.

From late July, when they reached one of

the Bay Islands off Honduras, until year's end of 1502, the four ships struggled along the coast of Central America. In an agonized and probably exaggerated account sent to Ferdinand and Isabella, Columbus told of a storm that went on for 88 days. "I was never without . . . wind, water, and cloudbursts . . . so that the end of the world seemed to have come. . . . the seams of my vessels opened, the sails tore, and I lost anchors, stays, and cables." Of a subsequent storm, the Admiral wrote, "When I thought it was finished, it was only beginning. . . . seas . . . boiled like a cauldron on a great fire. . . . One cannot say that it rained, but rather that a second Deluge had come. The crews were so bruised and beaten that they wished for death."

Added Ferdinand: "and with the heat and the wetness . . . the biscuit became so verminous that, God help me, many awaited the coming of night to eat . . . so as not to see the maggots in it."

One agonizing week of rain and hardship followed another. The search for the nonexistent strait was abandoned. The discovery of the Pacific Ocean, which lay so few miles away across the Isthmus of Panama, would have to wait for Balboa.

But at least Columbus had found more gold. At a great bay in northwestern Panama he encountered Indians who "showed no fear, and . . . gave a mirror weighing 10 ducats for three hawkbells; they said of gold there was very much and that they got it not far from there."

These were the Guaymis, whose descendants still ply long, graceful log canoes—driven now by snorting outboard motors—across Almirante Bay's reef-threaded waters. The gold mirrors they once wore are long gone, as is their innocent nakedness. But even in their poverty the Guaymis remain a handsome and dignified people, living much as their ancestors did. They raise a few bananas, pigs, and chickens, and delight in plunging fully clothed, like so many laughing children, into their beautiful rushing rivers. Here, more than anywhere else I traveled, was the New World as Columbus found it: untouched, a little ominous, suffocatingly lush, with flocks of parrots wheeling and squawking above towering jungle trees.

THE STORMS CONTINUED. Columbus found shelter inside the mouth of Panama's Rio Belén, and decided to put up a trading post. But the Indians' curiosity and willingness to trade soon turned to open hostility. Columbus managed to tow three of his ships out of the river, now almost impassably shallow after a storm, but one, *Gallega*, had to be abandoned.

I flew over the Rio Belén with pilot Jim Tumlin. Somewhere down there in that quiet river-mouth lagoon still lies *Gallega*'s carcass, or at least her ballast stones and perhaps the fastenings that held her together. She could be the easiest to locate of any of Columbus's ships, yet I know of no one who has even tried.

Now it was mid-April of 1503. More than a year had gone by since the ships had departed Seville, and most of that in tropical waters. The crews, constantly at the pumps, grumbled more and more in the belief that Columbus was leading them ever farther from Hispaniola. *Vizcaino* became so riddled by shipworms that she had to be abandoned. The remaining two vessels struggled onward to the present Panama-Colombia border, where the sailors refused to go on. Columbus, suffering from arthritis and malaria, and with the knowledge that his High Voyage too had failed, agreed to turn northward.

Though they used every pot, pump, and cauldron at hand, the sailors were still unable to keep up with the water that poured through the wormholes. At St. Ann's Bay, where Columbus had discovered Jamaica nine years earlier, the dying vessels were run aground at high tide, and palm-thatch shelters were built on their decks. There Columbus spent still another miserable year, beset by mutiny and the threat of Indian attack.

That he was rescued at all is something of a miracle. No Spanish ship was likely to come that way; Columbus had made it clear there was no gold to be had. And Ovando, smarting from the loss of his fleet after Columbus's warning, would hardly be sending a ship, even if he knew where to send it.

In the end a ship's officer, Diego Méndez, traded "a very good brass helmet . . . and a coat, and a shirt of the two I had with me" for a canoe, which he fitted with a sail and keel. With one other Spaniard he set out for

Hispaniola. Captured by Indians, he escaped and returned to St. Ann's. On a second try he reached Santo Domingo, 400 miles away. Not a great small-boat voyage, perhaps, but the act of a brave and loyal friend.

Eleven months after Méndez had left Jamaica, the little caravel he finally succeeded in chartering in Santo Domingo—a rotting hulk with worn-out sails and bottom so foul she could hardly sail—reached Columbus and his hundred or so men and took them back to Hispaniola. There the Admiral, suffering agonies from his arthritis, chartered another vessel and set sail for the final time.

Columbus's last glimpse of Santo Domingo must have been a wrenching one. No longer a collection of rude huts, it was already blossoming with the beginnings of stately limestone buildings that survive to this day. It had become a gateway to the whole New World. Other daring men—Cortés, Balboa, Pizarro, Ponce de León—were already there or soon to arrive, on their way to triumphs for which the Admiral had paved the way.

SO HOME TO SPAIN in a rented ship went the conquered hero. He was well off financially, but that was little consolation for the loss of position he felt was rightfully his. And others were making the discoveries now. The Admiral's old shipmate Vicente Yáñez Pinzón had reached Brazil in 1500. And another Genoese, probably named Giovanni Caboto (we know him today as John Cabot), had stamped England's claim on a second great continent. At least Columbus was spared the knowledge that his countryman Amerigo Vespucci's name—not his own—would be given to the New World, thanks to an early mapmaker's gullibility.

Columbus had only a little time left. Painfully he followed the court as it moved from one city to another, hoping for an audience with the king and the restoration of his privileges. His illness worsened and his sense of failure deepened.

As the end neared, Columbus's two sons, his brother Diego, and two loyal shipmates gathered at his bedside. The court sent no one. On May 20, 1506, "suffering greatly from . . . the sorrow of finding himself fallen from his high estate, [the Admiral] gave up his soul . . ."

Thus, scorned and ignored, died a man who had totally and forever changed the course of human affairs. When he had appeared on the stage—an obscure sea captain promoting a doubtful and expensive adventure—the eyes and minds of Renaissance Europe were turned largely inward. By the time he left it, the electric thrill of his discovery had created ripples of expansion and exploration that would extend outward until they had carried men to the moon.

TEN YEARS PASSED *before Columbus's death merited the smallest published acknowledgement. In 1516 historian Peter Martyr casually noted that the Admiral had "departed out of this life." Those few words, so far as anyone knows, were Columbus's only obituary!*

It remained for Ferdinand to pen a fitting epitaph, the tribute of a proud son to the memory of a great father. I found it in the dim, hushed Biblioteca Colombina, housed in a corner of Seville's magnificent cathedral.

Chiding me for not keeping my voice low, a brown-garbed Franciscan friar led me to a case that holds some of the greatest literary treasures on earth—Christopher Columbus's own books, with marginal notes in the discoverer's hand. With them rests Ferdinand's copy of Seneca's "Medea," opened to a prophecy written 14 centuries before the discoverer's time:

"An age will come after many years," promised the Roman philosopher, "when the Ocean will loose the chains of things, and a huge land lie revealed."

"This prophecy," Ferdinand added in so disciplined a hand that the letters look as if they had been printed, "was fulfilled by my father . . . in the year 1492." * * *

Within a decade of Columbus's death, the lure of New World gold had launched shiploads of adventurers. Cortés, Pizarro, Balboa, and the rest would become known as "conquistadores," whose exploits were fueled by motives both pious and profane. We came here "for the service of God," one reported, ". . . and also to get rich."

INDIAN WARRIORS' MASK AND ORNAMENTS, GOLD MUSEUM, BOGOTÁ

PAINTING BY SEBASTIANO DEL PIOMBO,
METROPOLITAN MUSEUM OF ART, NEW YORK,
GIFT OF J. PIERPONT MORGAN, 1900

He was a well-built man,
ruddy of face, and
"more than middling tall."
His strongest oath was
"by San Fernando!"

WOODCUT BY FOLIAS STIMMER,
LIBRARY OF CONGRESS

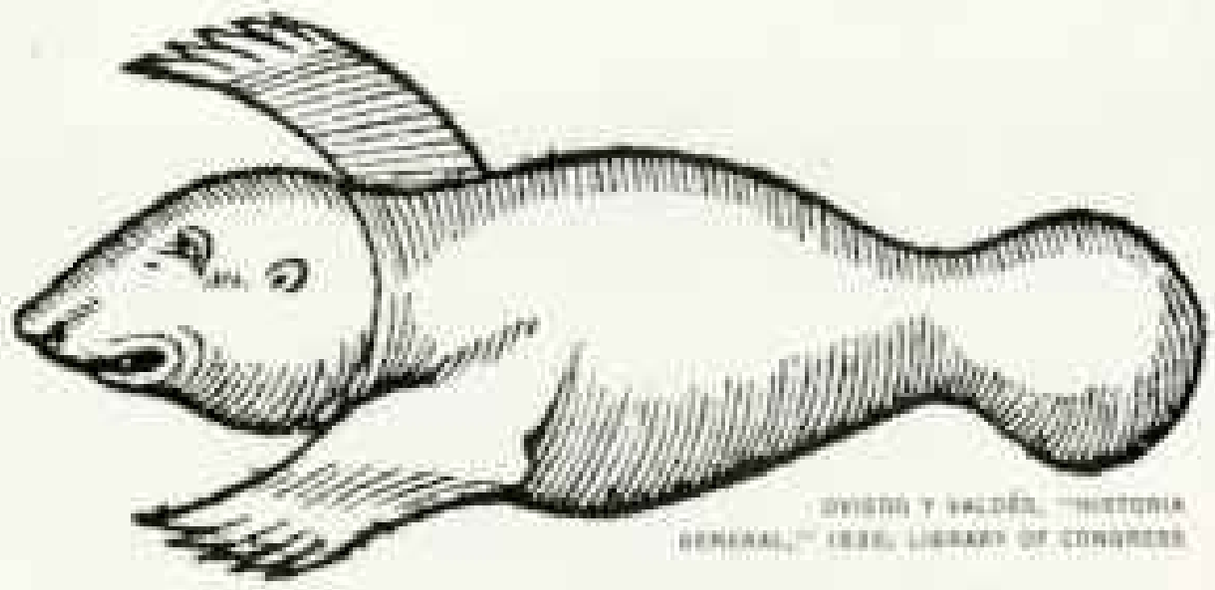
ATTRIBUTED TO GUIDO MAZZONI,
COLLECTION OF RICHARD GARTTENS, WEST GERMANY

ARTIST UNKNOWN,
NAVAL MUSEUM, MADRID

What did Columbus look like? No one knows. No portrait painted during the Admiral's lifetime appears to have survived, but scores of later artists rendered *their* Columbuses. Did he look like a somewhat pompous merchant (**left, upper**), or a man embittered and prematurely aged (**right**)? Could he have had hesitant eyes and a mincing mouth (**left, center**)? Surely he must have been resolute, dignified, self-confident (**left, lower**).

It is argued that a portrait-medal (**above**) was made shortly before Columbus's death. Then the discoverer's voyaging was done, and he was vainly attempting to have his promised emoluments restored. The medal shows a man bent with age, face wrinkled from the rigors of life at sea.

ATTRIBUTED TO RUDOLFO GHIRLANDAIO (RIGHT), NAVAL MUSEUM, PERU

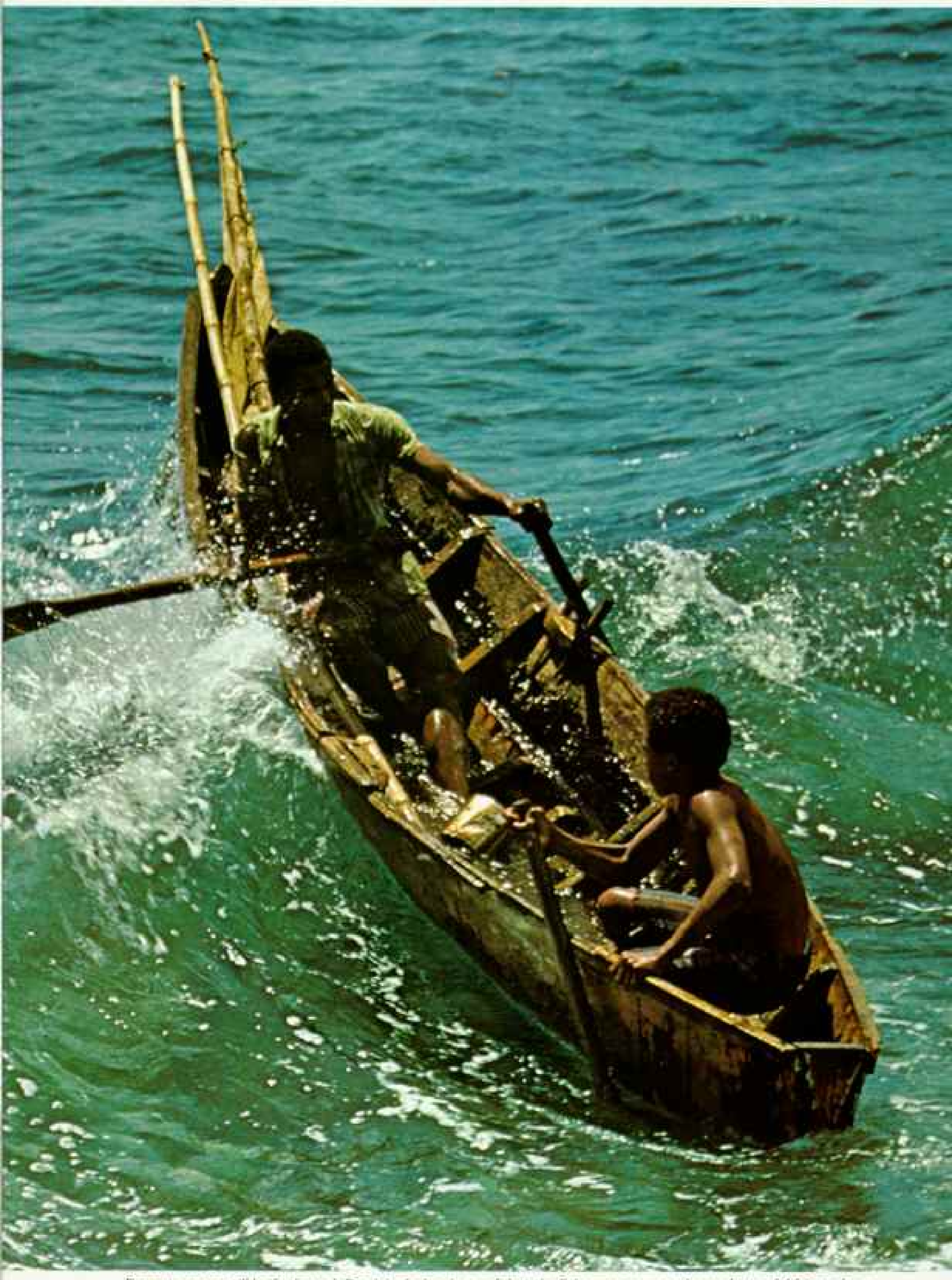


OVIEDO Y VALDÉS, "HISTORIA GENERAL," 1535. LIBRARY OF CONGRESS

Manatees browse isolated lagoons . . .

It is the same, and yet
not the same, in the golden
lands Columbus found

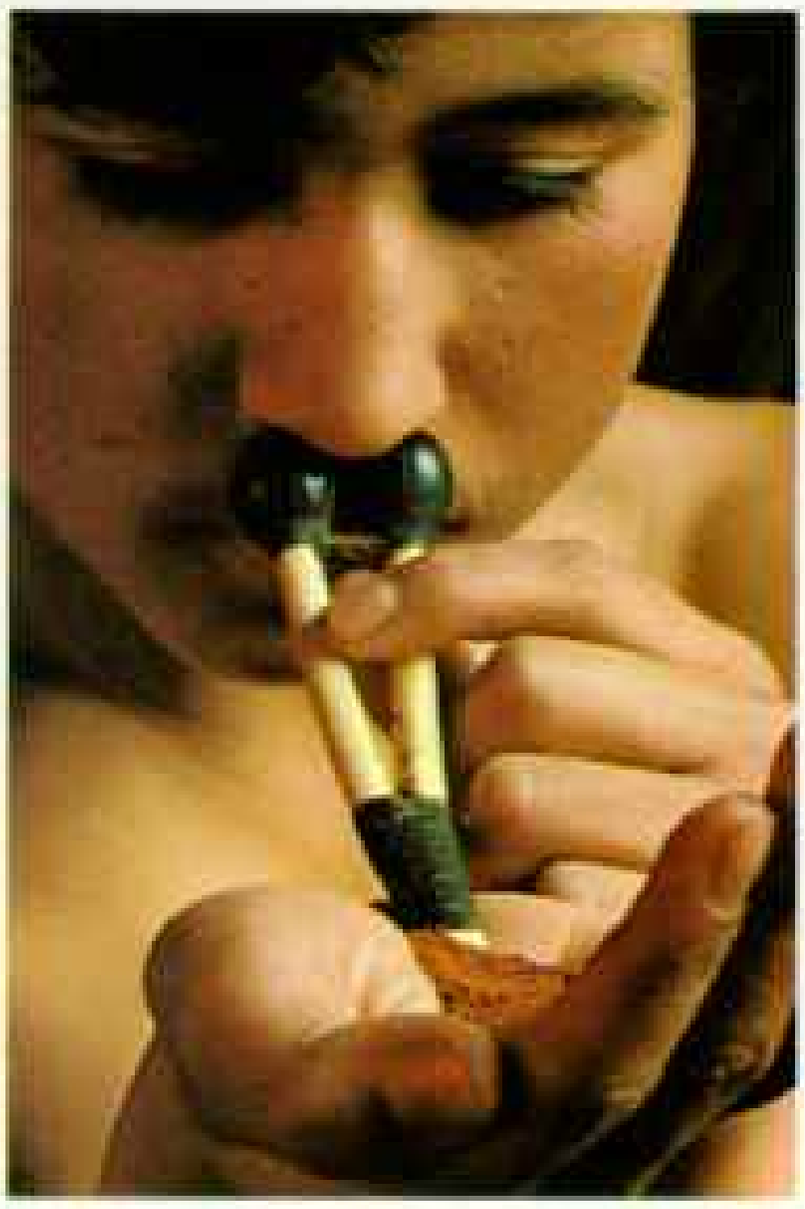
. . . and Guaymi children wear only nature's garb.



Dugout canoes still knife through Dominica's dancing surf, but the fishermen now are descendants of African slaves.

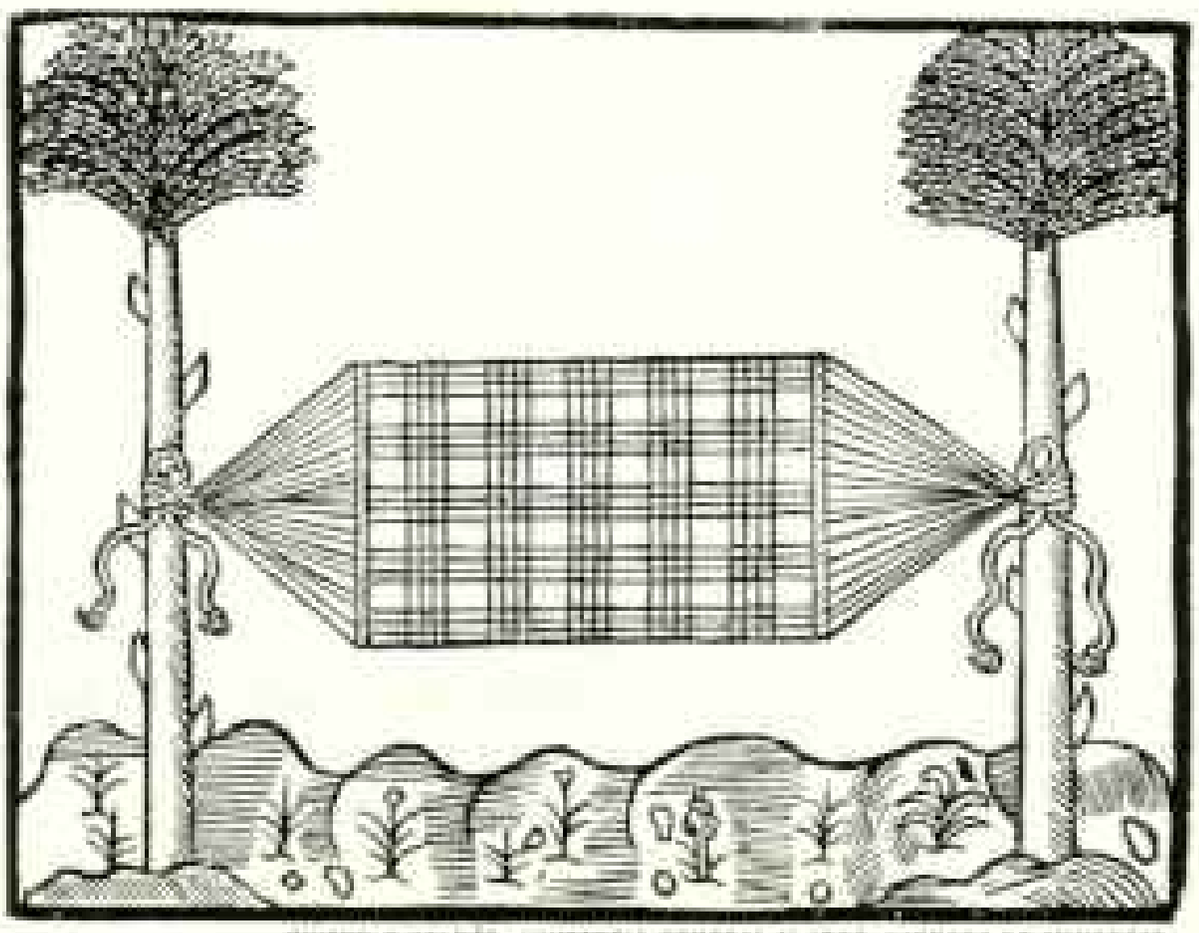
Panama's Caribbean coast remains largely as Columbus saw it when he searched for a strait there that would lead to India. He sailed through Almirante Bay (**left**), where the channels are still as narrow as "streets between one island and another."

The Admiral spent New Year's Day, 1503, anchored near present-day Colón. Ironically, the Pacific lay only 40 miles away, but four centuries would pass before a "strait" would exist there—the Panama Canal.



"With this powder they take leave of their senses, becoming like drunken men." Inhaled through a double-stemmed tube like the one above, the powder was presumably the narcotic *yopo*, still sniffed by the Guahibo Indians of Colombia.

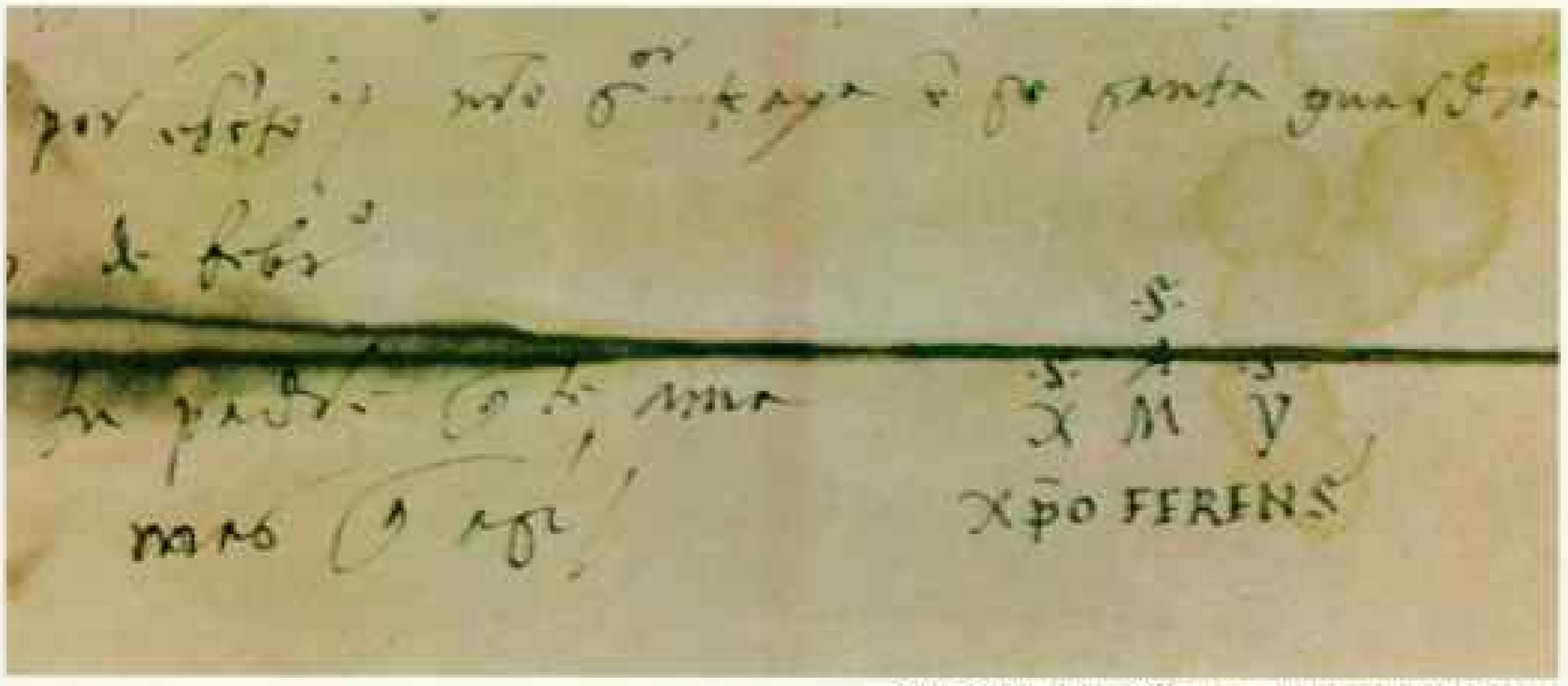
In the San Blas Islands a Cuna woman (**above, right**) wears leg bindings, as did the Caribs. Columbus probably never saw the Cunas, who descend from mainland peoples, but his men observed the *hamaca* (**right**) on many islands. It eventually became a favored bed for sailors around the world.



OVIEDO Y VALDÉS, "HISTORIA GENERAL," 1535, LIBRARY OF CONGRESS

Mist moistens the brow of a Dominican mountain. An Indian with a gold nose ring has his rest (**upper right**). The land endures, but those who lived there were hounded, brutalized, and sold into slavery. Of the Indians Columbus discovered, only a handful remain.

The same man who set this bleak chapter in motion signed his letters below a mysterious symbol (**right**), which has never been explained. Biographer Samuel Eliot Morison interprets it as meaning "Servant am I of the Most High Saviour, Christ Son of Mary." Xpo Ferens is a Greco-Latin rendering of Christopher. In this letter, written to his son Diego in 1505 and delivered by Amerigo Vespucci, Columbus remarks of Vespucci that "Fortune has been adverse to him. . . . His labors have not profited him." But Amerigo's reward—though undeserved—would come. Two years later an obscure cartographer would put "America" on his world map. Fortunately, Columbus did not live to know of that final indignity. □



SKULL: GOLD MUSEUM, BOGOTÁ; LETTER: ARCHIVE OF THE INDIES, SEVILLE

Chinatown, the Gilded Ghetto

ARTICLE AND PHOTOGRAPHS BY
WILLIAM ALBERT ALLARD

IN PORTSMOUTH SQUARE old men play checkers in the sun-dappled shadows. Chinese grandmothers gossip as they tend children who tumble at their feet like puppies. Tranquility blesses this small park on the eastern edge of San Francisco's Chinatown.

For more than a century the city's Chinese enclave was the very symbol of exotic culture in America—all but self-governed, separated by language and folkways from the high-rise world around it, its tong wars and opium dens hidden from the passing tourist behind a pall of incense rising before inscrutable gods. In life-style, cuisine, social structure, it was China in America. The minds, as well as much of the money, of its people were directed homeward, the final ambition being to return to China to end one's days in comfort there.

Today, while Chinatown's facade is still persistently Chinese—its bazaars sparkling

Graduating into the rugged reality of San Francisco's Chinatown, immigrant and American-born children say farewell to the part-time Chinese-language school that has given them a tie to old-country culture. Now they must master other ways, to cope with the special problems of their overcrowded but warmhearted community.

Leaping with the skyline, a kung fu artist demonstrates Chinese self-defense in Portsmouth Square, oldest in San Francisco and center for its 60,000 Chinese-Americans. Above him towers the Transamerica building, a 48-story pyramid on a nine-foot-thick concrete raft designed to help it ride out earthquakes. A few blocks away a cable car (**right**) rumbles to a halt: "Grant and Cal-ee-forny. Chinatown!" the gripman sings out. Another carload of tourists enters a world of neon and silk, jade and ginseng. Old St. Mary's Church, where Mass is said both in Chinese and English, looms from the shadows. In 1853 ships brought its foundation stones from China. Tens of thousands of Chinese came, too, in the 19th century. Today 4,000 a year arrive from Hong Kong and Taiwan.

with silk and porcelain, its pagoda-roofed restaurants and shops filled with hanging fowl and squid—the old culture has eroded. The well-to-do have left, rising on the American ladder of opportunity. The tight security and discipline of the family have loosened, the bonds of an ancient religion weakened.

The old men and women sunning in the park—many of whom speak English poorly at best—have lived the story of an immigrant people in the place they once called Gam Saan, the Golden Mountain. But on Chinatown's streets can also be found others, members of a new wave of immigrants, largely from Hong Kong, who have arrived in large numbers since the laws were relaxed a decade ago. No longer the Golden Mountain, Chinatown is now the gilded ghetto.

A rectangle of 24 blocks, Chinatown hugs the hills of San Francisco next door to the financial district. Some 35,000 people,

a little more than half the city's 60,000 Chinese, crowd into this small enclave, making it second only to sections of New York City as the most densely populated area of the United States.

Gateway to Another World

From Grant Avenue or Powell Street, you can glimpse slivers of San Francisco Bay. On the roofs of the low buildings (few rise above seven stories) rainbows of laundry billow in the breeze. Oriental music spills from a balcony. Mah-jongg tiles click somewhere out of sight. In the narrow alleys men in baker's white coax along carts loaded with noodles and fortune cookies destined for all parts of the United States.

Chinatown is the center of a thriving business in Oriental goods and foods. Millions of dollars' worth of imports—sesame oil from China, litchi nuts from Taiwan, a thousand other exotic items from locales equally exotic—are handled by Chinatown businesses every year.

Behind this veneer of activity lie the usual ghetto aches and pains: inadequate housing, high unemployment, streets haunted by violence. The tuberculosis rate is higher than in the rest of the city. For years its people lived with these and other ills in near-silent suffering.

"The early Chinese in America came at one of the lowest points in China's history," Philip Choy, past president of San Francisco's Chinese Historical Society, told me. "Floods and droughts had caused widespread famine. The country was oppressed by European exploitation and decadent Manchu rule. A series of rebellions left large areas in devastation. When news of the California gold discovery in 1848 reached Canton, it started the exodus of Chinese to America."

Many went to the goldfields. Some 10,000

blasted the Central Pacific rail line through the High Sierra, living in fear of snowslides that could bury entire camps. Others found work in the salmon canneries along the Northwest coast, in shoe and cigar factories, and building levees and tending farms and orchards in California's Central Valley.

As the port of debarkation for Chinese immigrants, San Francisco saw its Chinese quarter grow rapidly. By the mid-1850's the area had 33 general stores and 5 butcher shops.

Yet very soon California was turning its back on the Chinese. Economic depression brought increasing resentment of Chinese by whites who had come west looking for work. In 1872 the state took away the right of Chinese to buy land. Ten years later the U. S. Government passed the Chinese Exclusion Act, suspending immigration of laborers. Finally, those already here were forbidden to bring in foreign-born wives.

America seemed to fear a yellow peril. Chinatown found itself surrounded with invisible walls, built to keep its inhabitants in and newcomers out. But many got through.

One Step Away From Citizenship

Richard Chung, 71, came to America 54 years ago. For much of that time he lived here illegally. Richard has a happy face. His smile comes on like an explosion.

"When I 16, I work on British ship that sails to San Francisco," he told me. "I jump ship with 40 other men. That was when Chinese not allowed to immigrate to America. I keep moving, working as janitor and on farms, and up in Alaska in salmon-canning factories. But all the time, I can't walk the

Graffiti of quiet revolution shout from an elevator inside a Chinese-American housing project. While no cohesive "yellow-power" movement has crystallized in Chinatown, poverty, high unemployment, and discrimination spawn rage. No English—no job, an axiom runs, but schools fall short in providing bilingual education. A life-style new to Chinatown haunts Jackson Street, typified by a youthful motorcyclist (**right**).

Gang wars flare among a few hundred young Chinese immigrants, drawn into Chinatown's web of gambling. They quarrel over jobs and money handed out by an older underworld establishment —and themselves bear the brunt of the bloodshed. Since 1973, more than 35 have died.

streets, I can't go anywhere. I much afraid.

"When I 19, I work in restaurant owned by Chinese lady. She tell me go to school. So I enroll and go to school four years."

For several decades, Richard saved his money to make a trip back to China. But as an illegal alien, he lacked the papers that would allow him to leave the U. S. and return. So he bought *kah-gee,* false papers.

When the San Francisco earthquake and fire in 1906 destroyed public records, a new kind of American was created: the "paper citizen," who claimed to have been born in San Francisco and appeared in court with documents to support the claim.

"I pay four hundred dollars for papers," Richard said, "made by a friend with an old typewriter and old paper. But when it comes time to apply for passport, I still afraid."

It took a war to make Richard a citizen. In the mid-1940's, as a gesture to an ally, the U. S. repealed Chinese exclusion legislation and permitted those who were already here legally to apply for citizenship.

"I take all my money out of bank," Richard recalled, "war bonds, everything, because I know they send me home. But they don't! They let me stay because I tell the truth. Lucky I go to school!"

How different things are today—when the Chinese in San Francisco have taken a strong position against busing school children to achieve racial balance in the classroom. One chief reason: The long ride would take from the children the time they spend learning the Chinese language. Like other minorities, many Chinese believe the best way to reap America's promise of opportunity is to remain

distinctly and proudly ethnic, even though with an American accent.

In 1965 all reference to race was eliminated in determining immigration status. Each nation outside the Western Hemisphere got a quota of 20,000 immigrants annually. America's door was open again to Chinese.

But for many of the 4,000 or so immigrants who now arrive annually in San Francisco, the going can be rough. Jobs are few and pay little. Newcomers with limited knowledge of English cannot qualify for work elsewhere in the city. A college graduate from Hong Kong who can't speak much English will probably start life here as a dishwasher.

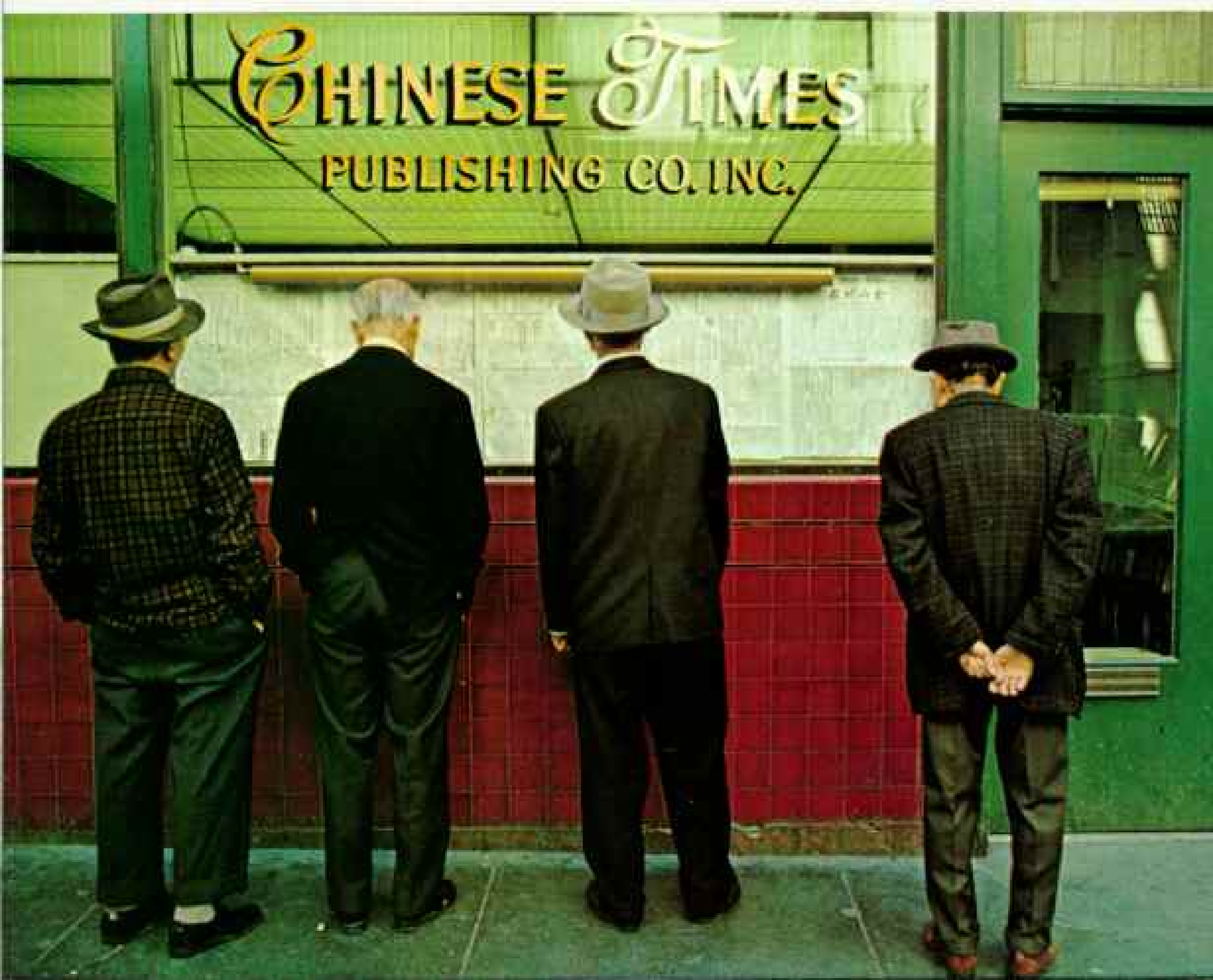
On a beautiful San Francisco evening, I called on the family of Jack Leong, who had just moved with his wife and six children into a four-bedroom apartment in a barracks-like housing project, Ping Yuen, on Pacific Avenue. In 1969 the Leongs came to Chinatown from Hong Kong, where all the children except the baby had been born. Jack Leong was unemployed. I brought a bag of oranges for the children. If I offered to give them anything else, the parents might be offended.

They were just finishing dinner in the sparsely furnished but clean apartment, and I joined them at the kitchen table for a cup of tea. Jack and his wife, Yuet, did not speak English, so Mary, the oldest of five children, spoke for the family. The others were shy, silent, watchful. I asked Mary why they had come to Chinatown, where life seemed so filled with obstacles.

"It's really better here than in Hong Kong," she said. "It's so crowded there, and jobs are even harder to find than in Chinatown. My parents are like most Chinese; they want their children to get a good education.

"It is hard to find a good place to live here," she continued. "We waited four years for this apartment. It's the largest kind they have in the housing projects, and they are much in demand. But before we moved here, we had only one room, so it's much nicer now."

As Mary spoke, the other children hovered near me, not quite sure how close they dared come. Nine-year-old May, a child of absolute beauty, was at my side and for just a moment



her fingers grazed mine, then pulled back.

Mary said her father had been a cook in one of Chinatown's restaurants, where he made about $500 a month, working ten hours a day, six days a week. But a leg injury now had him looking for a job that would not require him to stand for such long periods.

"Needed to Run Sewing Machines"

Mrs. Leong sewed at home for a garment maker. Before the baby came, she sewed wedding dresses for 30 cents an hour. Her face brightened when Mary talked about the "so many nice people" who had helped them.

"And my English is getting better because my schoolteachers and the other children all helped me to learn." She repeated this to her parents in Chinese. Her mother responded with the old gesture of thumbs up.

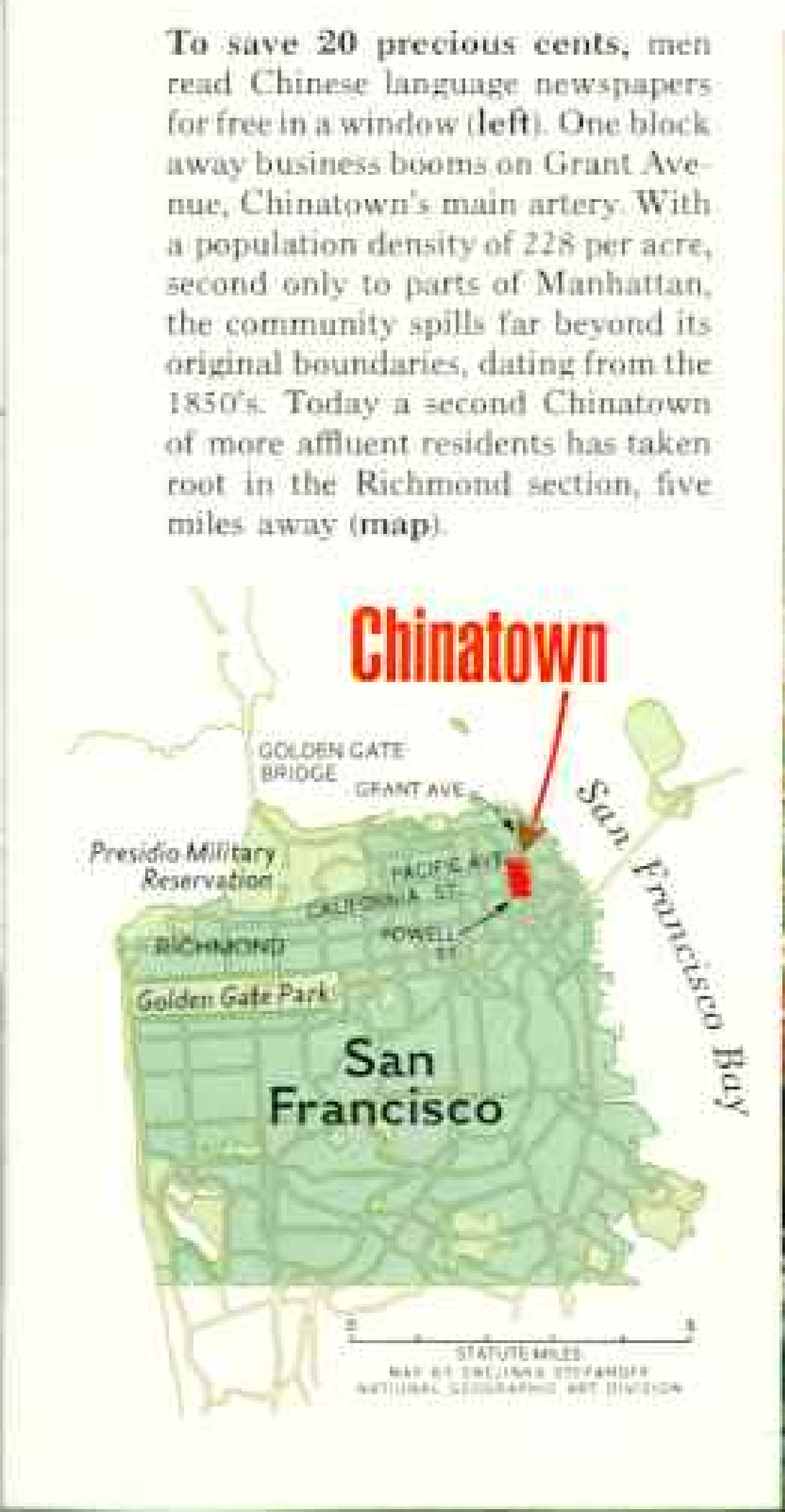
Yee yan cher yee is a phrase frequently seen in help-wanted ads in Chinatown's newspapers. It means "people needed to operate sewing machines." Often the only work women can find is in one-room garment-factory sweatshops, of which some 150 are scattered through Chinatown. They sew bathing suits, shirts, dresses, and other garments at piece rates.

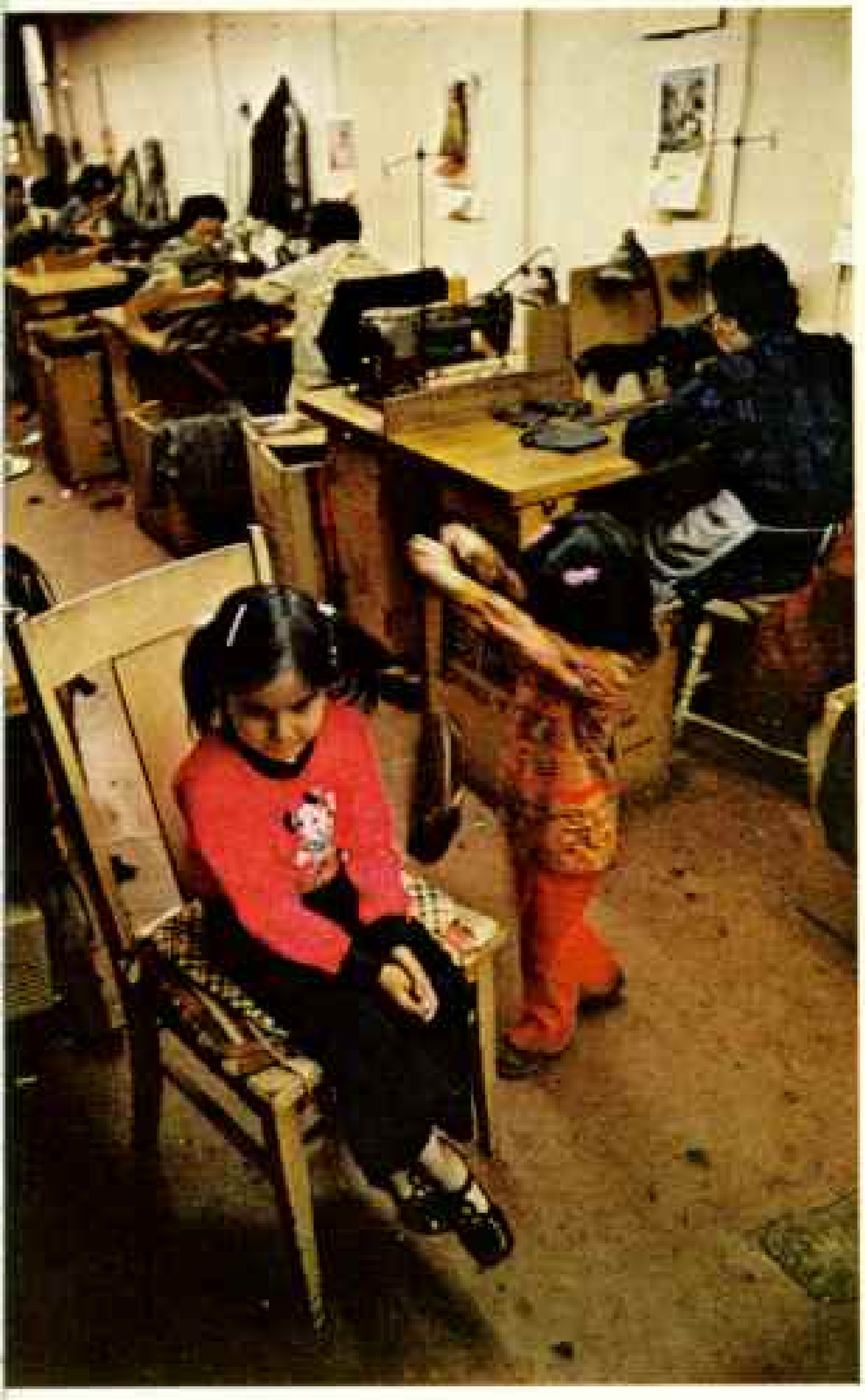
Although they pay less than $1 an hour, far below the federal minimum of $2.10, the sweatshops offer one advantage: The women can leave to cook meals for their families, to take a child to school or out to play. Preschool children go with their mothers to sweatshops and play beside the sewing machines. "It's not an ideal situation," one mother said to me, "but the children must be cared for and the family must eat."

There have been cases of outrageous exploitation. But, as one informant told me, both employers and employees play second fiddle to larger shops downtown, from which they receive their orders, and have to be happy with the prices they can get.

In the past people seeking help would turn to the Chinese Consolidated Benevolent Association, better known as the "Six Companies" because it was formed from six earlier organizations representing many different districts in China. Formed in the

To save 20 precious cents, men read Chinese language newspapers for free in a window (**left**). One block away business booms on Grant Avenue, Chinatown's main artery. With a population density of 228 per acre, second only to parts of Manhattan, the community spills far beyond its original boundaries, dating from the 1850's. Today a second Chinatown of more affluent residents has taken root in the Richmond section, five miles away (**map**).





Children wait while mothers sew in one of Chinatown's 150 garment factories. Most women earn far less than the federal minimum wage, $2.10 an hour. In 1971 a seamstress won a $3,750 court judgment against her employer, who had juggled her time card to make it appear that she was making the minimum wage, when, in fact, she was earning 67 cents an hour. Many Chinese charge that the practice persists. But the owners themselves are at the mercy of garment contractors in San Francisco. If the sweatshops raise wages, the contractors go elsewhere. So Chinatown must fight for the pittance it earns. The situation keeps the child of one seamstress in a familiar place: behind the shopwindow, looking out (**facing page**).

1860's, it settled disputes among Chinese, who believed that prejudice against them precluded justice in the civil courts, and became a powerful economic and political force, especially in Chinatown.

"The Six Companies was the Supreme Court of the Chinese in America," said Fred Huie, a San Francisco stockbroker and former Six Companies president. "It spoke for all the Chinese in California and fought anti-Chinese legislation in America. Later it started a school to teach the children Chinese history, language, and philosophy. It helped the community build a hospital. In those days, we were not welcome in other hospitals."

Dream of America Comes True

Mr. Huie and I talked in his office in a downtown skyscraper. Education, he told me, is the key to the door leading out of the ghetto. "The Chinese have always stressed education, even if it meant depriving themselves to keep their children in school. People can overcome almost anything with education. We learned that lesson in America long ago."

Now, he noted, there are Chinese property owners in every district of the city. Chinese are found in most professions; the postmaster and a former city supervisor are Chinese.

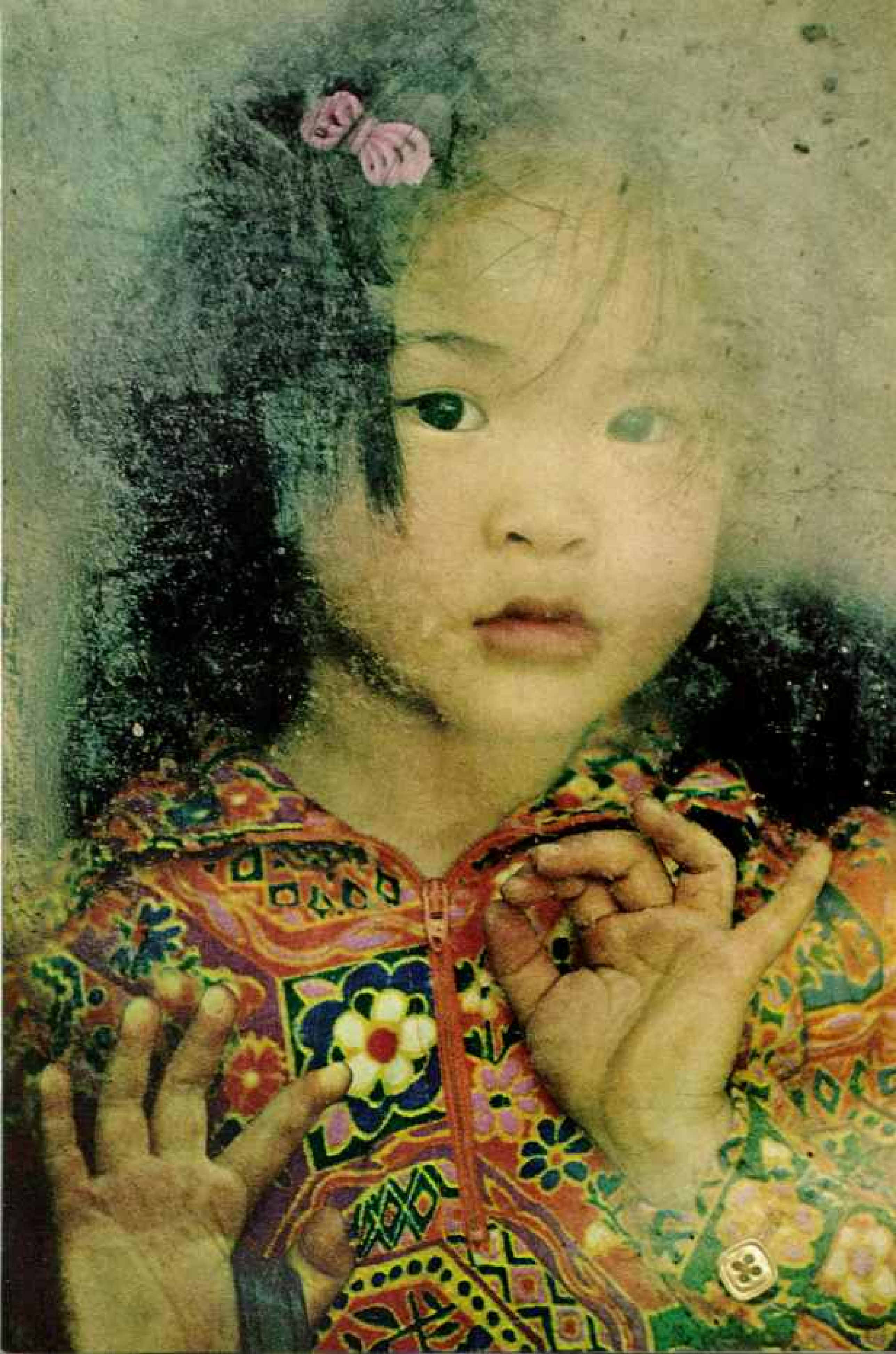
"Today there are millionaires among San Francisco's Chinese," Mr. Huie said. "Why? Because we're thrifty, industrious, patient. There's no limit to what a Chinese can be."

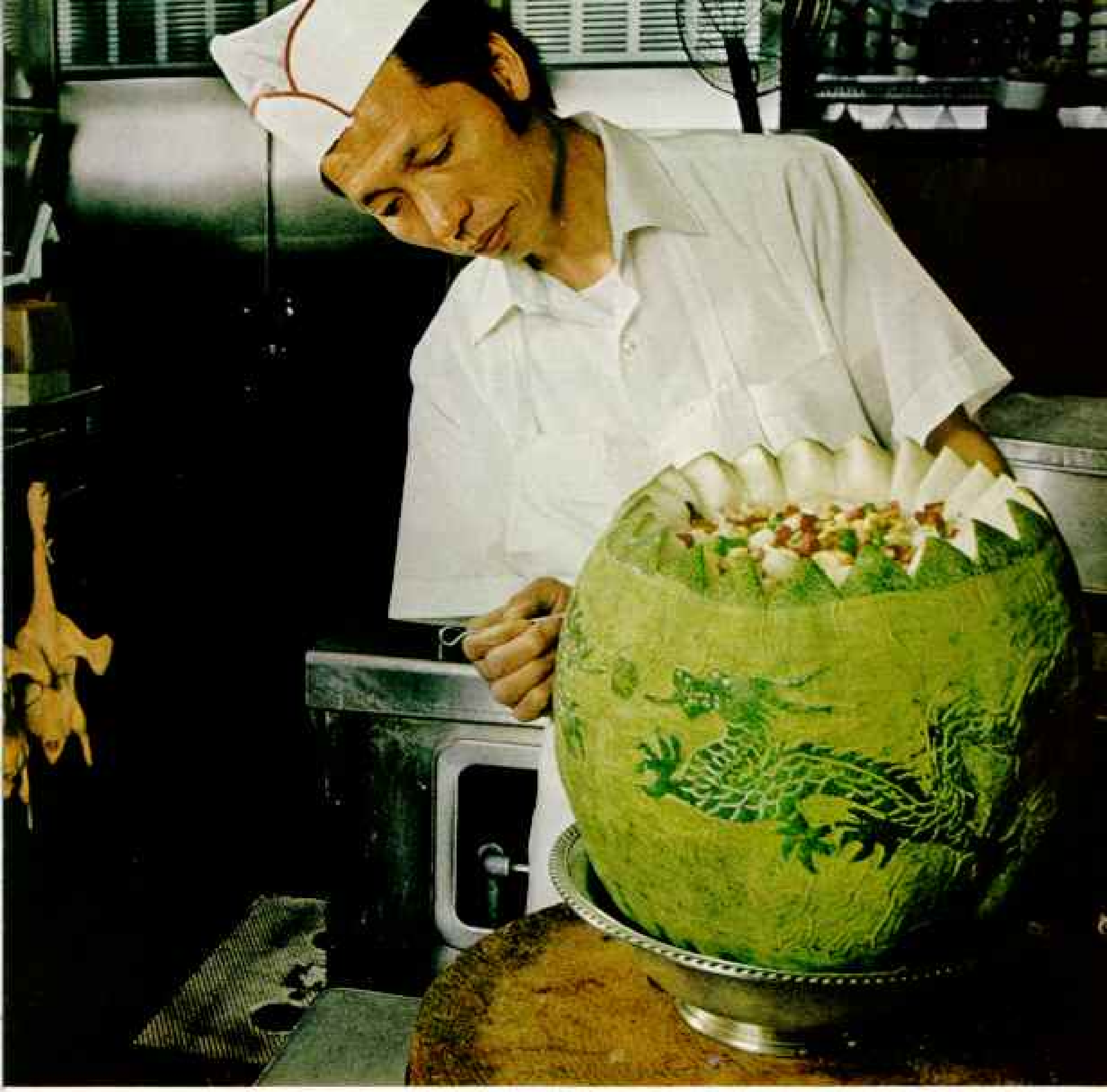
Almost all affluent Chinese now live outside Chinatown. Some who remain say that the Six Companies is losing its influence; that it doesn't care about contemporary problems or finds them too large to handle.

Many conditions have improved since the turn of the century. The opium dens are gone, and there is less prostitution. The clicking sound of mah-jongg games can still be heard along the dark alleys, but large-scale gambling has decreased. The tuberculosis rate, while still high, has dropped with the availability of treatment and some public housing. But progress comes slowly in Chinatown, and patience, in the minds of the young at least, is not a popular virtue.

"The kids today," says Mr. Huie, "don't realize how long it took, and what we had to go through to reach this point."

Chinatown was once noted for having almost no juvenile delinquency. But for more than half a century, there just weren't many children in *(Continued on page 639)*





"**Best in the West,**" many gourmets call the Chinese food of San Francisco. Tommy Toy, manager of the Imperial Palace in Chinatown, spreads an Oriental feast fit for an emperor's table (**upper left**): stuffed lobster with glaze sauce, almond pressed duck with fruit sauce, abalone, chicken, and barbecued lamb with fresh asparagus.

The restaurant's chef, Luke Chan (**above**), takes all day to prepare a winter melon. "First I have to find the right melon from a produce market," he explains. "The skin must be just the right color. Then I hollow it and fill it with lotus seeds, mushrooms, chicken, and other ingredients. I carve the dragon with a skewer, in relief, by scraping away the skin around it. Thereafter it steams for eight hours. For our New Year the dragon symbolizes good luck, prosperity, and authority." Fowl hanging next to him are destined to become Peking duck.

The secret of Chinese cooking? "First of all, thousands of years of practice," says Luke. "And selecting the proper food that's good for the body for the proper season."

Students of Chinese cooking learn the art at a school (**left**) established by the Chinese Consolidated Benevolent Association, or "Six Companies," formed 115 years ago to help immigrants adjust to a strange world.

(Continued from page 634) the community. Now, many new immigrants arrive in large families. They live in crowded rooms, often with no one to look after the children, whose playgrounds are mostly streets and alleys. Chinatown has a youth problem. Street gangs with members as young as 12 have become heavily involved in crime, and in open warfare among themselves; more than 35 young people have died by such violence since 1973.

I met with a gang leader who had survived the street wars. We talked outside San Francisco; he has enemies in Chinatown.

Now in his 20's, he had come to Chinatown from Hong Kong a dozen years ago. "When I arrived," he said, "Chinatown looked like a back alley of Hong Kong.

"I wanted to go to school. And I tried. But it didn't work. You know what happens; the other Chinese kids say they are not Chinese but Americans. They spit on me."

He dropped out of school. By 1967 he and a group of other foreign-born boys were living off what they could steal and engaging in knife fights with their American-born rivals.

Broken Promises Lead to Bloodshed

The next year many Chinatown youths met with city and community leaders to plead for help in finding employment.

"It didn't work. There were a lot of promises, but nothing changed," he said. "That was the last chance to avoid what we have today. Probably nine out of ten guys would have gone straight if the community had tried to help then. I went back to burglaries."

The foreign-born gang grew large. Many members took jobs as bouncers and lookouts in gambling establishments (mah-jongg and fan-tan are traditional games of chance in Chinatown) in return for free meals, bail money, and legal fees. Some youths who didn't take these jobs were beaten. The gang split, and a violent battle broke out.

Street violence moved from knives to guns, and a tragic code of honor dictated that one death must be answered with another, even if the avenger didn't know the victim.

I asked the gang leader if he was afraid.

"I worry about the young ones, the 15- and 16-year-olds who want to be heroes. If I see a young one in a bar, I keep my eyes on him because I know he shouldn't be there."

We parted, going in different directions. In my jacket pocket I found a ribbon of paper, my fortune-cookie message from the evening's dinner. It said, "You have at your command the wisdom of the ages." I wonder.

Against the Streets, "Four-Four"

Chinatown citizens say the solution to the youth problem lies in providing better living conditions. "The traditional family structure is in great danger now," said Philip Choy of the Chinese Historical Society. "You can't expect a family to be closely knit when everyone must scrounge just to survive. A kid who has no one to go to goes to the streets."

The Chinatown Resources Development Center has been helping youths avoid the streets with a program called "Four-Four." It teaches them English and trains them for a job at the same time.

"We tell prospective employers that we will train a student in English four hours a day for five months and pay his wages if they'll give him on-the-job training for four hours a day," said the center's Tony Leong, 27. "We find the job first and then recruit the student. We graduate about 130 students a year—not many, but it's a start."

Students learn reading, writing, conversational English, typing, and filing. One may be a youth with a third-grade education, another a woman with a degree in chemical engineering. "What they have in common," Leong said, "is the desire to survive."

One afternoon I sat by as an instructor counseled two young students on how to present themselves at job interviews. One, a slim, pretty girl with shining eyes, seemed confident, but she acted as if she would rather be somewhere else, having fun.

"Now instead of just rambling on, organize your thoughts," directed the instructor. "What do you want to tell me?"

"My name is Brenda. I'm Chinese . . . [giggle] . . . I went to high school in Hong Kong and got my diploma . . . [giggle] . . ."

"I told you yesterday, Brenda, hundreds

Artist, teacher, dancer, and interior designer, Linda Shen Lei strives to preserve Chinese art. An immigrant from Taiwan and a former Miss Chinatown U.S.A., Linda performs traditional dances with the Chung Ngai Group; its president is her husband, David, who stars with the dance troupe during Chinese New Year celebrations.

"**You *can* fight City Hall!**" Senior citizens (**above**) prepare to enter a city-council meeting, where their leader will give an impassioned speech for more housing. Taught by a community agency, Self Help for the Elderly, tactics such as these work. Construction of the first new housing project to be built in Chinatown in 14 years is scheduled to begin next year. Of 220 available units, 160 will be reserved for the elderly—but 2,000 are already on the waiting list. Too many will live out their lives in a tiny room like the one below, crammed with photographs and memories.

apply for jobs every day. Now tell me something interesting about yourself, that will make me want to know more about you."

She resumes, suddenly serious. "My parents sent me from Canton, China, to Hong Kong when I was 4. I haven't seen them since. I am 20 now, and I wonder what they look like."

The other student lacked Brenda's confidence. He tried hard, but his limited English handicapped him.

"Now remember," said the instructor, "I'm the employer and you've already told me how you left your father in Hong Kong and came to America. As an employer I want to be sure that you'll stay—that you like it here. That makes people in America very happy."

The boy continues, haltingly. "Now I have a job . . . in hotel . . . washing towels and . . . delivering them. . . . I love my job."

"Good!" says the instructor. "Now, tell me more about yourself. What are your hobbies?"

The student drops his head, embarrassed. Slowly he looks up at the instructor and asks softly, "What are hobbies?"

Ten Years to Learn to Cook

About eighty restaurants offer employment in Chinatown—and also are, collectively, the community's greatest tourist attraction. Every day thousands of visitors sample the fare, which is predominantly Cantonese in style. Gourmets say the best Chinese food in the West is to be found here. The finest restaurants are booked three years in advance for Chinese New Year festivities.

"Chinese cuisine took 2,500 years to develop," said George Chow as we sipped jasmine tea in his Golden Pavilion Restaurant, on a second floor above busy Grant Avenue.

"In China today at least ten years of apprenticeship is necessary to train a cook. But the basic philosophy behind Chinese cooking is instinctive rather than a measured, mechanical process. You simply work with ingredients until they taste good."

The Chinese gourmet, George Chow told me, evaluates a dish by four standards: color, aroma, taste, and texture. "A superior dish must please the eye, perhaps by blending harmonious or contrasting ingredients. The sense of smell augments the sense of taste, so a dish must be appetizing in aroma. Texture is a sophisticated aspect. Shark's fin and bird's nest are neutral in flavor, but give texture."

He picked up a bowl of snow peas. "This humble vegetable," he said, "provides all four qualities. Fresh green in color, it is sweet in aroma and flavor, and succulent in texture if properly cooked."

Chinatown's fare can be as grand or as plain as one's appetite and pocketbook dictate. Often, hurrying to keep an appointment, I lunched in a crowded teashop on a simple plate of chicken or tomato-beef curry. When I wanted to try really fine food, I dined at the Golden Pavilion or the Imperial Palace (pages 636-7). For $200, the Palace will prepare a 12-course banquet for eight to ten guests, including chunks of prime beef sauteed with baby winter bamboo shoots and green onions, garnished with "snowflakes" cut from thinly sliced cantaloupe. Dessert is a carved watermelon filled with fruit and, as the menu notes, "blessed with raisins in rose syrup."

Companionship for the Elderly

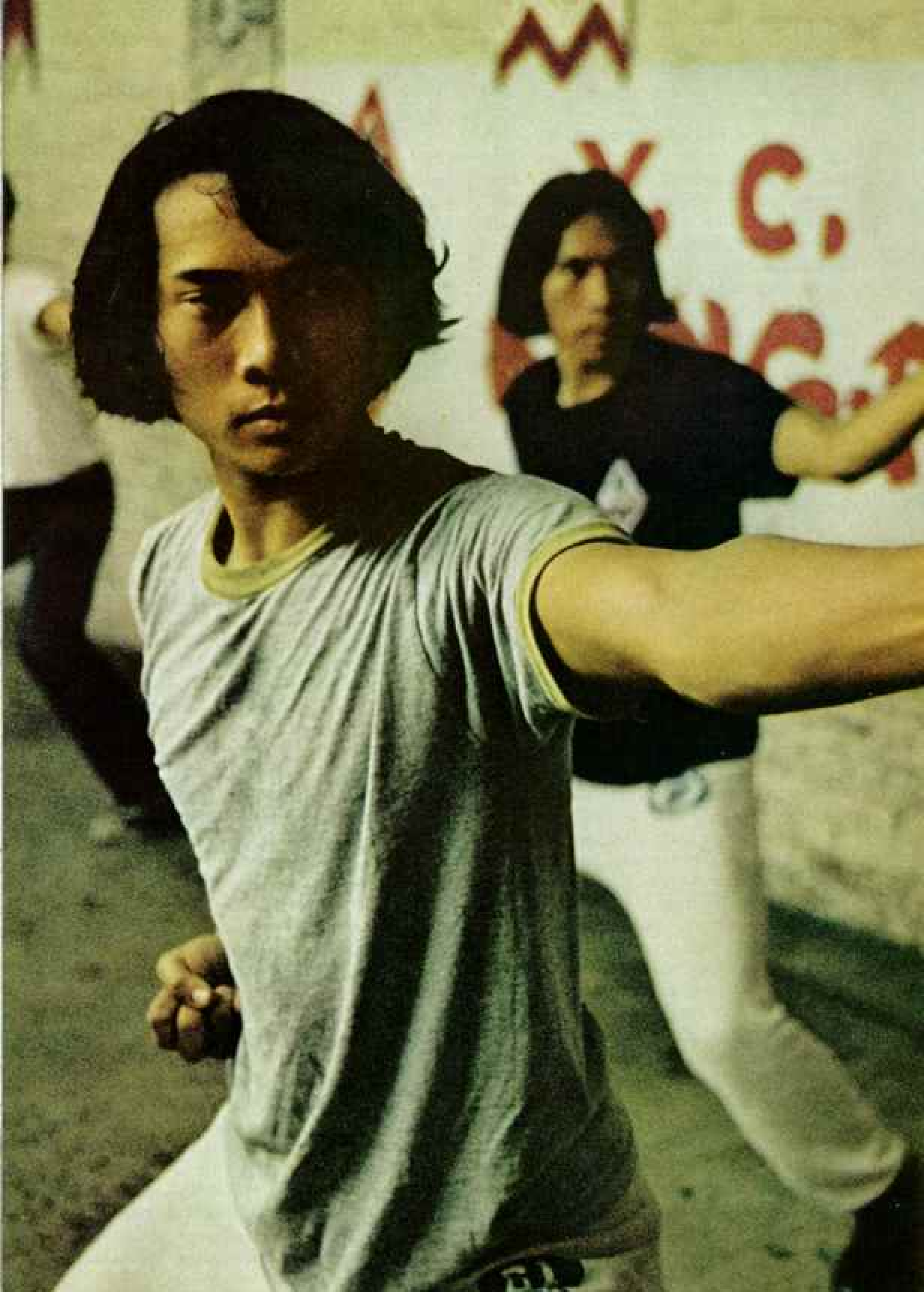
Chinatown often seems a place where old men live out their lives in lonely rooms. There has always been a preponderance of males over females there. In the 1930's, it was still three to one. By 1960, a third of the population was over 65, mostly single men, and the opium, gambling, and prostitution that once relieved empty days had largely vanished.

I found one answer to this problem in a dimly lit basement of an old Chinatown hotel. There, seated on folding chairs around an odd assortment of tables, 90 elderly Chinese gather Monday through Friday to enjoy a 40-cent dinner sponsored by Self Help for the Elderly, one of the most successful social-service organizations in the community.

Aproned ladies brought us steaming bowls of seaweed soup and plates of tasty spare ribs. As we ate, there was a constant hum of conversation and the room seemed brightened a bit by smiles and laughter.

Sam Yuen, director of Self Help and a man with a kind face sometimes furrowed with frustration, watched over the tables like a concerned parent. When he spoke, the humming of voices stopped and the old people listened, because they trusted him.

Devoted to assisting the elderly poor (and anyone else it can), Self Help offers such services as hot meals delivered to the homebound, legal advice, aid in finding housing, anything that will make life a little easier for the old and sometimes forgotten residents of Chinatown. Since Self Help was established in 1966, the suicide rate among the elderly has fallen markedly.



"The old saying that 'the Chinese take care of their own' has really been mostly myth, at least in America," says Sam Yuen. "The elderly often have no families in Chinatown. If they do, their children cannot afford to support them. These people have always earned their living; they'd rather not be on welfare. Most of them have little savings, because for years they sent money back to China to support relatives. Then, when they are too old to work, their lives come down to a small room where they eat, sleep, and die."

I had seen many such rooms. I recalled that of 70-year-old Fong Chung Young—little more than a bed, table, sink, and hot plate. The rent, inflation, and needs of his ill wife quickly swallowed his only income, his Social Security check.

"An old person should be valuable," he told me, "like a piece of gold. But without education you are only good for something when you're young. An older person without education is like only a piece of paper."

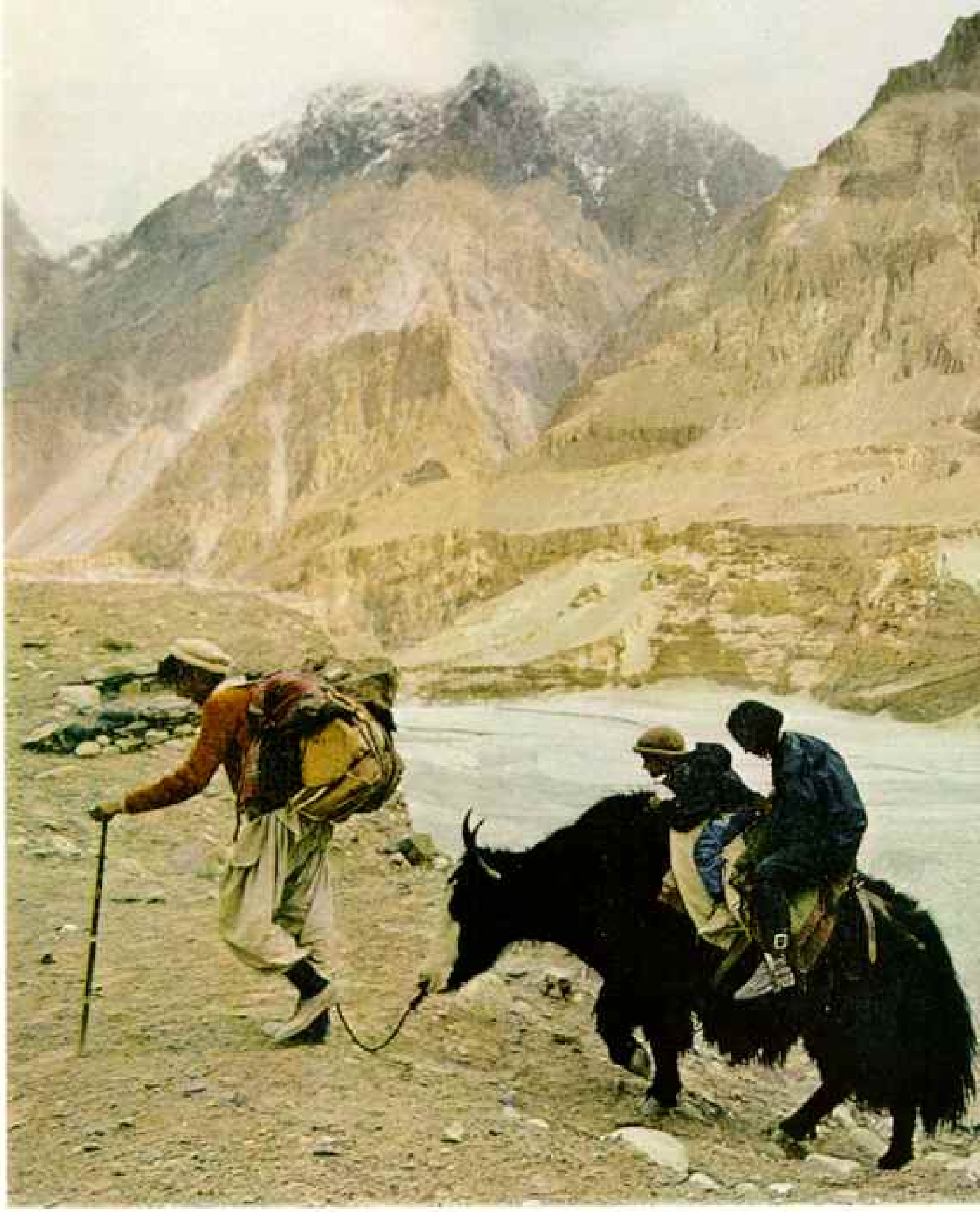
Still They Come to a New Life

At the airport I watched Po Wong of the Newcomers Service Center assist new arrivals, gently explaining to a woman with a withered face why she had to surrender a bag of fruit to customs officials. Nearby a father struggled to close a suitcase. Then he joined a weary mother with an infant on her back and two other children. With hesitant steps they started through the door to a new life.

Po Wong and many other persons who work with the poor, the needy, and the newly arrived often ask themselves a question which, in time, I found myself asking too: How much longer will the former Golden Mountain be the gilded ghetto?

Today Chinatown is finding its voice, a voice that cries out in both anguish and hope. It is the voice of many dedicated men and women, and they wage a desperate battle. If you go slowly through the streets and sunless back alleys of this country's oldest Chinese community and listen carefully, you can almost hear the struggling heartbeat. □

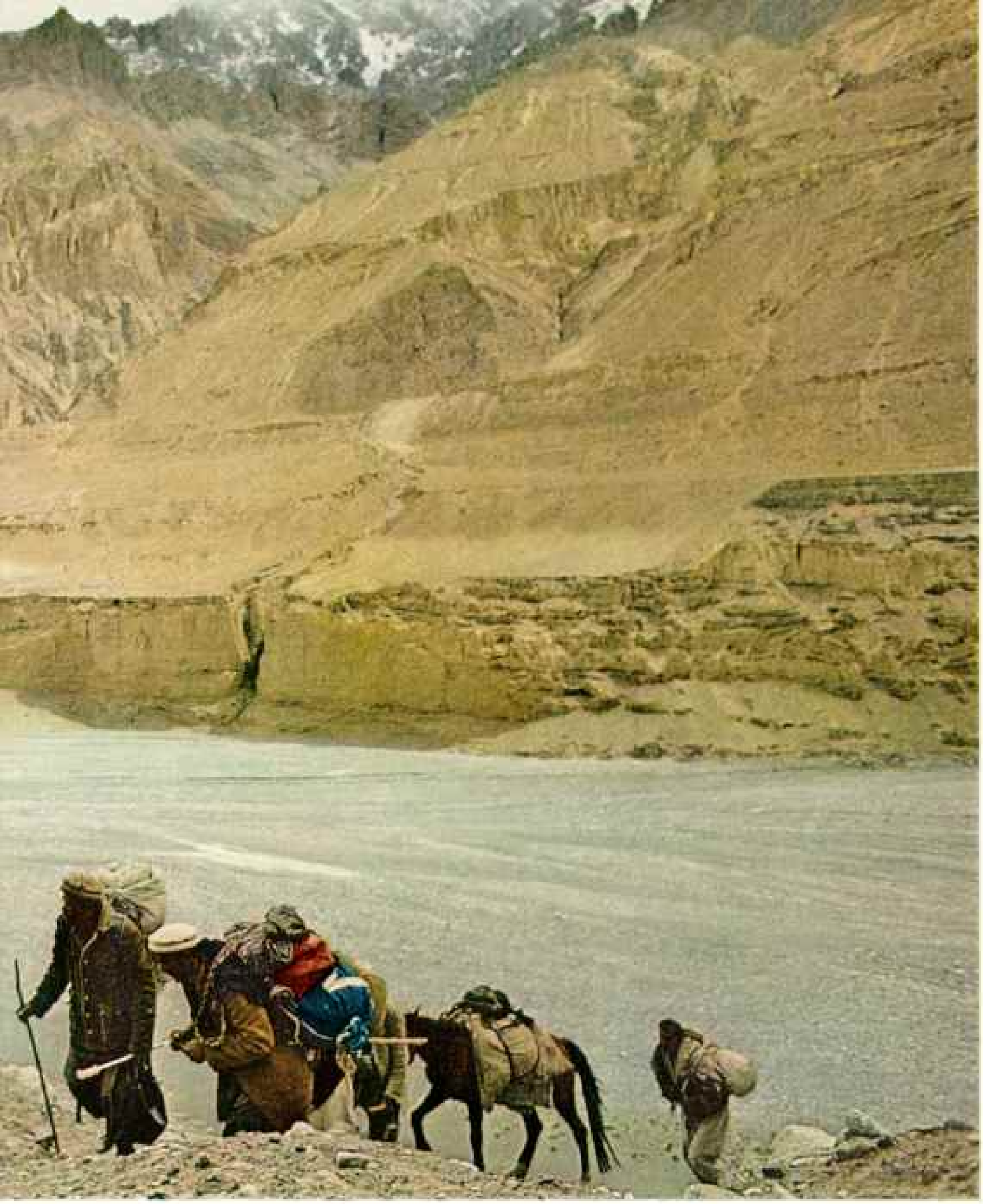
Pulling the arrow: A student performs an exercise in kung fu to gain strength and help prepare himself for the next move. Kung fu stresses perfect mental and physical discipline to overcome handicaps—essential qualities for growing up in Chinatown.



Foot-weary in a vertical world, Sabrina Michaud and her young son,

Trek to Lofty

ARTICLE AND PHOTOGRAPHS BY SABRINA AND ROLAND MICHAUD



Romain, ride a yak in the majestic but barren Karakorams of northern Pakistan.

Hunza—and Beyond

Trek to Lofty Hunza—and Beyond

ROCKS ARE RAINING all around me. The evening wind has risen, dislodging a few stones high up on the talus slope, and they send others tumbling down in a dizzying waltz. Boulders bound in spectacular arcs and plunge into the swollen Shimshal River, close enough to splash me.

"Don't move!" cries my young guide, Tarif Khan. He is already safely beyond the slide on this rugged trail high in the Karakoram Range in northern Pakistan. He is also right; it may be safer to stand fast than to run blindly.

But I am exhausted and near panic. Pain stabs my legs after days afoot in these precipitous mountains. I have fallen behind the rest of our little caravan—my husband, Roland, our 5½-year-old son, Romain, our interpreter, Riaz Ahmad Khan, and porters.

Hypnotized by the dancing rocks, I stand trembling a moment more. Then fear wins. I bolt headlong through the clattering downpour. I no longer feel the sharp rocks underfoot, nor the pain in my legs. I reach Tarif Khan and grasp his arm.

When we catch up to the others, they are upset to hear of my close call. One of them declares solemnly that we were protected by Shah Shams, the "Sun King," a Moslem saint whose simple stone shrine rises above the cluster of huts where we will camp.

Little Romain, listening wide-eyed, tries to comprehend a rock avalanche and says, "Mama, you should have called us—Papa and I would have come to help you!"

The brush with danger makes me more aware than ever of the risks we are taking with our child. From the shelter of our Paris apartment those risks had seemed reasonable enough: a well-planned journey of several months to remote and peaceful mountain villages and valleys amid the lofty Karakorams. If anywhere in the world a paradise exists, might it not be hidden in so spectacular and unearthly a setting?

How can one describe this powerful mountain mass? In Turki *kara* means "black," *koram* conveys the notion of crumbling rock. The range, some 300 miles long and adjacent to the Himalayas, is at a strategic junction in Central Asia where China, the Soviet Union, Afghanistan, Pakistan, and India meet (map, page 649).

The dry, harsh climate gives this region an aggressive personality, and the view is rarely softened by a tree or animal, or even by a bird, except in the few oasis valleys. Everywhere one sees jagged peaks, chaotic piles of sterile rock.

The local people, mostly Moslems, live in scattered villages tucked in the valleys between the high sunny slopes, dominated by seas of ice. The Karakoram Range includes 5,000 square miles of glaciers; their melt gives life to these mountain oases through the dry summer months.

We reach this region by rented jeep from Gilgit, administrative center of Pakistan's northern districts. When we arrive in Baltit, capital of the princely state of Hunza and a legendary Shangri-La, we are taken aback.

The Mir of Hunza himself—Mohammad Jamal Khan—tells us with a touch of bitterness that "progress" has reached his once-isolated realm, over the same road we had traveled from Gilgit. Hunza is now ruled by Pakistan, and this hereditary prince has since been retired on a government pension.

The customs of the Hunzukuts are dying away, he says. There is no more hunting with bow and arrow. The famous wood sculpture is not carved here anymore. Polo? The mir has sold all his horses.

From the palace we can see workmen building a new 40-room hotel, an invitation to a tide of tourists. "If you want to find our traditions alive," says the mir, "you must travel to more difficult valleys, like Chapursan, or Shimshal."

Shimshal! The sound of the name fires our imagination. "We leave tomorrow for Shimshal," Roland announces to me.

A Pinch of Flour for the Road

A day's travel up the Hunza Valley from Baltit lies Pasu, the starting point of the trail leading eastward to Shimshal, the most remote village in the high country of Hunza. By local custom, the women of Pasu throw a pinch of precious flour over our shoulders to bring us good luck on the road.

Hunair Beg, chief of the porters, leads our group, followed by Guda Ali, Shabuddin, Ghulam Nabi, and Tarif Khan. Then come Roland, Romain, our interpreter, and myself. The Hunzukuts walk the rugged trail with a springy, effortless step. But this is no mere stroll in the mountains.

It is spring in the Karakorams, a time of

avalanches. We cannot use pack animals, we are told, for they are still weak from the deprivations of winter. The path, with hairpin bends, juts boldly out in ledges along the steep cliffs. We climb, descend, climb, and come down endlessly—tiny insects crawling across immense bare walls.

Often landslides spew rock debris over the dreadful precipices and block the trail. We pick our way across powdery talus slopes with great care; the smallest wrong step can plunge us into the chasm. Each skid releases another rock slide. We have the impression that this mountain is ready to break into pieces and destroy us. Romain must cross such places perched on the back of a porter, and he doesn't appreciate it. "He carries me like a package. I am not comfortable," the child complains.

Dynamite and Dedication Build Roads

We are joined along the trail by Imam Yar Beg Sany, the foreman of bridges and roads, who is responsible for construction of pack trails in upper Hunza. He is accompanied by his three most devoted laborers: Beko, Darvish, and Ghulam Hussein. Sany, a man with a ready smile and twinkling blue eyes, falls into step beside me and we talk.

"I own land near Baltit," he says. "I could be just a farmer. Or I could have an easy life in the army, like my brothers. This job is very difficult, but I love these mountains—I could not think of leaving them."

In order to span the chaotic 40 miles that separate Pasu from Shimshal with an improved trail through the Shimshal River Valley, 150 to 200 villagers, whose salary is 10 rupees ($1.00) a day, have labored for two years with dynamite and sweat. Each spring this tenuous thread is cut by bad weather.

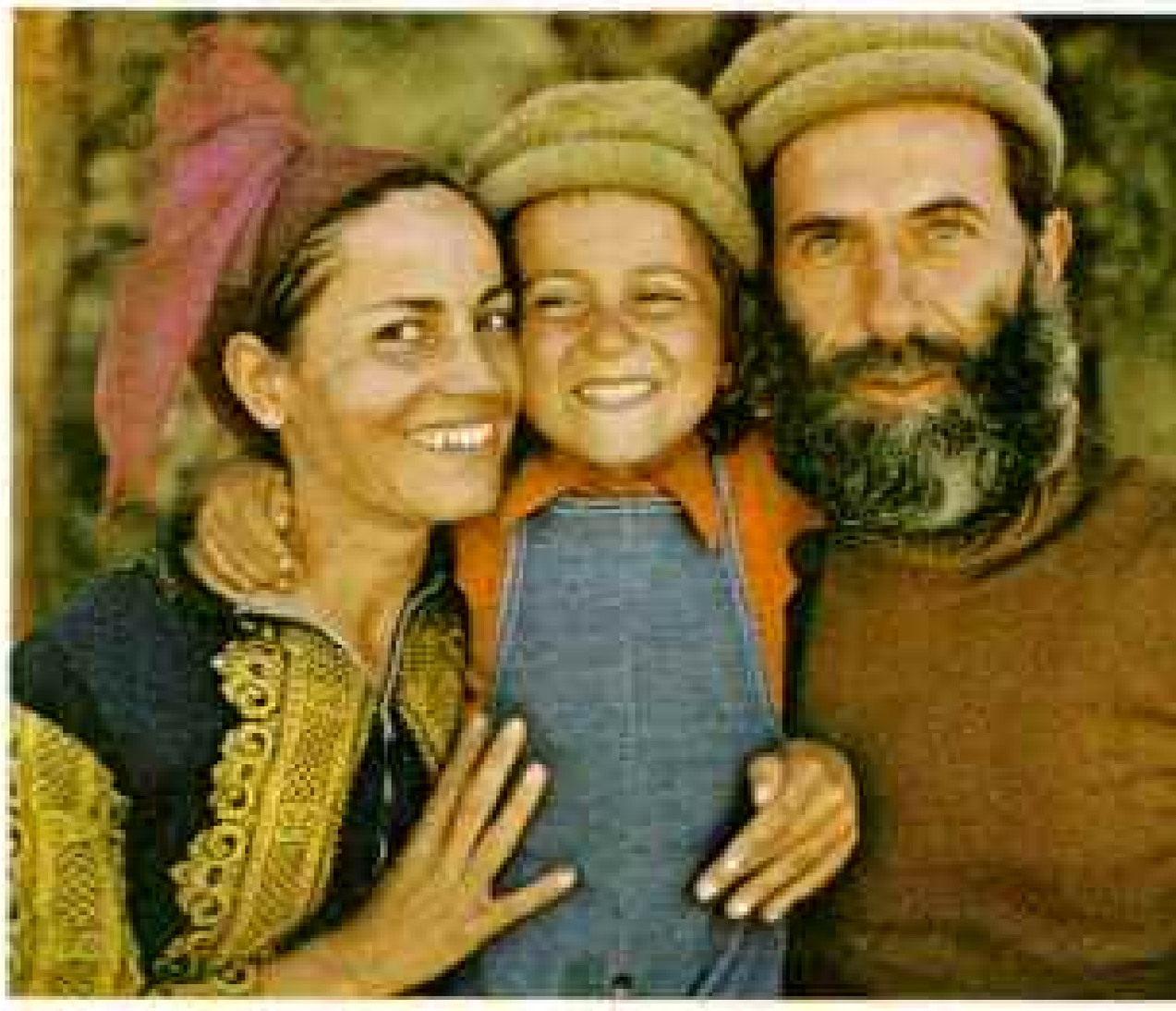
They use an ingenious technique for constructing a trail on the flanks of a cliff. In Burushaski, a language of the Hunzukuts, it is called *galing*, a technique found all over the Karakoram mountains. It consists of driving wooden beams horizontally into cracks in the rock, and then piling layers of flat rock on the beams. Sometimes the path is practically suspended above the void.

At a place called Sugardan we settle for the night in a shepherd's shelter, simply roofless stone walls (page 649). Our first unpleasant surprise: We cannot use our kerosene stove. The driver in Baltit had mistakenly filled our jerrican with gasoline. While I prepare a meager meal on the porters' wood fire, Romain carpets the floor of our humble abode with straw until it looks like a Christmas crèche.

The second surprise happens with rustling noises during the night: Rats have discovered our potatoes, and are noisily eating them. "Why didn't we bring a cat?" Romain asks sensibly, when he is awakened by our light.

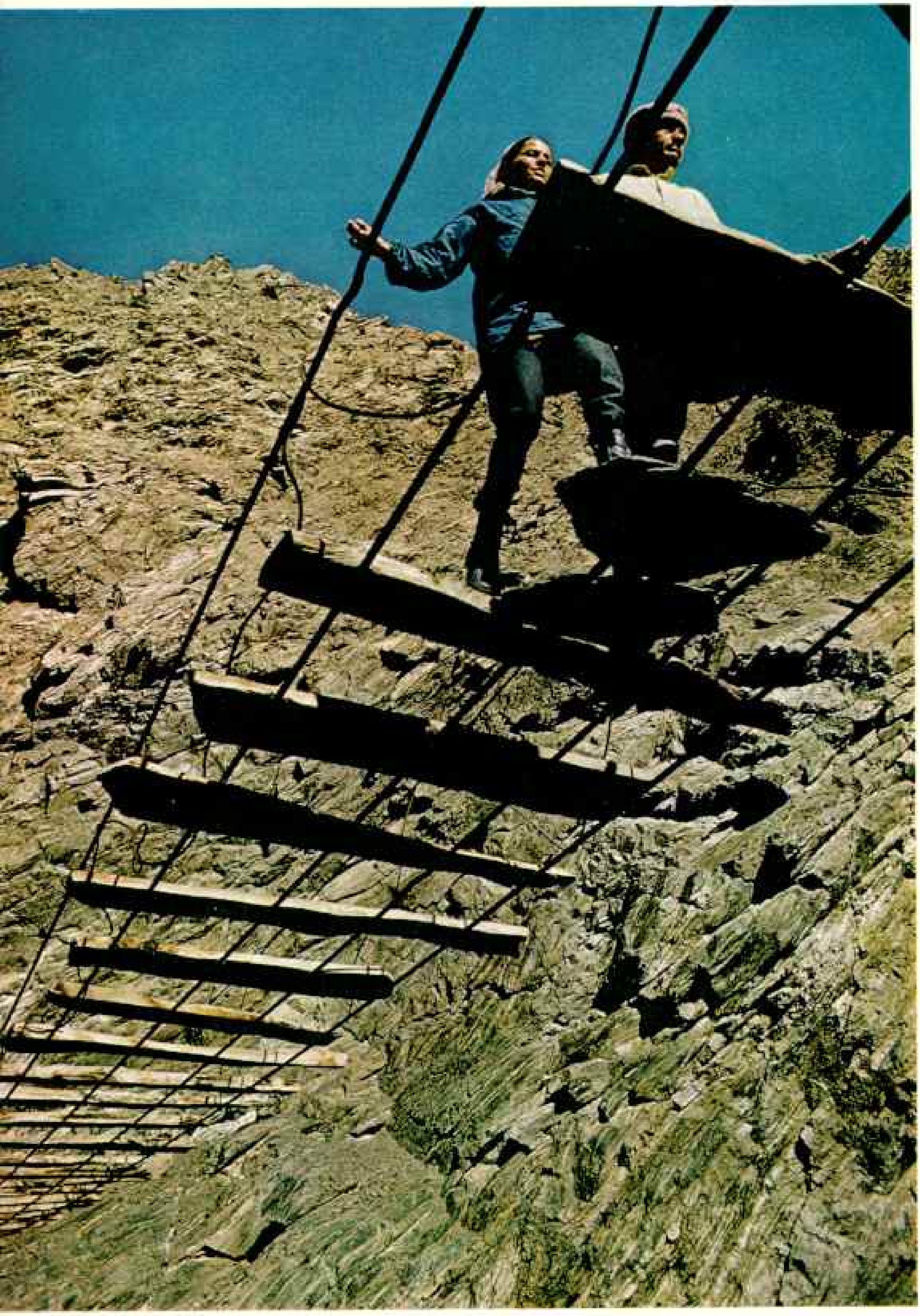
The following morning we cross a hanging bridge, a test for Roland, who is subject to dizziness at heights. Stretched cables are the handrails and some doubtful-looking planks form the footpath. They are spaced so that you can see the roaring river far below (following page). The porters cross the abyss one by one. Roland accepts the hand that Hunair Beg holds out for him.

A hard day. The trail threads its way through crevices, leads over loose rocks and to the bottom of dark chasms, then climbs to imposing ridges. We are coming to know these Karakoram mountains. This is an anarchic universe, torn and tortured, a terrestrial hell that humbles man. Yet extremes, perhaps, are never very far apart, for in its grandeur it gives him a glimpse of paradise. We walk in silence *(Continued on page 652)*



RIAZ AHMAD KHAN

Adventure on the rooftops of Asia drew French writer-photographers Sabrina and Roland Michaud and their 5½-year-old son, Romain, from Paris to perilous trails of the Karakoram Range. Avalanches, swollen rivers, and slippery glaciers along the trek caused concern for the youngster's safety. He responded by excitedly scribbling pictures of open-air campsites and chattering spiritedly throughout the trek.



Tightrope trail off the main routes leads Sabrina and a Hunza guide across a deep gorge (**left**). The high peaks of the Karakorams guard the crossroads of China, Afghanistan, Pakistan, India, and the Soviet Union. In its slender valleys lie scattered villages of Baltistan and the long-isolated princedom of Hunza, ruled by Pakistan since 1974. A new road through the range and a modern hotel in Baltit may soon draw a mounting flow of tourists. Away from the tiny capital, the Michauds slept in roofless, three-sided shelters (**below**) in their search for villages yet unaffected by the outside world.

HEAVEN-REACHING SPIRES *of the Karakorams, their gloomy granite brightened by snow, form the mightiest concentration of mountains in the world. Nineteen peaks exceed 25,000 feet, including 28,250-foot K2, second only to Mount Everest.*

(Continued from page 647) except for Romain's chatter, each of us withdrawn deeply within himself.

After eight or nine arduous, sweaty hours on the trail, the stop in the evening is more than welcome. The night exhales a fresh, cool breeze; we restore ourselves before confronting the difficulties of the next morning.

Today we must cross an almost vertical stretch of mountainside that has been polished by the violent Shimshal River. My stomach is glued to the smooth wall; my arms extend like a cross; I cling to the few cracks as my foot feels its way, searching for support.

"Mama, you are embracing the mountain," Romain calls back, laughing.

This long "embrace" leads to a series of talus slopes where landslides have poured rock into the river. And it is at one of those slopes that I am suddenly caught in an avalanche of rocks. Dead tired, I thank Shah Shams with a little prayer for having protected me, and collapse for the night in a shepherd's hut. In the morning, following local custom, I make an offering to this Moslem saint, adding my scarf to the many flags fluttering at his shrine.

Another long day's march takes us to the foot of the Mulungutti Glacier. The weather is overcast and cold. We cross a mountain meadow flowering with thyme. Sany goes to find a shepherd and flock, and returns with a lamb he has purchased.

Romain watches the men butcher and cook the animal, and asks a hundred questions. Choice pieces, tendons, and trimmings alike are chopped up and tossed into rapidly boiling water. The rising aroma is comforting.

The porters work in high spirits, some searching for wood, others keeping the fire going or preparing the flat round bread called chapaties. Romain watches enviously. "Do you want to make a chapati?" Beko asks, and hands him a lump of dough. Flushed with pleasure, Romain pats it into a pancake.

The few drops of rain that fall during the

night do not spoil his enjoyment of camping out. During this trip Romain spends his first nights at the "Inn of the Moon." Fascinated by the canopy of heaven, he loves to watch the shooting stars before falling asleep.

Slipping and Sliding to Shimshal

The big glacier stretches ahead of us today. After a difficult climb we arrive panting at the edge of this enormous outflow of ice, embossed with ridges and gaping with crevasses.

It is hard to find a solid foothold. The sun appears, warming us, but it also turns the glacier into a dazzling mirror and skating rink. For two hours we slide and slip and fall, to the great amusement of the porters.

Finally the plain spreads out before us in an ocher-and-black carpet. Climbing to a new height, we can see the green spot of Shimshal. We tumble down to the river and, mile after mile, nibble off the distance separating us from the oasis.

Spread out above the river on the edges of a gentle valley, the village of Shimshal is as delighted to see us as we are to arrive. After the hostility of the mountains, trees seem to smile and weeds to sing. Men working on irrigation ditches drop their shovels and come down the cliff like goats. They run to embrace us, relieve the porters of their loads, and take us to their homes. Man has found his brother again, in the midst of stern nature; we find it a moving display.

The village of Shimshal, at an altitude of 10,000 feet, lives virtually cut off from the rest of the world. We are the first Europeans to visit there in 27 years! The last had been a British official in 1947, before Pakistan became an independent state.

People come running from all sides to welcome us. Daulat Amin, the village teacher, takes us to the only dwelling place with guest quarters, and a dozen men crowd inside with us. We are quickly served salted tea with milk. For those who wish more flavor a chunk of rock salt is passed around—you have only

Where hospitality soars, 102-year-old Wazirzadah Ali Murad (**left**) shares tea with the Michauds. Called Joonu, a name that means "beloved," he serves his neighbors as a doctor.

The faces of Hunza reflect the mystery of the people's origins. According to the Hunzukuts' own legend, they came from the north into the Karakorams not earlier than A.D. 200. Joonu's features recall an influx of Persians to the Karakorams centuries ago.

Portrait of grace, with a look more Mediterranean than Oriental, Bibi Nabinama (**right**) presides over her home in Gulmit wearing hat and dress distinctive to her land.

to soak it for a few seconds in your bowl.

The tea is followed by *mash*, a thick soup of melted cheese, local noodles, and clarified butter, eaten with a communal wooden spoon. Several spoonfuls are enough to fill us. But the dish is barely finished when a second one appears, then a third, and a fourth, all identical.

"Custom decrees that each of the wealthiest houses of the village send this dish to every visitor who may pass through," Riaz tells us, laughing over our surprise. And so begins for us a fascinating look at village life in upper Hunza.

Three Distinct Peoples in Hunza

The people of Hunza—mostly Moslems of the Ismaili sect—are divided into three basic groups. In the south, lower Hunza is populated by 4,000 to 5,000 Shinakis who speak Shina. They are reputed to be hot-blooded and quarrelsome. In the central part, Hunza proper, some 15,000 Burushos speak Burushaski and are known to be hardworking, good-humored, and thrifty.

Upper Hunza, where we are now, which continues northward to the Chinese and Afghanistan borders, is populated mostly by 5,000 to 6,000 Guhjalis, who speak Wakhi. These are most hospitable and generous people, and they regard their cousins to the south as avaricious. They have a saying in Shimshal: "The Burusho asks, 'If I come to you what will you give me, and if you come to me what will you bring me?' "

From our sleeping quarters we can span the entire Shimshal Valley with a glance. To cook our meals we must go to the house of our hosts, who allow us to share their hearth.

You enter the house through a maze of doors and rooms arranged to block the wind and cold. The anterooms, provided for the animals, lead to the large communal living room, dimly lit and ventilated only by an opening in the roof above the hearth. Raised alcoves carpeted with felt serve as dining room and bedrooms; one with two levels is the kitchen. Here the women often crouch, occupied with cooking and other housework.

It is pleasant here, but the acrid smoke from the hearth makes my eyes water and gives me a headache. Bibi Amina Khatun, the hostess, prepares bread for us. She energetically kneads the dough, punctuating her effort with *"Ya Allah ya Ali!"* This is to give her strength, her husband explains.

Our meals are rather meager. Besides some provisions we brought with us, we can obtain milk, but eggs, potatoes, and meat are very scarce. These villagers are very poor, but their generosity toward us is remarkable. They even adopt our interpreter, Riaz, who

Pillar of light from a smoke hole illuminates a Hunza home where the Michauds interview a bearded patriarch, Noor Mohammad. This land where people often live to a vigorous old age has attracted several studies to probe the secrets of longevity. Most-cited factors: Diet, exercise, and freedom from emotional stress.

was a bit sad and lost when we arrived, but is spoiled at the moment by a couple he calls his "milk father and mother."

From now on Riaz lives and eats free of charge in Shimshal. If a member of his adoptive family goes to Baltit, he will be received in the same fashion at Riaz's house. The system is very practical in a region without hotel or restaurant.

"Beko, will you become the milk father of Romain?" I teasingly ask the porter who has carried him most often along the trail. "You could offer him a baby yak, two ewe lambs, and a pony, and he will send you a minijeep to travel on these awful, unfinished trails."

"I am too poor to offer him all that," Beko answers seriously. "But I would give my life for him."

There is a simple, self-sustaining quality to life in Shimshal. There are no merchants; we see no sugar, tobacco, or matches. There are no policemen (disputes are arbitrated by the mir) and no doctors, despite some sick people.

Accepting their destiny, these solid, easy-going mountain people cultivate barley and wheat and also grow some vegetables: chick-peas, potatoes, carrots, cauliflower, and turnips. They tend orchards of apricot, apple,

Rhythms unchanged through the centuries mark the daily round of life in upper Hunza. In the remote village of Shimshal, Mohammad Nayab and his son cut a log into planks with a bucksaw (**above**). Craftsmen all, people of the Karakorams exchange goods and services as well as money, for little cash reaches the more remote areas.

Mallets rising and falling (**right**), two Shimshal women soften a roll of wool cloth, newly woven on looms of ancient design. The most durable material comes from the wool of the yak; the shaggy beast also provides shoes, water containers from the hide, tools and musical instruments from the bones and horns, fly whisks and brooms from the tails, and fuel from the dung.

and mulberry trees. Perhaps they now also have garlic; Amina Khatun's husband watches me use it in cooking, asks me for two cloves, and immediately goes to plant them.

Each of the 80 families in the village owns a plot of land. They also take care of their yaks, cattle, goats, and sheep; spin their wool, weave their clothing, and sew their shoes. Besides all this, each of them is a miller, a baker, a butcher, and even carpenter and mason when need be. Only tools and plows must be made by craftsmen from outside the village—itinerant blacksmiths who come from Baltit, the capital.

Valley Boasts Six Radios

Remote as it is, Shimshal is not totally without modern conveniences. We find four hand-powered sewing machines in the village; they are run by men. We see the six transistor radios of the valley proudly carried by their owners as they parade, during rare moments of leisure, near the simple stone "house of reunion"—a building that serves as a mosque for the Ismaili sect.

Roland often visits two brothers in the village—Gulbadan, 42 years old, and Imanullah, 50. They are weavers, who live and work together, and at their loom Roland enjoys the peaceful atmosphere. In the precise, repeated movements of their hands he feels the elemental rhythm of their simple lives, a harmony with nature.

The villagers of Shimshal, using small looms, weave their clothing from sheep's wool, including the beret with rolled brim typical of this region. More famous throughout Hunza are the rugs from yak, sheep, or goat wool called *poloss* in Gujhali and *sherma* in Burushaski. There are about 40 persons in Shimshal who can weave these rugs. They measure three by ten feet, and the nimblest fingers take three long days to finish one.

We admire the rug offered to Riaz by his adoptive parents. It is in dark-brown tones and natural sepias because no dyes are used. Despite its weight—almost 20 pounds—our friend does not hesitate to pay a porter to take it to Baltit. "They are very solid," he confides to us, "and they last more than fifty years."

Riaz is beginning to pine for his family, and it is time for us to move on. "We will go when the herds leave for the mountains," Roland says.

In mid-May many of the village families migrate to the upper pastures, or pamir, north and east of Shimshal. Up there they settle in summer encampments, grazing the flocks until mid-October, when they come back down into the valley to spend the winter. Of the 800 inhabitants, half, mostly women and children, make the trek; the others stay to cultivate the land.

Feverish activity takes hold of the valley. Saddlebags are sewed, harness is mended, food is prepared for the trip. Then one day the slow caravan gets underway. The villagers and their herds, led by a bleating cohort of goats and sheep, head in small groups toward a ford several miles upstream. Powerful yaks and oxen bow under the weight of their odd loads: rugs, looms, clothing, pots and kettles, ropes and chickens. One feels a strange grandeur in this exodus.

Helped by the men who push them in single file, the goats and sheep cross the river on a crude bridge—tree trunks wedged against rocks in the current. Some fall and are swept away, but most of them are rescued by men posted half a mile downstream. Amid cries and laughter, husbands and brothers carry women, with their children in their arms, across the torrent.

Yaks throw their mass and multitude against the obstacle of the river. Urged on by men's cries, goaded by their sticks, the animals finally climb the steep far shore. Now Shimshal's 600 yaks, 300 cows, 1,500 goats and sheep, and about 40 oxen are on their way to their summer pasture. And we, too, are on our way again.

New Chinese Road Follows Caravan Route

We turn back, retracing the arduous march toward Pasu and the Hunza Valley. From there we take the opportunity to explore a momentous development amid these lofty mountains: the new Karakoram Highway.

Much of this modern asphalt road, which follows an ancient caravan route through northern Pakistan, is being built by Chinese engineers and laborers. When completed, the highway may become one of the major commercial arteries of Asia, giving China a "back door" to the sea—the Arabian Sea.

In our rented jeep we follow the road northward toward the Chinese border and see many Chinese, laboring in shifts around the clock. From their blue work clothing one cannot distinguish rank, or even whether they are soldiers or *(Continued on page 661)*

RIVER BECOMES A HIGHWAY *for a yak as shepherds guide it around a tortuous passage between Shimshal and Pasu. Some forty glaciers, the largest nearly fifty miles long, feed the Karakorams' icy streams.*

Signposts of change on opposite sides of the border between upper Hunza and China warn motorists to switch lanes (**above**). Pakistanis normally drive on the left side of the road. Chinese and Pakistani crews are carving the Karakoram Highway —a symbol of increased cooperation —from Sinkiang Province to Gilgit. At an unbridged lake (**below**), Pakistani soldiers supervise the ferrying of Chinese provisions.

(Continued from page 657) civilians. "Soon we'll see more Chinese than Hunzukuts here," mutters one of our companions. Some 20,000 are engaged in the project, we are told.

We cross a wooden bridge; it is guarded by Pakistani soldiers, but not for strategic reasons. Firewood is very scarce, and wooden planks make excellent fuel. Farther on, at Khudabad, Riaz indicates a track toward the west. "That way is the Chapursan Valley." There the people are so poor, we have heard, that they mix earth with their flour to gain extra mineral nourishment.

We stop at several military checkpoints, and pass more Chinese camps; the road improves as we approach the frontier. At last we reach Khunjerab Pass—altitude 16,188 feet—and gaze out over Chinese Turkistan, or Sinkiang, long closed to foreigners.

"China—Drive Right," warns the sign at the frontier. There is no guard post, but a few miles away we can see a camp. All seems serene, yet we stand at the crossroads of Central Asia. Even in recent history the Britannic lion, the Muscovite bear, and the Chinese dragon have all eyed each other uneasily at this strategic junction.

British Turn Brigands Into Farmers

On the way back toward Baltit, the heart of the Hunza Valley, we pass dozens of Chinese trucks in convoy, carrying supplies for the road-building camps. "They even bring their own drinking water from China," Riaz claims. We find an irony in this, for outsiders long regarded the water of Hunza—clouded with glacial silt—as a health-giving elixir.

Compared to conditions in lower India, the good health and longevity of the Hunzukuts impressed the British when they arrived in this region in 1891. At that time the country was called Kanjut, and its inhabitants Kanjutis. So feared were they as brigands that caravans either avoided the valley or paid tribute to the mir for safe passage.

The British quickly defeated the Kanjutis, ousted the mir, and installed his brother on the throne. The Kanjutis—now the Hunzukuts—have been peaceful farmers ever since. Even traditional squabbles with their neighbors in Nagir, across the Hunza River, have long been settled.

A famous physician of British India at the turn of the century, Sir Robert McCarrison, wrote of these mountain people: "Their nerves are as solid as cables and sensitive as

Carrying a cargo of love, a shepherd prepares to cross the Shimshal River during the annual cavalcade of valley herds to high summer pastures. About half the 800 Shimshal villagers make the seasonal trek, camping there from mid-May to mid-October. The others remain behind to tend crops.

Outsiders have often marveled at the stamina of the mountain people. During climbing expeditions into the Karakorams, they have found the endurance of Hunzukut and Balti porters at high altitudes rivals that of Sherpas in the adjacent Himalayas.

No clod goes unturned in the arid Karakorams, where existence depends on scant patches of arable soil. In the Balti village of Yugu two men pull a plow guided by a third, as a child dozes on the ground (**right**). A bare-footed woman spades her garden near a field of ripened barley (**above**).

Apricots, eaten fresh in summer and dried for winter, provide a staple in a largely vegetarian diet that includes barley, wheat, buckwheat, and garden vegetables. A maze of canals carries glacial runoff to irrigate fields; because bright sunlight melts ice and increases the flow, farmers look for clear skies, not clouds, to bring the bounty of moisture.

the strings of a violin." He attributed much to their diet, based largely on fruits and grain.

However healthful the diet may have been, it was dictated more by nature than by choice. In this harsh environment fuel is scarce, so food is seldom overcooked. Limited pasturage means modest herds and little meat. Chickens and eggs are scarce where grain must be set aside for next year's planting.

The good health and longevity of the Hunzukuts became legendary, though generally exaggerated.* In truth, the people of Hunza, though hardy, suffer from many of the illnesses of the outside world.

Wheat Sprouts Make a Special Treat

When Pakistan achieved independence in 1947, however, many things changed rapidly in Hunza. Young men enlisted in the Pakistani Army and returned with a taste for tobacco and candy. In 1960 a new road from Gilgit brought in flour, kerosene for stoves, and inexpensive *dalda*—margarine that replaces the fine oil pressed from apricot seeds.

"I have witnessed the evolution that is taking place in my country, but what can be done? We must accept changes; they are unavoidable." So says Qudrat Ullah Beg, or "Haji Sahib," Riaz's father-in-law, who welcomes us on our return to Baltit.

It is good to lose the bitter dust of travel from our cracked lips. We stay with Haji Sahib for two weeks; he is a wise and lettered man, and he teaches us much about the ways of the Hunzukuts.

In our honor the lady of the house, Bibi Mehrab, prepares *deram fiti*—a dish made from young wheat sprouts, dried and ground into flour and cooked like crepes. Naturally sweet and covered with melted butter, they are a coveted treat in Hunza. "I won't make any deram fiti when you come to my house," warns a girl when her brother playfully threatens to beat her.

As we sit drinking tea on small cushions around a cloth, we enjoy the company of Wazirzadah Ali Murad, centenarian of Baltit. A jolly fellow with henna-dyed hair and laughing eyes, he says he is 102; his nickname is "Joonu"—"beloved" (page 652).

"Joonu, how do you know you are more than a hundred years old?" Roland asks.

"Because everyone keeps telling me so," Joonu replies with a sly grin. If the legends be true, Hunza surely is populated with centenarians, but despite our efforts to find them, we have met only two. The second, Noor Mohammad, lives in Gulmit and passes the time quietly, chewing caramels all day long.

I am awakened at 5 a.m. by the sound of chopping. It is Bibi Mehrab cutting wood for the morning fire. It is strange to see this elderly woman, her head coquettishly covered with an embroidered bonnet and veil, performing such hard work. I join her in the kitchen. Everyone else is still asleep. A calmness always spreads over me when I am near Bibi Mehrab, for she goes about her chores with great serenity.

"What have you done to have only one child?" she asks me. Her own children range from 12 to 30 years of age, and seem evenly spaced, four to five years apart. "We leave our husband's bed until each child is weaned," she explains simply. But this natural means of birth control has declined, and population has soared.

Since the construction of the road, whole new settlements have sprung up, and many Hunzukuts have migrated to the larger towns and villages in Pakistan.

About 6 a.m. everyone awakens and has breakfast—a chunk of bread soaked in a bowl of salted tea with milk. Then Bibi Mehrab goes to the fields with her daughter. There they will plant, pull weeds, gather fodder to be dried and stored for the winter, and milk the cows.

Life-giving Canals From the Glacier

Haji Sahib shows Roland the local irrigation system. Construction and maintenance of the canals is everyone's job, because irrigation is vital to every village in these arid mountains. Most of the water for Baltit and surrounding villages comes from the ice of the Ultar Glacier.

From one main canal the water is divided and subdivided into smaller and smaller ditches; it is rigidly apportioned among the farmers, and many of the disputes in this mountain region arise over water distribution. Drinking water comes from the same canals and is named, like French wines, according to location; the most highly esteemed comes from the Barbar channel.

Our days pass peacefully. From our terrace overlooking the main square of old Baltit, I can watch the daily comings and goings. In

*Dr. Alexander Leaf studied the longevity of the Hunzukuts in "Every Day Is a Gift When You Are Over 100," in the GEOGRAPHIC for January 1973.

the schoolyard near the house of reunion the students gather at 8 a.m. to pray and sing the Pakistani national anthem. The half a dozen shops open their doors; a few men lounge in the morning sun, roses tucked into the rolled brims of their woolen berets. Women fetch water from the communal basin, or return from the fields bent under willow baskets filled with fodder.

In the courtyard Romain is busy with the other children, plastering mud over a small framework of branches. They are making a house for the laying hen which Riaz brought as a gift for his in-laws. "She has not been laying any eggs," Romain explains to me, "and Haji Sahib says it is because she does not have a house." Sure enough, the next day the hen produces an egg.

Apricots a Staple Food in Hunza

The time I spend with the women preparing meals is enriching for me; we ask each other many questions, and I learn many things. Today, while Bibi Mehrab cooks dandelions, her daughter Khush Begum mixes and squeezes the dried apricots that have soaked overnight, preparing *faring-cho*, an excellent fruit juice.

Together with cereals and dried mulberries, apricots remain a staple food in Hunza. I have read that a Hunzukut woman does not want to live where apricots do not grow, but Bibi Mehrab dismisses this with a proverb:

"If the husband goes to the mountain, his wife ought to go to the mountain; if the husband goes to the river, she should also go to the river."

It is time for us to go to a different mountain, a different river. We have enjoyed Haji Sahib's hospitality too long, and there is a different part of this Karakoram country that we have yet to see. It is Baltistan, a region about a hundred miles southeast of Gilgit, where Hunza's famous apricot trees are supposed to have originated. From there, too, we are told, came the artisans and masons who built the palace of the Mir of Hunza as part of the dowry from his bride, a Balti princess.

We head for Skardu, the administrative center of Baltistan. We drive the sinuous track along the Gilgit River, a tributary of the Indus, then along the "Father of Waters"—the Indus itself, which flows northwest out of Tibet. At this time of the year it courses in muddy waves that explode against the cliffs and rocks in the narrow gorges.

Where the valley widens into a plain, we come to Skardu—in the midst of a sandstorm. The wind moans and the sand nearly blots out the jagged peaks of the Karakorams. Here is the densest aggregation of high peaks in the world (pages 650-51). Mount Godwin Austen, or K2, second only to Mount Everest in the nearby Himalayas, is only one of 19 peaks above 25,000 feet.

Baltistan's 200,000 people are an ethnic composite of Tibetan and Indo-European. The first Balti we meet describes the climate of this high, arid region: "In summer eggs fry; in winter water freezes."

Many Baltis wear their hair long, under a small conical white hat. With full blouses belted at the waist and trousers tucked in at the ankles, they remind us of Florentine page boys of the Renaissance.

Formerly Buddhists like their neighbors in eastern Ladakh, they became Shiite Moslems in the 15th century. They are now governed by Pakistan, while the other Ladakhis are under the rule of India.

The Indo-Pakistani cease-fire line that divided Kashmir in 1949 put an end to the free exchange of caravans and people. No

Fuel from apricots: In the waste-not, want-not tradition of the mountains, a girl kneads paste made from the nutlike seeds of the fruit. Oil extracted from the paste is used for cooking and fuel for lamps, or brightens the hair as a cosmetic.

longer do the *amchis*—Tibetan doctors from Ladakh, well versed in acupuncture—come to Baltistan to pick medicinal herbs in this desertlike region.

Of the six valleys that constitute Baltistan we choose to visit Khapalu, some fifty miles east of Skardu. We drive through reddish desert landscapes and over high ridges on alarmingly acrobatic roads. We are following an Indus tributary, the Shyok, which braids among sand and gravel banks like a Hindu goddess with many silver arms.

We find the views here as splendid as any we have encountered. The Earl of Dunmore, a British explorer who spent a year crossing the Karakorams in 1892, called the scenery near the Shyok Valley "more beautiful than anything I have ever seen in my life. . . . magnificent, and on an enormous scale, larger than anything even in the Rocky Mountains of America."

Against such a backdrop, on the left bank of the Shyok, stands the idyllic village of Khapalu. We settle in the tidy government rest house, shaded by a century-old walnut tree. The emerald lawn and the garden ablaze with giant poppies are worthy of a cottage in the English countryside.

The Khapalu Valley resounds to the song of a thousand birds, unlike Hunza where we rarely heard such music. Romain discovers two young hoopoe birds fallen from their nest in a hollow tree; he replaces them gently, and is delighted when the parents once more fly on their striped wings to feed them.

Each Man His Own Raja

Until recent years Baltistan was divided into separate principalities, each ruled by a raja. Now the Pakistani Government has stripped these sovereigns of their power. In Khapalu's crowded bazaar we hear a representative of the Pakistani People's Party exhorting the villagers:

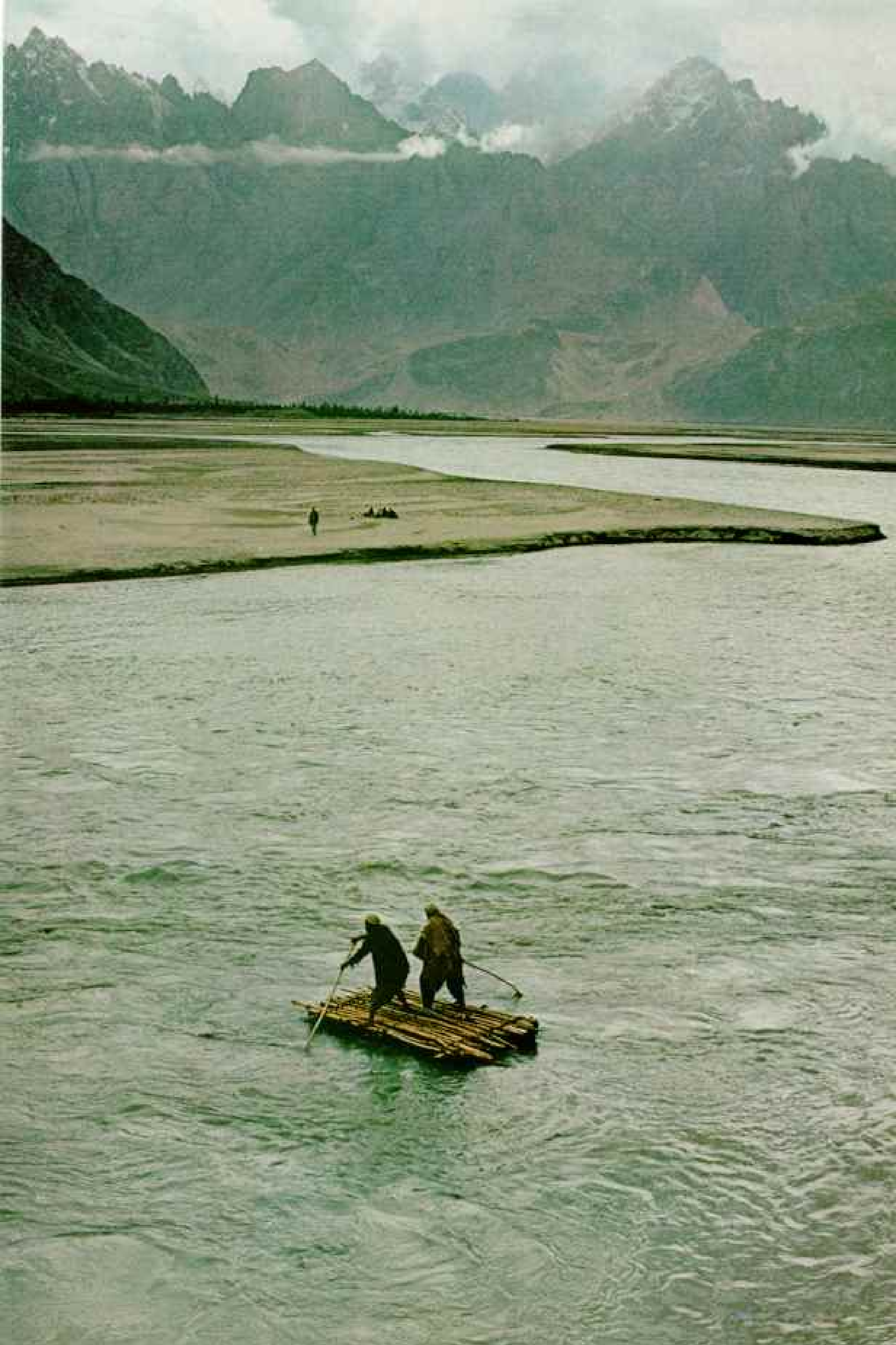
"The time of the rajas is over," he shouts. "Now each of you is his *own* raja!"

We meet the Raja of Khapalu, Yabgu Fateh Ali Khan, at his aged but charming palace overlooking the village. "I am the seventy-second descendant of the chieftain of a Turkish tribe, the Ghuzz, which once ruled all of Tokharistan," he tells us. Though his power is gone, he remains the most respected figure in the valley.

He offers us delicious cherries from his garden; while he and Roland talk, Romain and I slip away and look for the tree that bears them. We are followed by a flock of young girls, including one beauty with languid green eyes and freckled face who intrigues me. Between pidgin English and Persian she finally makes me understand that she is Nasra, the daughter of the raja's brother, who married an Englishwoman.

In the days that follow, Nasra takes me to meet the women of other villages around Khapalu. Dressed mostly in black, they wear silver jewelry and bonnetlike headdress. They offer us wild flowers for our hair, and dishes of *tchafe*—a flavorful gruel of ground, roasted

Slim poles battle the current as Balti ferrymen cross the Shyok River on a raft buoyed by inflated skins (**right**). The Michauds crossed for a hunting trip; Romain, wearing a goatskin life preserver (**left**), faces the adventure with characteristic cheer.



barley laced with sugar and butter. They impress me as a simple, strong, and serene people, befitting this peaceful valley in which they live.

Before our stay in Khapalu is ended, a friend invites us to go hunting with him to Muchilu Bowari, two days distant. We set out next morning to cross the Shyok, but the current is swift and deep. A raftsman, or *chungkhann* (literally "man sitting on the water"), ties an inflated goatskin to Romain as a life preserver (page 666).

The frail raft rides low in the water under our weight. The ferrymen lean on their poles with all their strength, but still we are carried far downstream before reaching the opposite bank.

Rough Ride On an All-purpose Yak

We trudge for half a day up a steep and rocky path. Climbing to a small plateau, we find a herdsman grazing a few yaks, and Roland hires one of the woolly animals for Romain and me to ride.

Baltis call the beast *hiyak*, and regard it as the king of animals. The *hiyakmo*—female yak—gives fine milk, about a pint a day in winter and six times that in summer; the butter made from it is above all praise.

Yak meat is relished by the Baltis, and they waste nothing of this versatile animal. The wool is used for weaving rugs, bags, and twine; the hide makes shoes; the horns are fashioned into musical instruments; yak dung serves as fuel; and yak tails make fine fly whisks.

"Cho khon, hiyak khon," says a local proverb; "Offend not a raja or a yak." Neither, is the implication, will ever forgive you.

Surely Romain and I have offended this cross, capricious beast. It lurches wildly, and seems to choose the steepest, riskiest slopes. We cling nervously to its long hair, listening to rocks rolling after every step.

"I would rather walk, Mama," Romain says. "I am not comfortable." Nor am I.

At that moment the stocky animal gives a vigorous kick, throwing both of us from the loose saddle. We rub our bruises and walk.

Near the village of Muchilu Bowari we are joined by a local hunter, a man with a keen gaze and a wispy white beard. Old as he is, his weapon is older: an antique muzzle-loader with a carefully polished stock. In these mountains hunting is one of the few pleasures a villager can afford; it may put an occasional duck or ptarmigan on the table, or keep a fox or wolf away from the flock.

But now we are in search of the Siberian ibex, whose scimitar-shaped horns we have seen decorating the tombs of Moslem saints.

At this season the ibex seek the higher elevations, and we spend the day climbing exhausting rocky trails. Often the hunters stop and stand perfectly still for long minutes, carefully scrutinizing the crags and peaks around us. The ibex, we are told, blends well into this rocky background, and if it sees us it will not move.

"The ibex has been more cunning than we," observes our friend as we trudge tired and empty-handed back toward the valley. Only later do we discover that big-game hunting here is now illegal. We are grateful for our bad luck.

Plump Pigeons Save the Day

But the hunt is not yet over. A flock of pigeons explodes into the air from behind a boulder; our host flings his shotgun to his shoulder and downs four with a single shot.

"So it was meant to be," he says cheerfully. "No ibex to eat, but four fine, fat pigeons!"

It is a philosophy, a scale of values that we have observed often in our wanderings through these Karakoram mountains, and that we have come to admire and respect.

We have not found Shangri-La, of course. A new hotel alters the ancient terrace-lined face of Baltit. Roaring machines and road builders' dynamite scar the beauty of the Hunza Valley. Transistors disturb the tranquillity of remote Shimshal, and political slogans resound in the bazaars of Baltistan.

Yet in these high valleys, so difficult to reach, we have met and shared in the lives of people who may be poor by our standards, but extraordinarily rich in other ways. It remains as it always has been: True paradise lies in the heart of man. □

Bouquet of tranquillity: A winsome Shimshal lass clutches a handful of apple blossoms from a valley orchard. Fondness for the beauty that surrounds them and a generosity that touches the hearts of travelers still weave a gentle thread through the harsh slopes of the rapidly-changing Karakorams.

LIBRARY OF CONGRESS

The Nation's Bookcase

By FRED KLINE

Photographs by

DICK DURRANCE II

WITH NATIONAL GEOGRAPHIC STAFF

DREAMING and reading and making notes for a poem I was writing, I sat in the Main Reading Room of the Library of Congress engrossed in the *Phaedo*, Plato's record of his teacher Socrates' last day on earth. The scene is an Athens prison in the summer of 399 B.C. Socrates, condemned to death, is charged with introducing strange gods and corrupting the young. His questioning and reasoning shattered too many illusions. Most Athenians, it seemed, preferred an unexamined life.

I looked up from my book and daydreamed under the gilded thinking cap of a dome. From the gallery of the immortals that circled the room, I saw the image of Plato peering down at me. Statues of Moses, Newton, Columbus, Shakespeare, and others also stood their vigil over this temple of knowledge. It was impossible not to feel that this

Haven for the questing mind, the Library of Congress acquires almost two million items each year and circulates many in the Main Reading Room (**left**).

Glory to God shines from a Book of Hours, or prayer book (**following pages**). The illuminated manuscript, executed in Paris in 1524, is one of the Library's priceless treasures.

fœ: vt qui tibi placere de actibus nostris non
valemus: genitricis filii tui domini nostri
intercessione saluemur: Per eundem christ
sum dominum nostrum. ℟ Amen

Sancti dei omnes intercedere digneminí
pro nostra omniumq; salute. ℣ Lætamini
in domino: & exultate iusti. ℟ Et glori
amini omnes recti corde. Oratio

DRAESTA Quæsumus omnipotens
deus: vt nullis nos permittas per
turbationibus concuti: quos in apostolice
confessionis petra solidasti.

mnes sancti tui: vt supra.

ADVE PER SDE EAT SEMAVI
GINE MARIA DE GE
NITRICE

VERS S

EVS in adiutorium meum
intende Domine ad ad
iuuandum me festina
loria patri et filio et spiritui sancto
icut erat in principio A Dum esse

DIXIT Dominus domino meo: sede a dextris meis
donec ponam inimicos
tuos scabellum pedum tuorum

was a hallowed place. The spirit of the martyred Socrates seemed to say: "Within these walls, the collective mind of civilization awaits you. Ask your questions. Remember, the unexamined life is not worth living."

Thus, with Plato's ancient text, I began my excursion into the Library of Congress—cornerstone library of the United States, information center for the Legislature, and ultimate keeper of recorded civilization for the nation.

Each year more than a million and a half visitors enter its doors. Physically, the Library occupies two, soon to be three, large buildings on Washington's Capitol Hill. The palatial main building opened in 1897. Close by stand the Senate and House Office Buildings, the Supreme Court, and the Capitol (page 687). The Library is connected to the Capitol by a pneumatic tube 1,100 feet long that speeds books back and forth.

One of the greatest libraries in the world, the LC shares that pinnacle with the Soviet Union's Lenin State Library, France's Bibliothéque Nationale, and the British Library. To mention a few of its mind-staggering collections: Here are some 17 million books; about eight million photographs; more than three million maps; 31 million manuscripts; four million pieces of music.

Not surprisingly, the collections have overwhelmed the Library. Since the mid-1950's there has been no more room on the 336 miles of shelves. Stacked in almost every usable space, millions of hard-to-find and damage-prone volumes await shelving—possibly by 1979—in the James Madison Memorial Library being constructed across the street.

IN THE MONTHS I spent at the Library, I found echoes of the past at every turn. As I roamed the Great Hall, the Corridor of Myths, the Hall of Muses, the first item I saw displayed was a Gutenberg Bible, printed about 1455. Its Book of Genesis marks the beginning of printing in the Western World. Nearby was Thomas Jefferson's rough draft of the Declaration of Independence. As Vice-President, he took an active interest in the Library's founding in 1800. It was then housed in the Capitol.

When the British burned the Capitol in 1814, all the books were lost. Ex-President Jefferson, retired to Monticello and deeply in debt, offered to sell Congress his personal library as the nucleus of a new collection. The subsequent purchase—the 6,487 volumes of a man whose mind ranged as far as Leonardo da Vinci's—altered forever the Library's legislative character.

IT IS NO EXAGGERATION to say that every person who has significantly influenced American life is represented by an item of importance in the Manuscript Division. Many consider it the Library's principal glory.

On the shelves scholars find personal papers of 23 Presidents—ranging in historical interest from Washington's First Inaugural Address to Coolidge's note saying, "I do not choose to run for President in nineteen twenty eight." Here is Robert Fulton's treatise on submarine navigation; a fan letter from T. S. Eliot to Groucho Marx; the papers of Susan B. Anthony, Alexander Graham Bell, Sigmund Freud.

I found a revealing letter Lincoln wrote in 1863 to a Shakespearean actor, in which he names his favorite play. "I think nothing equals Macbeth. It is wonderful." The letter continues: "Unlike you gentlemen of the profession, I think the soliloquy in Hamlet commencing 'O, my offence is rank' surpasses that commencing 'To be, or not to be. . . .'" The letter's underlying dark mood left little doubt in my mind that the Civil War tortured Lincoln's soul.

The records of the National Association for the Advancement of Colored People from 1909 to 1959, among the largest collections of documents ever acquired, provide a gold mine of source materials for the study of Afro-American history.

Walt Whitman wrote in 1855, at the end of the preface to *Leaves of Grass*, "The proof of a poet is that his country absorbs him as affectionately as he has absorbed it." Among the memorabilia, within the vast Charles E. Feinberg Collection of the papers and books of our great national poet, I found delightful proof that he had, indeed, been absorbed by his country: labels for a line of canned vegetables bearing Whitman's name.

As America grew, men and women worked and sang their songs, and Whitman wrote: "I hear America singing, the varied carols I hear." In the Archive of Folk Song, our

Illuminated initials are reproduced from a French Book of Hours completed about 1510 and now in the Lessing J. Rosenwald Collection, Library of Congress.

Punching in a call for legislative data, Senator Howard W. Cannon of Nevada (**right**) uses the Congressional Research Service. Some 475 full-time specialists compile reports on legislative issues, then catalog them in the Library's computer. When a Congressman punches a code on his office terminal, the information he requests appears on his screen. The CRS answers about 2,000 queries a day (**lower right**). A hot line from the floors of Congress handles last-minute questions.

oral traditions have been preserved on thousands of records that contain items of folk song, folk music, oral history, riddles, proverbs, and games.

I listened to America singing. I heard the coal miners singing "Down, Down, Down" and "Sprinkle Coal Dust on My Grave"; the songs of sailors: "Blow the Man Down" and "Homeward Bound"; the cowboy singing "The Night-Herding Song" and "The Cowboy's Life Is a Very Dreary Life." I heard the songs of the railroad men—"Calling Trains" and "Lining Track." I heard the lumberjacks singing "Turner's Camp on the Chippewa" and "The Falling of the Pine." The flavor and spirit of a toiling young nation live on in these songs that reflect the workman's camaraderie, his shared hardship, his loneliness.

In the Library cafeteria over lunch, I talked to Joe Hickerson, who heads the archive (page 683). On his desk earlier I had seen an album of songs that he had recorded, and I asked him if he had contributed any songs to the folk-song revival of recent years. Modest and serious, Joe was not quick to answer. "I guess the most popular one that I had something to do with was 'Where Have All the Flowers Gone?' which I helped to write. Pete Seeger had written it with three verses. I added two, and Pete heard them and liked them enough to have the song recopyrighted.

"I made it longer and brought it back full circle to the flowers. The flowers had gone to the young girls, the young girls had gone to the soldiers, and the soldiers had gone to war. I added the soldiers, 'they've gone to the graveyards every one,' and the graveyards, 'they're covered with flowers every one.'"

I remembered the refrain: "When will they ever learn, when will they ever learn." Evoking, finally, a reverence for life, this song from our recent past offers an ironic and prayerful lament about a world too often at war.

The Nation's Bookcase

Blind but all ears, George Rose, a student at Washington's Sharpe Health School (**left**), listens to *Charlotte's Web,* one of three million talking books in the Library's collection. Regional libraries across the nation distribute the records and Braille books produced by the Library's Division for the Blind and Physically Handicapped.

Bent on finding a book, a researcher struggles with Library overflows (**right**). Congestion slows the stream of books to the Main Reading Room, where another researcher signals for silence (**below**).

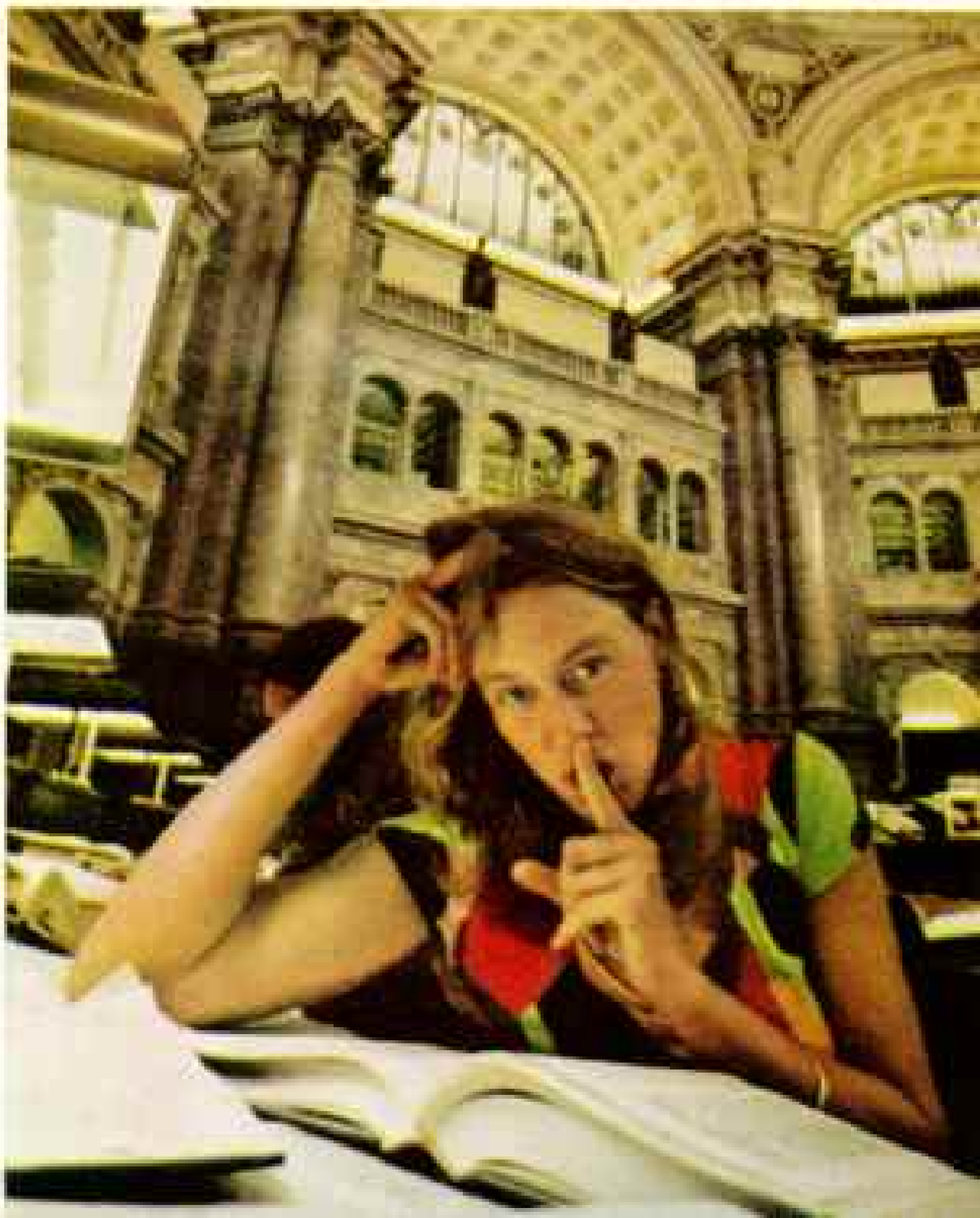
AN AIR from another time and place pervades the Rare Book Room. Here readers study priceless volumes, delivered to them from steel-and-concrete vaults where the collections are kept at a constant 68 degrees and 50 percent humidity. Among the noteworthy treasures is the 1640 Bay Psalm Book—the earliest surviving example of printing in the American Colonies, one of 11 known copies.

The special collections combine rare books with more-common ones. The richest collection—donated to the nation by Lessing J. Rosenwald—contains 2,600 items, including some of the world's most valuable illustrated books and manuscripts, as well as the finest editions of landmarks of recorded knowledge. Houdini's library of magic and the occult is one of the more exotic collections.

With William Matheson, Chief of the Rare Book and Special Collections Division, and his assistant, Dan Burney, I toured the book vaults. We began with the incunabula—books printed before 1501—the largest such collection in the United States. The name sounded so strange that I said it to myself over and over—*incunabula, incunabula*—and was spirited away into the mists of time.

I held in my hands the first printed Homer, issued in Florence in 1488, and leafed through the Greek text. Thinking to smell the Florence of Michelangelo, I brought it to my nose. It smelled like a clean old garment.

Dan Burney demonstrated for me the paper's suppleness. "These early volumes are in such good condition largely because the paper was made from rags and washed in the alkaline water of mountain streams. The paper we've been using for the past century is



made from wood pulp, is highly acid, and deteriorates rapidly. It is the acid in the paper that speeds up deterioration."

For a moment I explored the very likely idea that someone had worn the rags that went into this fine paper and refuted for all time that old saw "You can't make a silk purse out of a sow's ear." The tatters of peasants and urchins went into this paper and they were rags nevermore.

ARCHIBALD MACLEISH, renowned poet and former Librarian of Congress, credited with an important reorganization of the Library, created many things during his term, among them the title "Keeper of the Collections." The title, alas, is no longer used, but the job remains.

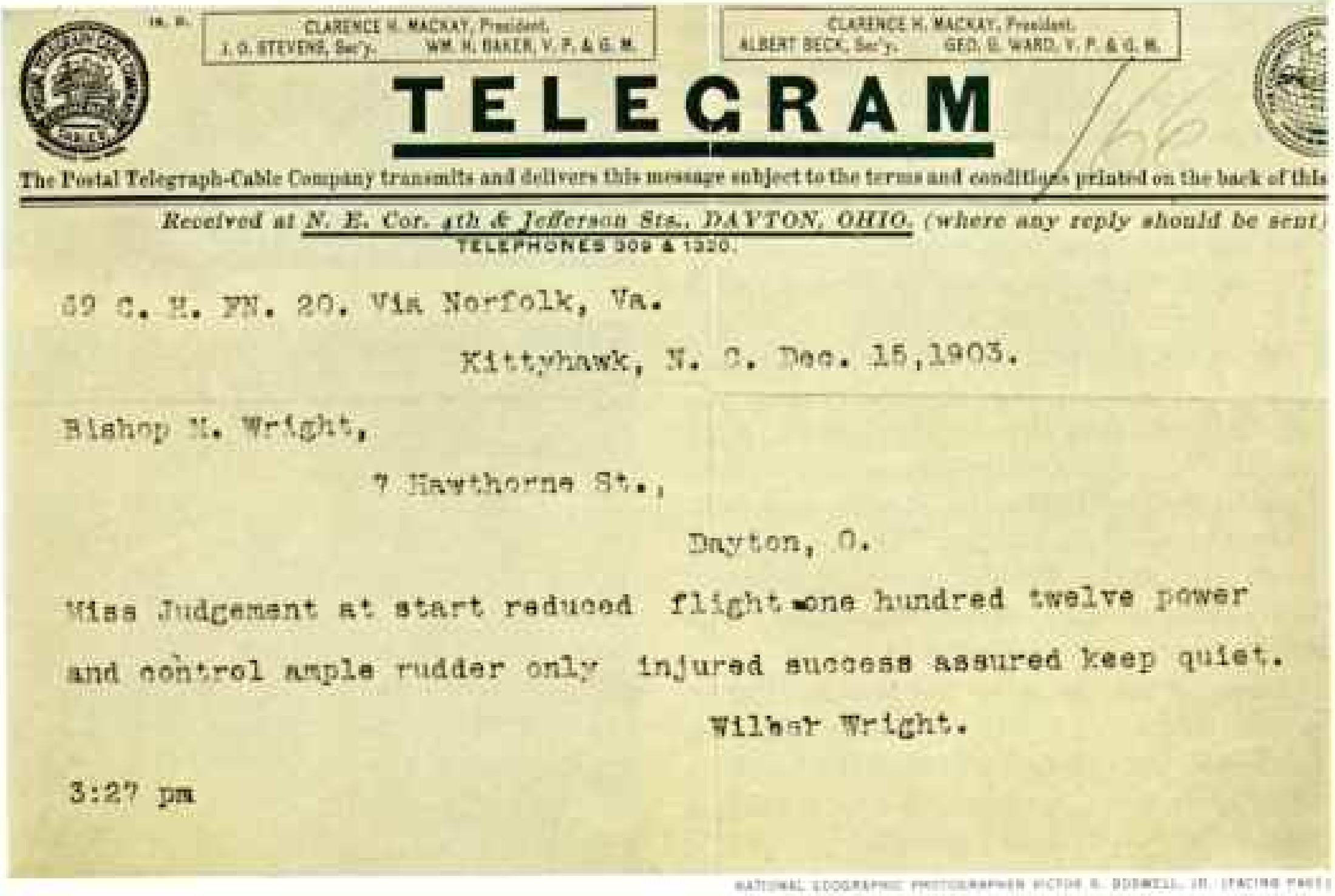
Frazer G. Poole's monumental responsibility as Assistant Director for Preservation is the maintenance, preservation, and restoration of most of the Library's collections. I asked him what the LC was doing about deteriorating materials. Some six million books will crumble at the turning of a page.

"First, we try to treat the really valuable materials in the collection by de-acidifying them to arrest or retard deterioration. Such materials are then restored to usable condition. Another way is microfilming when expensive restoration is not justified. This preserves the intellectual content at minimum cost."

Treatment and restoration of the rare and valuable materials in the collections are under the supervision of Peter Waters, the Library's Restoration Officer. Mr. Waters and two of his assistants, Donald Etherington and Christopher Clarkson, all helped in the rescue of the libraries of Florence following the disastrous flood of 1966.

When I found Chris Clarkson, he was engaged in a Herculean labor—the preservation of 8,000 aged tomes from the Law Library, the Library's million-volume archive and reference center of international law.

Soft-spoken and British and wearing a workman's apron, he seemed a man of powerful determination. And he was troubled. "Here you see part of a phased preservation



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TELEGRAM

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TELEPHONES 309 & 1320.

39 C. H. FN. 20. Via Norfolk, Va.

Kittyhawk, N. C. Dec. 15,1903.

Bishop M. Wright,

7 Hawthorne St.,

Dayton, O.

Miss Judgement at start reduced flight one hundred twelve power and control ample rudder only injured success assured keep quiet.

Wilbur Wright.

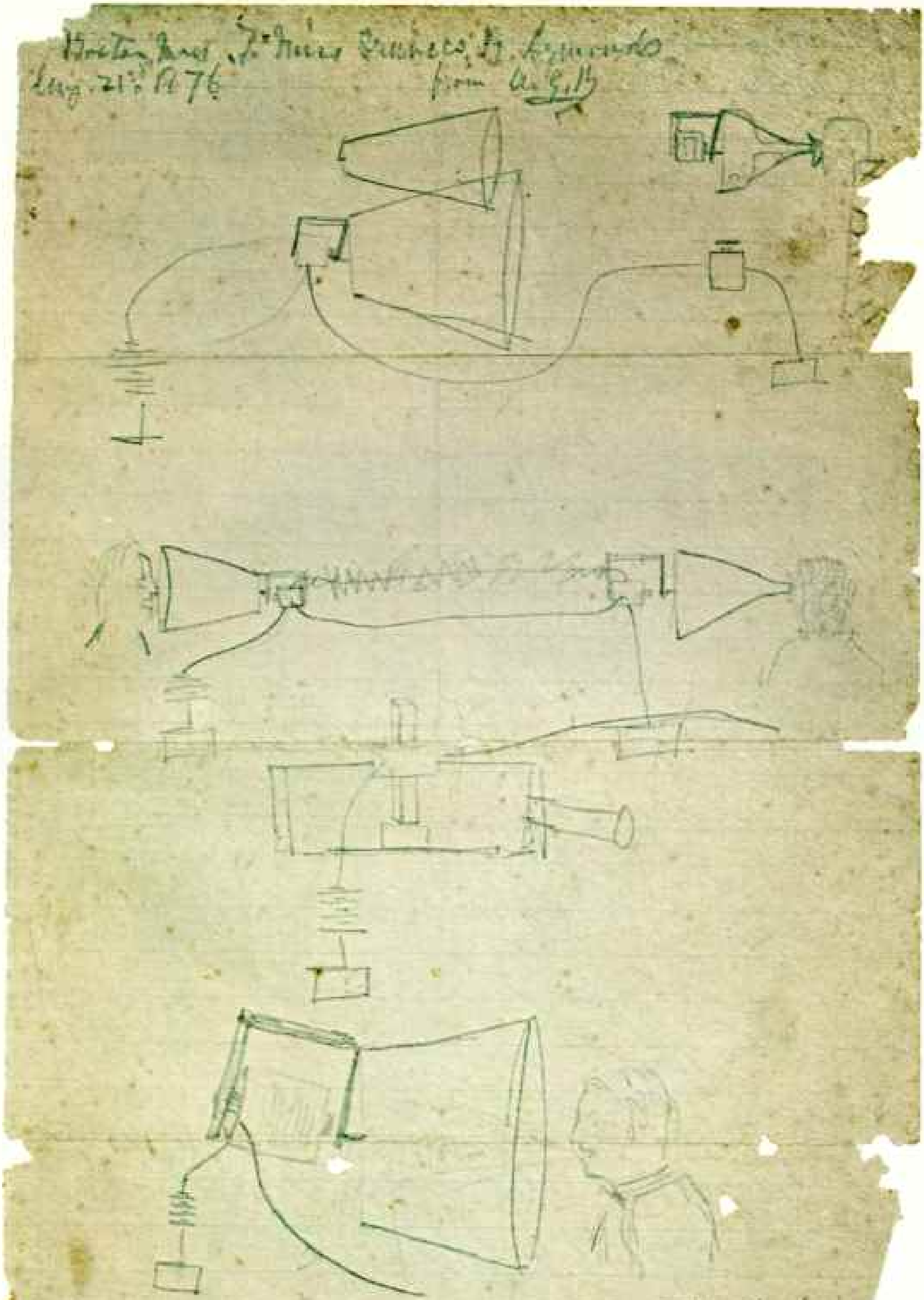
3:27 pm

NATIONAL GEOGRAPHIC PHOTOGRAPHER VICTOR R. BOSWELL, JR. (FACING PAGE)

Off to a flying start, Wilbur Wright optimistically wires his father "success assured" for the flight on December 17 that was to launch the Air Age. "Keep quiet" reflects fears about advance publicity. "Miss Judgement" and the misspelling of Wilbur are telegrapher's errors (**above**). Alexander Graham Bell's first sketch of the telephone (**right**) highlights a collection of Bell papers recently given to the library by his heirs.

Exhibited at the Franklin Institute, Philadelphia, U.S.A.
Aug. 21st 1876

from A. G. Bell

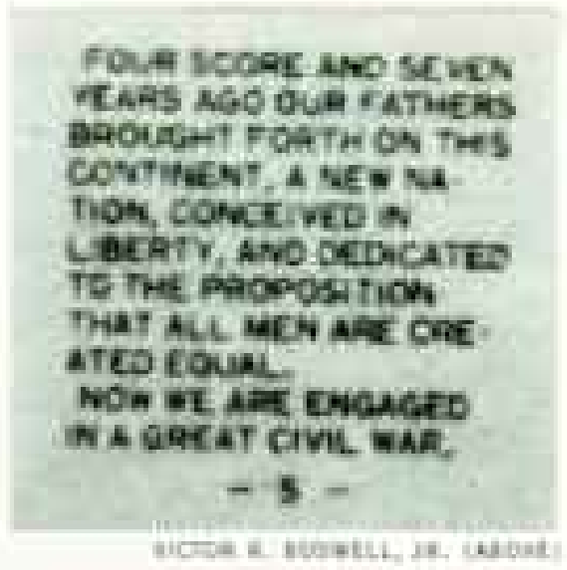


As far as I can remember this is the first electrical instrument for the transmission of vocal utterances by telegraph.

A. Graham Bell

Match-head copy of the Gettysburg Address, printed in Tokyo in 1965, is one of the world's smallest books (**right**). The Library's miniature-book collection contains more than a thousand volumes, each less than four inches tall. At the other extreme, John James Audubon's "elephant folio" of American birds stretches four feet wide (**below**).

Fighting time and decay, 37 restoration experts work to preserve the Library's rare books, manuscripts, and prints, patching tears and cleaning stains page by page. "Aging ovens" in the Library's laboratory hurry time's effects on paper and help chemists predict which treatments are best. Microfilm replaces books too brittle to use.



VICTOR R. BOSWELL, JR. (ABOVE)

program. Since our resources are inadequate to restore all the valuable deteriorating books, we're making boxes to give them a more protected shelf life." The boxes were cunningly designed, making perfectly fitting straitjackets for the timeworn volumes. He spoke of the great need for people trained in book conservation.

"Here's a real horror story," Chris said quietly. "These used to be the letters of Hans Christian Andersen." What I saw could have passed for a pile of crumbled crackers. "Luckily, the letters had been microfilmed in Denmark. When the Library acquired them, they were in celluloid envelopes—the same cellulose nitrate used in thousands of old movies that the Library is also trying mightily to preserve. As you can see, it's self-destructive, and anything in it or near it is destined to be destroyed." When I left, I wished Chris luck in getting the hundred more people needed in the Restoration Office.

CONGRESSMEN CALL the Library for virtually everything: analysis of issues, legal research, translations, assistance with statements and drafts of speeches, the drawing up of charts, and help with constituent mail.

It is the primary responsibility of the Congressional Research Service, a department within the Library, to respond to Congress's requests. And the requests come at the rate of 2,000 a day. The research may take an hour or months; reports delivered to Congressmen may be three pages or 300. They range in topic from "Adoption of Alien Children" to "Zero-base Budgeting."

A Congressional hot line relays quick answers to questions that often originate from the floor of the House or Senate (page 675). A Congressman once asked about the origin of the term "silent majority." According to the researcher, the first instance of its use was an article on funeral practices in an 1874 *Harper's New Monthly Magazine*.

Charles A. Goodrum, Assistant Director of the CRS and author of a recently published book on the Library, gave me his feelings about the complex services that the Library strives to render:

"On the one hand you have a Congressional library furiously trying to live in the present—Congress needs to know right now and we're their brokers of information. On the other hand you have a national library furiously trying to gather and catalog material for the scholars of the future. Yet nothing could be more reasonable than combining the two to make the resources of the present and the future as rich as possible."

THOMAS EDISON predicted that one day his favorite invention, the phonograph, might be used to play books for the blind. This invention, together with pioneering work on the flat disc record by Alexander Graham Bell and others, made the concept of the talking book possible. In 1934 the American Foundation for the Blind produced the first talking books. Today, in the Library's Division for the Blind and Physically Handicapped, the circulating collections of Braille and recorded books exceed four million.

Surprisingly, the division's work is not well known, although it performs some of the Library's most remarkable national services. "Our greatest problem is reaching those who need the service," said Charles Gallozzi, former assistant chief. "There are some seven million people eligible for the program today, but only about 400,000 are using it. Many think you must be totally blind. But even if you have 10 percent of your sight left you are legally blind, and entitled to our service."

Not only the blind, but people with physical disabilities affecting reading—including some children with perceptual problems—are eligible to receive, absolutely free for however long it is needed, a phonograph or cassette player and circulating talking books and talking magazines, including NATIONAL GEOGRAPHIC, that arrive in the mail.

To receive the benefits from the Division for the Blind and Physically Handicapped, a statement of need from an authority is forwarded to the regional library in the recipient's state, and it, acting as distributor of the books produced by the Library of Congress, will do the rest. "Our average user will keep a machine for ten years and listen to thirty or forty books each year," said Mr. Gallozzi.

A music section for the visually handicapped, one of the division's newest and most popular ventures, circulates a large collection of Braille musical scores and texts, and recorded instruction in voice, piano, organ, guitar, and drum.

HAD WRITTEN A BOOK of poetry that was going to be published while I was exploring the Library. I thought that I would follow it from its first contact with the Copyright Office and Processing Department, and by so doing gain an insight into the mysteries of those all-important cataloging centers for the nation's libraries and publishers.

Copies of all copyrightable material produced in the United States—books, photographs, prints, sheet music, films, plays, beer labels, and other intellectual works—are deposited in the Library. Thought of in these terms, the collections of the Library of Congress are made possible—in an important way—through gifts from the nation's creative citizens. Citing the myriad national services that the Library performs, many librarians and others over the years have urged its official recognition as "The National Library of the United States," a de facto designation it now owns and uses.

If the book conforms to the Library's broad, though selective, acquisition policy, it will proceed on to the cataloging stage, where a coded card emerges that becomes the book's definitive description—its ID card. It is then deposited in the Library's card catalog, printed and sent, for a fee, to thousands of subscribing libraries.

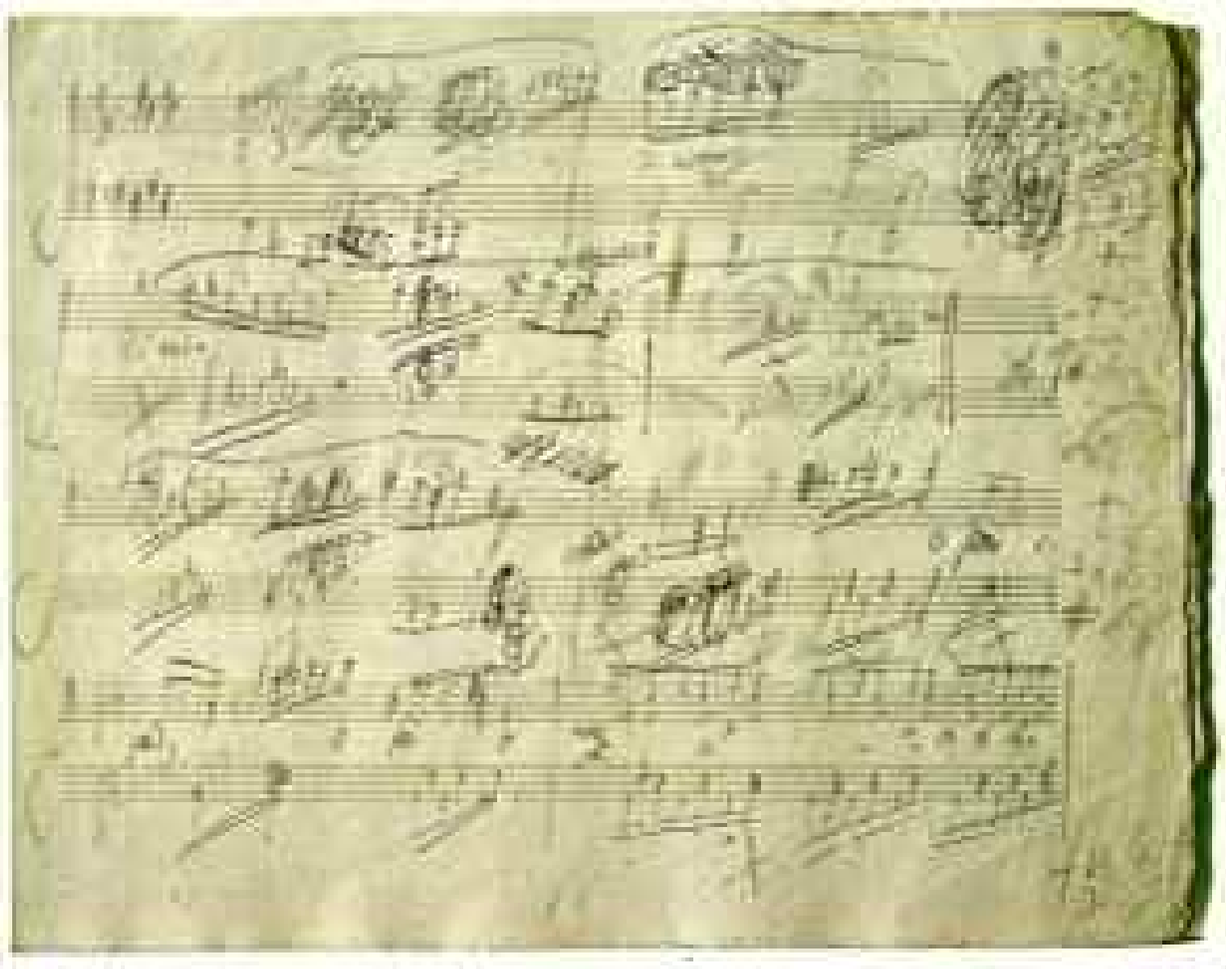
Anyone may read the Library's books *in* the building. Borrowing privileges extend chiefly to Members of Congress, government agencies, the Diplomatic Corps, local authors, and research libraries.

Strengthening the cultural life of the nation, the interlibrary-loan system enables libraries in the United States to borrow for scholarly research any item that cannot be found elsewhere. If the requested book or photograph or map is too rare to send, the Library's Photoduplication Service will make a copy for a fee.

At the end of the processing line is the National Union Catalog, the nation's bibliography. Literally an extensive inventory, it locates by the author's name all the books held by more than 1,100 libraries in the United States and Canada. Most of the significant English-language and European publications that have appeared since the middle of the 15th century can be found on the National Union Catalog's cards.

Out of curiosity, I checked under my name

Scribbled score of Beethoven's Piano Sonata in E Major, Opus 109, can be studied by any musician looking for errors that years of reprinting may have produced. Concerts by the Juilliard String Quartet in the Library's Coolidge Auditorium (**below**) draw audiences eager to hear the LC's famed Stradivari instruments.



Microphone and mountain lore meet in John Jackson's Virginia living room, as folklorist Joe Hickerson, right, records songs and stories for posterity. Since 1928 the Archive of Folk Song has worked to preserve traditional music, mainly American, building a collection of more than 200,000 recorded items.

and found that two of my earlier books were residing in libraries across the nation. It's good to know where your children are, I thought—go, make friends.

The ongoing publication of the National Union Catalog in book form, a monumental project, is the kind of enterprise that gives you a feeling of optimism, a feeling that we are trying very hard to get our oceans of information charted and mapped. It is a calculated step in the direction of education—information that can be used—not just for ourselves but for the world.

SEEKERS of more material things may find the collection of treasure maps and charts in the Geography and Map Division a stimulus for great adventure. But an atlas of 1482, Ptolemy's *Cosmographia*, spoke of a greater adventure—that of a world yet to be explored, the uncharted and unmapped Terra Incognita. Later, running my hand over a relief map of the moon, I thought of someone many centuries hence looking back to our time and being struck by how much of his world was reckoned by us as part of the unknown.

Now housed in a building in Alexandria, Virginia, the Geography and Map Division will return to Capitol Hill when the Madison annex opens. Among the treasures of the cartographic collection, the largest and most comprehensive in the world, is an extraordinary record of urban land use in the United States from 1852 to 1968—some 750,000 large-scale fire-insurance maps covering more than 12,000 cities and towns.

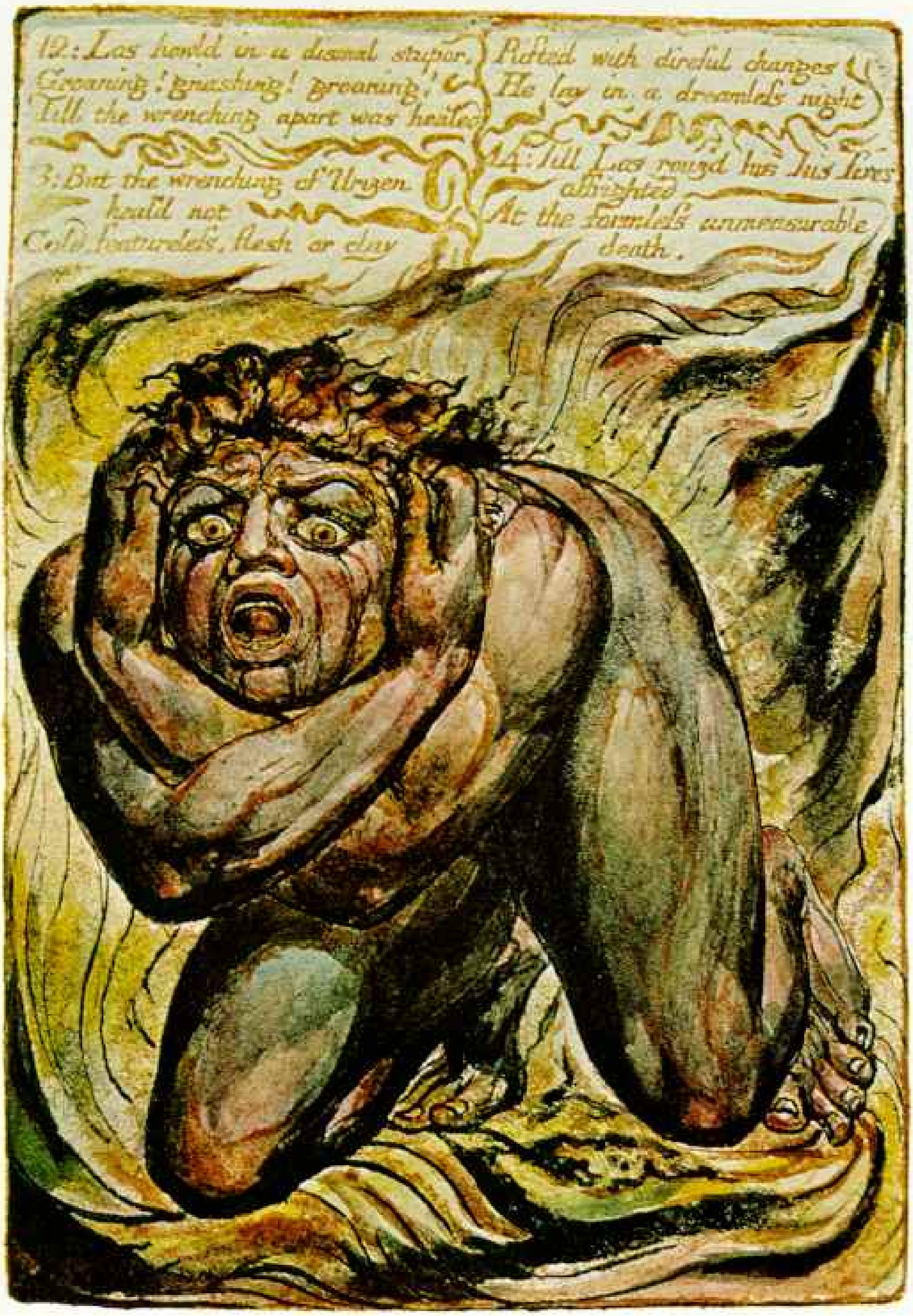
The Library's vast labyrinths, I found, house even the comic books of my youth. For a few hours one morning—in the Newspaper and Current Periodical Reading Room of the Serial Division—I dipped back into that spine-tingling world of the "horror" comics of the 1940's and '50's.

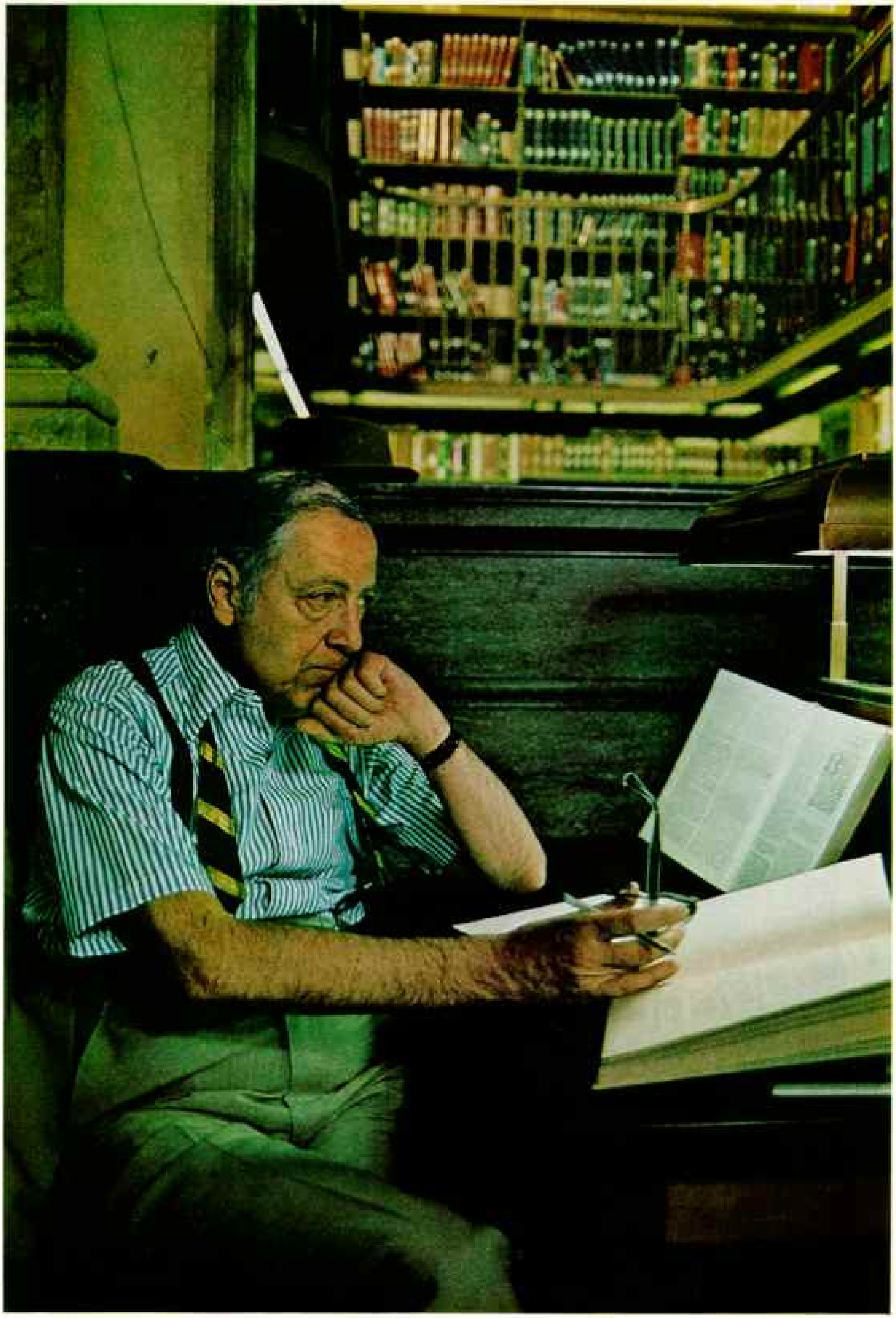
Here were stories—surprisingly literate and well drawn—like "Phantom of the Seas," and "Bat by Night," from a series called *Adventures Into the Unknown*. Somebody was out to scare me out of my wits, and they did, and I loved it.

On another occasion in the Periodical Reading Room, I requested—as if asking for last month's newspaper—*The Pennsylvania Gazette* from 1776, a bound volume of the originals, in amazingly good condition. In the

Superman's 37-year war on crime carries on (**above**) among comics now worth hundreds of times their original price. British artist Theodore Lane pokes fun at London life during 1827 in "A Thaw" (**below**).

Cringing in terror, William Blake's hell-bound Los confronts his fate in one of seven known original copies of *The Book of Urizen,* donated to the Library by collector Lessing J. Rosenwald, but kept along with the Book of Hours (pages 672-3) at his Jenkintown, Pennsylvania, gallery. Rosenwald treasures in the custody of the Library's Rare Book Room include the Giant Bible of Mainz, a manuscript begun in 1452.





issue dated July 10, 1776, I found what I was looking for. In a column about three inches across the front page, I read:

"In Congress, July 4, 1776.
A Declaration
By the Representatives of the
United States of America, in
General Congress assembled.
When, in the Course of human Events. . . ."

Here was the complete text of the Declaration of Independence in one of its first newspaper appearances. In the antique typeface of this 200-year-old page, I could imagine reading it for the first time. And I have never been so moved by those familiar words:

"We hold these Truths to be self-evident, that all Men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty, and the Pursuit of Happiness. . . ."

Reading the four-page paper, I was struck by a great irony brought home by many of the advertisements. Here was our fundamental testament of freedom just two columns away from reward notices for runaway indentured servants and slaves; and on the back page, slaves and servants were offered for sale. Business as usual.

The ideal had just been born, I realized, and for almost a hundred years slavery would still be a fact of life.

As we come closer to the Bicentennial of the American Revolution—with the Library of Congress's American Revolution Bicentennial Office in the vanguard of establishing the commemoration—it is heartening to know that "these Truths," in two hundred years, have become increasingly "self-evident" to a nation that values and responds to them.

THERE IS A GREEN and quiet center within this sanctuary of the mind, a garden courtyard of grass and flowering bushes and a still pool that reflects a window of walled-in sky. Here time passed like a silent river, and I thought about this Library of ours.

I thought about what it represented to the Republic: the love of learning, the lessons of history, the peace of study—those things that converged here, in this citadel of the examined life.

I remembered Josephine Jacobsen—a former Consultant in Poetry to the Library—speaking in her farewell lecture about "the instant of knowing," which she said comes about through "a knowledge of what we already knew, become so devastatingly fresh that it could be contained no more than a flash of lightning."

If ever a place offered the promise of finding that "instant of knowing," it was here at the Library of Congress. The thunder and lightning, wind and rain from those storms of the mind raging here promise energy enough to create many a new world. □

Realm of the intellect, the green-domed Library stands neighbor to the United States Capitol. Beyond its duty to serve Congress, the Library welcomes sightseers as well as readers and writers, among them author Herman Wouk (**left**), here working on a sequel to his best-selling novel *The Winds of War*.

Romania: Maverick on a Tightrope

By WILLIAM S. ELLIS

Photographs by WINFIELD PARKS

BOTH NATIONAL GEOGRAPHIC STAFF

Ten hands high and two around, a wide-eyed foal gets a taste of companionship in the rocky meadows above Romania's Urda Valley. As they grow older, both horse and friend will be harnessed to Romania's determination to maintain her independence within the Communist world. Their valley specializes in sheep-milk cheeses, including one wrapped in pine bark for flavoring.

NICOLAE CAPASTRARU is a man of 85, maybe 86 (he's not sure), and on the second Saturday in May for most of those years he has joined his fellow villagers to drink plum brandy, eat sausages, and wish the shepherd well.

So it was on a day in mid-May that this old man, his health failing, and most of the other 200 people of Buseşti feasted amid the flowering cherry trees on top of a mountain in southwestern Romania. They started to gather in the late afternoon. By the time darkness had overtaken the last splash of cranberry-colored light, the young were dancing to the music of a Gypsy band.

The Gypsies wore black—garments so frayed and threadbare that when the leader of the three-man band raised his violin, his elbows shone like peach stones through the jacket. His brother, the accordionist, smoked a cigarette while playing, letting the ashes fall in the folds of the instrument. Between numbers they solicited gratuities.

A kindly man, but penniless, Nicolae Capastraru offered the musicians two hard-boiled eggs. He was born in the village, he told me, and can remember attending the celebration as a child. Then, as now, it was known by some as the "Shepherd's Custom." Others call it the "Measurement of the Sheep." Whatever the name, it endures, unchanging, in a land whose bedrock is tradition.

At this time all the farmers of the village place their sheep in the care of one shepherd. The animals remain with him for the summer as they graze the sweet grasses of the tablelands. "Altogether there are 333 sheep this year," a farmer said. "The shepherd will milk them. He will also make the cheese, keeping a hundred pounds of it for himself. The rest will be divided among us."

Buseşti Rises Above Politics

Except for that tableau of collectivism, Romania's Communism has not yet climbed the mountain to Buseşti. Farms there are individually owned. No banners flaunt party slogans, no voices extol the ripening fruits of a five-year plan—not on this mountain, where the bleat of sheep is a hymn to life.

The road down, however, leads to a Romania in the painful throes of development. The hardships are many—grim austerity, government controls on the candor of expression, scrupulous adherence to the work ethic—but they are not without purpose. Romania has

FEEDING A GIANT'S APPETITE, *buckets of iron ore ride a cableway toward Romania's major steelworks in soot-shrouded Hunedoara. To the right, the stone towers of a 13th-century castle keep watch over the town. Resolved not to rely too heavily for its economic well-being on any foreign power—including the Soviet Union—Romania has strained its economy to industrialize. Two of Hunedoara's new open-hearth furnaces alone produce twenty times as much steel as did the entire plant a generation ago.*

Romania

TRANQUILLITY OF TIME and gentility of manners reign on a street corner (**left**) in the old section of Bucharest. Romania's everyday life reflects its position at a crossroads of cultures, with the Danube wending 1,770 miles across Europe to its mouth on the Black Sea, and the River Prut serving as a link with the Soviet Union and the north. Roman legions found the country's river valleys inviting and colonized the area in the second century A.D. Their descendants speak the Balkans' only Romance language.

GOVERNMENT: Socialist republic. **AREA:** 91,700 sq. mi. **POPULATION:** 21,200,000; Romanians 88 percent, rest Hungarians, Germans, Jews, Serbo-Croats, Ukrainians, Greeks, and Turks. **LANGUAGE:** Romanian. **RELIGION:** Romanian Orthodox. **ECONOMY:** In the past 30 years industrial output has increased 30-fold, with manufactures including metal products, chemicals, consumer goods. Agriculture (corn, wheat, sugar beets) still employs 42 percent of the work force. **MAJOR CITIES:** Bucharest, capital (pop. 1,507,195); Cluj-Napoca, industrial center; Constanţa, port. **CLIMATE:** Cold, windy winters; summers cool in the mountains, hot in Bucharest.

chosen to be a maverick among the socialist nations of Eastern Europe. To ensure the success of this independent role, sacrifices are being made now as an investment in the future.

In Bucharest the sense of deprivation was pressing as I walked along the General Maghern Boulevard. Rain had fallen most of the afternoon, and the stygian post-storm light fell in yellows and browns so that the city seemed cast in amber. Not much traffic moved on the broad tree-lined thoroughfare because few Romanians can afford a car; the price of a locally made four-cylinder Dacia runs about $7,000, and the average monthly income about $100. At the same time, the cost of bread, housing, public transportation and other utilities is extremely low.

Showers of blossoms from chestnut trees, falling feather-soft in a gentle wind, heralded the season. So did signs in shopwindows: *primăvară*—spring. But beyond the signs, most windows were as bare as the trees of winter. One display featured a pair of gray plastic shoes, another a Chinese-made "Hero" harmonica. A third offered crowds of window-shoppers a set of curling irons for frying milady's hair to a once-fashionable frizzle.

The availability of consumer goods is low on the list of priorities. Rather, as the nation stands in chancy defiance of the Kremlin's guidelines for economic and political policies, the plan is for full pursuit of industrial might.

Romania flexes its economic muscle and finds itself strong enough to:

- Demand more decision-making powers for smaller nations within the Warsaw Pact.
- Deny the Soviet Army transit rights to maneuvers conducted in Bulgaria.
- Resist Soviet demands for supranational integration among armies and economic systems of Eastern Europe.
- Refuse to participate in an electricity-sharing project to link the U.S.S.R. with its bloc countries.
- Become the only Communist country to maintain diplomatic relations with Israel, although ties are also maintained with the Palestine Liberation Organization.

It has been said that the Socialist Republic of Romania walks a tightrope. "Of course, the possibility of Soviet troops moving on us is a thought often on our minds," said a

university professor in Bucharest. "When they went into Czechoslovakia, many were certain they would come here too. But they didn't, and still haven't. Why? Because Ceauşescu performs a brilliant balancing act. He taunts and appeases, taunts and appeases. Snickersnee and bind the wound."

Press Soft-pedals President's Outrage

President Nicolae Ceauşescu is the unquestionable voice of authority in Romania. His leadership has been imaginative, but the 57-year-old party chief brooks little internal opposition. He denounced the Soviet invasion of Czechoslovakia as a moral outrage, but permitted only soft criticism of the action in the press. After President Nixon visited Romania in 1969, the government-controlled newspapers in Bucharest stressed Romanian-Soviet friendship. In each case the balancing act was performed with hardly a wobble.

As he adjusts the fine workings of Romania's international relations, President Ceauşescu also pushes ahead with the program for an expanded economy. A high percentage of the national income is reinvested in industry, leaving little for raising the salaries of workers. Some excellent products are manufactured in Romania—a jeeplike vehicle, for example—but most are exported, mainly to Western European countries, to build up reserves of foreign currency.

"Several years ago I worked with a group of Austrian tourists," a guide at the National Tourist Office in Bucharest told me. "When they left I asked one of them to send me a shirt from Vienna—something stylish and well-made. He sent me two. They were beautiful. And I found they were made in Romania." Later, I repeated the guide's story to a farmer in the north, and he said: "A shirt? Of what importance is that? It's the land, Romanian land, that matters, and they can never export that."

Yes, the land: Valleys that sing with the rush of rivers and the tinkling rustle of aspen leaves; mountains that skewer clouds, and plains flat enough to hold rainwater where it falls; and the delta, a vast and reedy realm where the Danube gives itself to the sea.

Among the more than 21 million people of Romania there are still some peasants with life-styles little changed from those of the 14th and 15th centuries, when men of stout heart

City built for princes and proletariat, Bucharest grew from a rude fortress town whose streets were paved with tree trunks. Today it flourishes as the commercial and cultural center of the lower Danube Basin. Most of the stately institutional buildings, such as those of the university,

defended their principalities against foreign invaders. The names of the lands they ruled seem taken from the librettos of dressy operettas. But Moldavia, Walachia, and, yes, Transylvania, are real. Not until 1918 were the three regions united to form the Romania of today (map, preceding page).

Like many Romanians, Adrian Petrescu hones his national pride on the shards of history. He is a student and a friend, and one day, as we walked along a forest path in the Carpathian Mountains, he told me what it takes for a historical figure to be judged a hero in his country. "He must have defeated the Turks," he said, "or at least have fought bravely against them."

"So Vlad Tepes is a hero?"

"Absolutely. One of the greatest. What's happening to his name now is a disgrace. It's true that he killed a lot of people, but almost all of them were either Turks or robbers."

Vlad Tepes—Vlad the Impaler—was a

right foreground, date from Romania's emergence from Turkish rule in the second half of the 19th century. After World War II the new Communist administration undertook massive housing projects, with distant clumps of high-rise apartments displacing antiquated structures.

Walachian prince, son of Vlad Dracul. Dracul means "devil," so Tepes was known as "son of the devil." And the word for that is Dracula. Thus it is said that Bram Stoker's famous novel about the vampire count was based in large measure on the life of the 15th-century ruler. *"Strange to say,"* wrote Stoker, *"there were hairs in the centre of the palm."*

Strange, indeed. But then Count Dracula, as created by Bram Stoker, was not one endowed with anatomical niceties. History does not record whether Vlad Tepes had hair on his palms, but he certainly had murder on his mind. Beggars, vagabonds, and lazy women, as well as thieves and Turks, were among his victims, and their bodies were left skewered on spikes for all to see. Once, when envoys from the sultan refused to remove their turbans in the presence of the prince, he ordered them nailed to the offenders' heads.

For all that, Vlad Tepes' reputation among Romanians remains that of noble

prince and brave warrior who annihilated thousands of Turks during one campaign in the winter of 1461. What to do, then, when thousands of tourists, Stoker's book in hand and precious foreign currency in pocket, demand to see the ruins of castles and other sites connected with Vlad Tepes-Dracula?

"It's embarrassing," an official of the Ministry of Tourism said, smiling weakly. "We do not want to blacken the name of a national hero—to give him vampire status, as some have. At the same time we do not want to keep the tourists away.

"So we have set up a program for tourists, and we call it 'Dracula, Legend and the Truth.' It is a two-part tour, with visitors first going to historical sites associated with Vlad Tepes. Then we take them to Transylvania—this is the legend half—to see the country Stoker used as a setting for his book."

"*Suddenly,*" he wrote, "*I became conscious of the fact that the driver was in the act of pulling up the horses in the courtyard of a vast ruined castle, from whose tall black windows came no ray of light, and whose broken battlements showed a jagged line against the moonlit sky.*"

To reach the ruins, I had followed the River Argeş northwest of Bucharest. Sheets of rain whipped the ground, and the poplars lining the road bowed before the wind. The mountains ahead stood dark and sullen, wrapped in a shroud of fog.

I passed a caravan of Gypsy wagons, and then, stopping at a mountain pass, felt a rush of cold, almost icy, wind.

Atop the peak to my left stood the ruins. The climb started easily enough, but soon the path of concrete steps began to stretch out in wide arcs around the mountain. Oak and alder and birch trees, all pendulous with moisture, screened off the light, and I didn't see the black lizard with orange markings until it ran across my shoe.

"*Welcome to my house! Enter freely and of your own will!*"

After the exhausting 45-minute climb, I had little will for anything other than rest. I found a clearing amid the ruins and sat there until night fell, reading portions of the Stoker novel. Something stirred in the trees as I closed the book on these words:

"*The thing in the coffin writhed.*"

Soft breezes, soft words draw families and lovers out of doors. Amid the budding green of Bucharest's Cişmigiu Gardens (**facing page**) a city-dwelling boatman threads a café-bounded passage.

Charting a different course, a northern Moldavian couple (**below**) stroll along a sidewalk of Gura Humorului, his radio and her embroidery playing a counterpoint of styles. Crowded homes and apartments often drive young people outside for a moment's privacy among less interested neighbors.

It was time to leave, to hurry down the mountain, to try to keep from falling when stepping on a fat and slippery slug that popped with a noise like *blup*.

Vampirism is popular in Romanian folklore, and storytellers still solemnly credit a clove of garlic with the power to ward off a sharp-fanged creature. But despite such somber tales, the Romanian often shows flashes of Latin temperament.

He speaks a Romance language closely related to Italian. The story is told of a Moldavian farmer who returned from a visit to Rome and said he liked the city, but the people spoke Romanian with a curious accent.

Win a Romanian's friendship and you will hear some humorous, often irreverent, observations on socialism as practiced in the republic. "In our system," a student told me, "you are assigned a job by the government after graduating from the university. Those with the best grades get work in Bucharest. The poorer the grades, the farther away they go. That's how a friend of mine who wanted to leave the country found happiness. He did so badly his assignment was in Munich."

Levity aside, Romanians generally regard the socialist system as a success—especially when set against the country's long history of sufferings. Off and on, from the first century A.D. to World War II, the land was invaded, carved up, and rejoined.

Bemedaled private on the economic front, an honored worker samples a banquet commemorating Romania's Liberation Day, August 23, 1944. State direction of the economy is nearly total; Only small pockets of mountain land and artisans' shops remain in private hands.

"Tidal Wave" Ravages Inland City

The country was known as Dacia when it fell to the Romans in the second century. More than a hundred and fifty years later the invaders left, but the Roman imprint on the culture of the people remained.

At intervals through the centuries, Romanians chafed under foreign rule—notably by Turks and Hungarians—and a revolutionary movement swept the country as early as 1821. A monarchy survived, nonetheless, from 1881 until 1947.

When World War II began, Romanian forces marched with the Germans. The loss of men during the Russian campaign was staggering. Michael, last of the Romanian kings, was forced to seek a separate peace with the Allies—but not until after one of the most intensive air-ground battles in history: the bombing of the Ploieşti oil refineries.

Ploieşti lies 35 miles north of Bucharest. Oil had been taken from the ground there for more than a century. It was so vital to the Nazi war effort that Winston Churchill called it "the taproot of German might."

The first Allied bombers to reach Ploieşti were a dozen U. S. B-24 Liberators, in June 1942. They came from Florida, via Africa, using U. S. Geological Survey charts and National Geographic Society maps. On the first of August the following year the strike was repeated, but this time an armada of 177 overloaded B-24's took part; each carried nearly 5,000 pounds of bombs in a mission aptly named "Tidal Wave."

As the bombers approached the city, the

heaviest concentration of antiaircraft power in Europe opened up. Most of the planes went in low—lower than the stacks of the refineries—and when flak hit one, the craft would strain to climb high enough to allow crewmen to parachute. One Liberator crashed into the Ploieşti women's prison. Others plummeted into fields of alfalfa.

The refineries and tank farms took fire, and the oil-fed flames raged against the sky. Tidal Wave lasted only 27 minutes on that apocalyptic Sunday in August. In that short time more than 300 U. S. airmen died. Of the 177 Liberators, 54 were destroyed.

In Ploieşti, 32 years later, I watched sheep graze in peaceful fields and heard only the bark of a shepherd's dog where the noise of that brief battle had struck men deaf for days. Smoke rose from the rebuilt refineries, and the rising sun glinted on the pecking wellhead pumps. The flow from Ploieşti continues, and in all Europe only the Soviet Union produces more oil.

History Lives in Venerable Frescoes

If war is the thorn in Romania's past, then religion is the rose. In northern Moldavia, near the Soviet border, are three of the most magnificent monuments to religious art in the world. Built in the late 15th and early 16th centuries, the three monastery churches are covered outside with frescoes—mostly scenes celebrating saintly endeavors (page 708).

Like many visitors before me, I found Voroneţ the most impressive of the monasteries. It was built in 1488 by Stephen the Great, a revered figure in Romanian history, and the paintings were added 59 years later. Blue is the dominant color, a blue as soft and serene as a splash of indigo on fresh snow. The paint has survived the passage of time and the harsh extremes of Moldavian weather.

At the Moldoviţa Monastery, one exterior wall is given over to the battle for Constantinople. As I studied the work, in which the Turks are clearly marked with touches of evil, the sound of wood striking wood began to fill the inner yard of the monastery. *Tac-tac-tac-tac-tac.* Then faster and faster—*tacatacatacatacataca*—until the breathless rhythm whirled around the yard. Finally it stopped, and then a bell began to toll softly.

This was the call to prayers for the 20 nuns at the monastery. It starts with the striking of a wooden board called the *toaca*. A mallet is used. The faster beat is set off by striking another, larger, board with two mallets.

I asked one of the nuns, Sister Lavrentia, if the heavy flow of visitors to the monastery interfered with her life of prayer and contemplation. She smiled, indicating that she has indeed heard the click of too many cameras, and said: "It is true that we have given up all worldly possessions for a life of devotion to God. At the same time, we keep in mind that we have a duty to our country, and part of that duty is receiving the tourists who come here."

Religion and Communism Coexist

God and country! Communism has failed to quash religion (predominantly Romanian Orthodox) in Romania. The Young Communist League member may embrace atheistic dogma, but chances are he has been to the font as a babe. The old commissar on his deathbed is likely to kiss an icon, not a portrait of Lenin, in his bid for final peace.

And if he dies in the village of Săpînţa there could be some laughter with the tears. For it is there that the departed are put to rest in the Merry Cemetery.

The wooden markers in the Merry Cemetery are painted in shades of red and gold, blue and white. Carved on each marker is a likeness of the deceased along with some lines explaining the circumstances of the death. For example, this:

I have lain here since I came,
Braic Heandă is my name.
Sons I had in my life five,
would God keep them all alive.
Grigă, may you pardoned be
even though you insulted me
when you came home drunk.
Well have you laid me down here
in the chapel's shade; but you
shall some day come hither too.

Ion Stan Pătraş—a short, round, elfin man of 67—has been carving and painting the markers since 1935. They were his idea.

"When I first started carving," he told me, "I put only the name of the deceased on the marker. But then I decided to do something different—to compose verse and put some life in death. I know all of the people in the village. When one dies it is easy for me to write something appropriate for the marker."

So one day, after they carried the body of a teenager in from the fields, Pătraş put these words on wood:


ROMANIA

Her smile as hefty as her performance, Argentina Menis (**left**), silver-medal winner for the discus in the 1972 Olympics, practices for an upcoming meet with Canada and East Germany.

Romanians flock to sports and theatrical entertainments, filling halls to watch some of Eastern Europe's most progressive stage work—both serious and comic. At Bucharest's Teatrul Satiric Muzical (**above**), a plumed performer dances before a full house.

I have lain here since I came,
and Stan George is my name.
Oh, the poor life that I led,
it has melted now, like lead!
I was digging in the field—
there was I by lightning killed.
Father is forever grieved,
and my mother, my poor mother,
she will not forget me ever.
Young I went to th'other side,
I was 19 when I died.

Săpinţa and the Merry Cemetery are in the northern district of Romania called Maramureş. Of the more than 13,000 villages in the country, the ones here are most heavily invested with the flavor of the old. One still sees clothing like that worn five hundred years ago—fur cap, embroidered shirt and skirt, sheepskin vest, pigskin shoes—and customs of similar age survive. In the houses children are rocked in hand-carved wooden cradles; beds are drawn close to wood stoves; shepherd's staffs hang by the door.

Driving through Maramureş, once invaded and burned by the Tatars, I came across a woman painting her house. New electric power lines had reached her home, she explained, and "it would not be right to have lights go on in a house in need of paint."

A cloth covered her head, and her body was swaddled in heavy woolen clothing. Her mouth was full of teeth made of stainless steel. She bore herself with the great, enduring dignity of the Balkan peasant. She spoke of her meager possessions as a dowager duchess might speak of jewels and rare porcelains. "I am sorry I cannot show you my napkins and ceramics," she said, "but I have put them away while I paint."

She and her husband are members of a co-op farm. They also have a small plot of ground for their own garden. "My husband is responsible for building our place up," she said. "He is very industrious." I asked her if he was working in the fields, and she replied, no, he was inside the house taking a nap.

Villages Reshaped by New Economy

Industrialization has brought significant changes to many parts of Romania. Often, villages in the vicinity of a new industry are grouped to form a new town. It is estimated that the number of towns in the country, now about 240, will double within twenty years.

One of the largest of the towns established since the end of World War II is Gheorghe

Gheorghiu-Dej, named for a former first secretary of the Communist Party in Romania. Situated on the eastern flank of the Carpathians, on the site of a village dating from the 15th century, the town of 42,000 persons thrives as a petrochemical complex.

Virgil Tămăşescu, the mayor, stood with me on the roof of the largest hotel in the town and, with a sweep of his arms, said: "We have it all here—a modern house of culture, a touristic complex, 900-bed hospital, two sports halls, and the best school for girl gymnasts in all Romania. We also have more intellectuals, in proportion to population, than any town in the country."

Below, the sterile symmetry of the buildings—block after block of flats—filled the land. Smoke the color of butterscotch moved in sluggish drifts over the industrial sprawl. "Chemistry, as you know, harms the air," said the mayor. "So we refresh it with oxygen from all the greenery and flowers planted in town. At least a hundred hectares [247 acres] are set aside for gardens and green spaces.

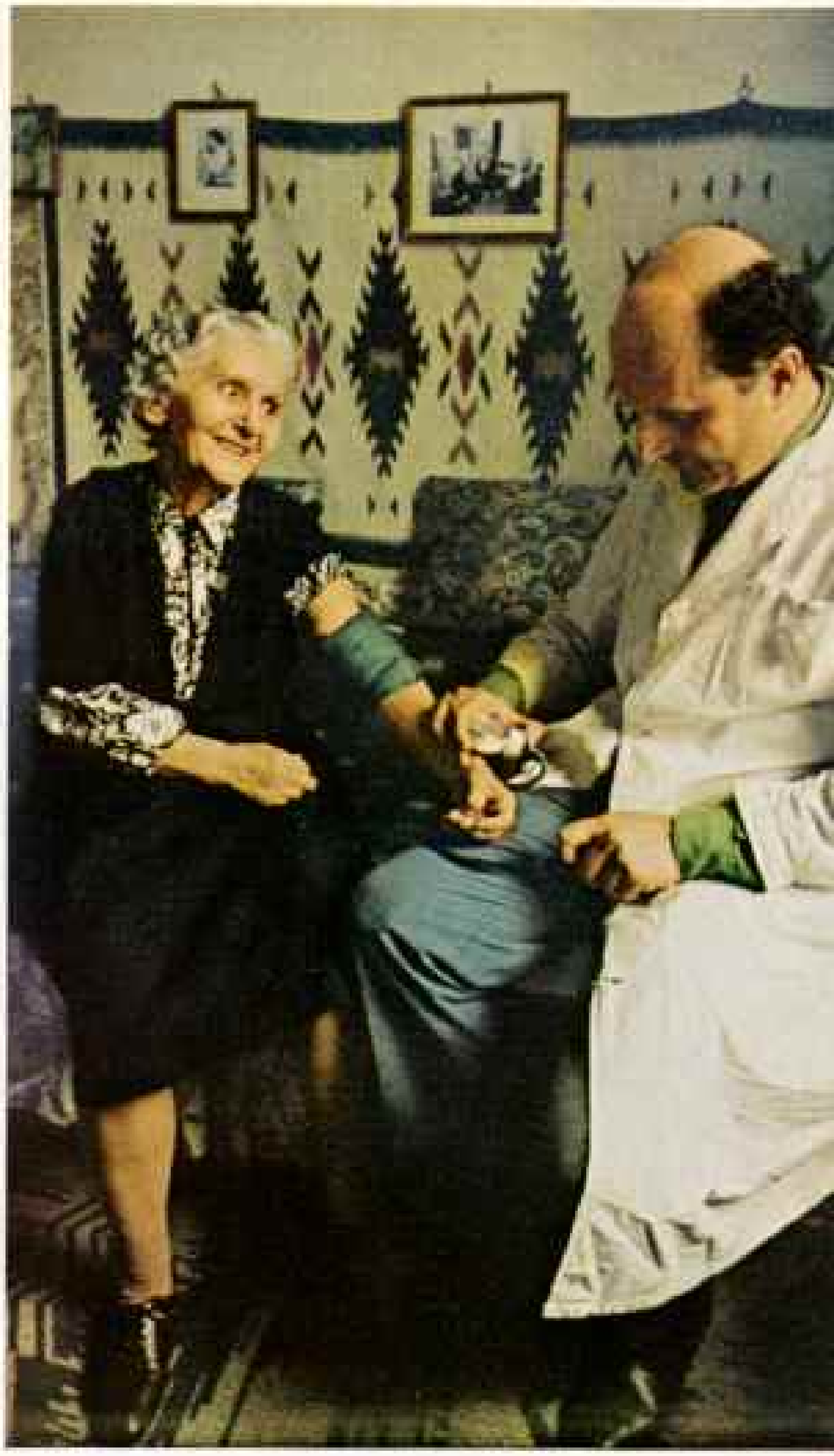
"It's true," he said, "that the people of Romania take great pride in the traditions of village life, and we do not forget that the very heart of our new town goes back five hundred years. However, our chief concerns must be with all that is new in social, economic, and industrial fields."

American Movies Bridge a Gap

Life, then, runs its government-plotted course in Gheorghe Gheorghiu-Dej. It is forbidden to simply pick up and leave for another place, another job, without government permission. For most, there is no desire to do so. Others, addicted to imported American films, have heady dreams—the bookseller, for example, who confessed to me his consuming ambition to be a tournament bridge player in Los Angeles.

Mostly it's the young who want to leave. At the same time, Romania attracts the elderly from other countries. With countless mineral springs gushing from the Carpathians, the country has built a reputation as something of a Valhalla for geriatric patients.

Romans prized these waters, giving them the name *Ad aquas Herculi sacras*, or "At the sacred waters of Hercules." The oldest and most famous of the many spas is named, appropriately, Băile Herculane. It sits at the foot of a towering massif in the Cerna Valley, west of Bucharest. Of the 12 springs serving



Eyes speak volumes as a doctor at the Institute of Geriatrics gauges the steady thumpa-thump of an 81-year-old patient's blood pressure (**above**). Treatment with a drug called Gerovital H_3 allegedly enables the arthritic woman to perform exercises that would make one half her age puff with exertion. U. S. health authorities have allowed the drug to be tested as an antidepressant. Its effectiveness in fighting the aging process has not yet been proven.

Enjoying a treatment with a 2,000-year test record, vacationing factory workers soak in the hot sulfurous baths at Băile Herculane (**facing page**), used since Roman times.

the spa, some are outrageous with odor.

"We can employ the waters in many ways," said Dr. Răileanu Bogdan, medical director at Herculane, "but generally for baths. The emphasis here is on easing the pain of rheumatism." Patients at other spas plaster themselves with mud (pages 712-13).

Controversial Treatment Lures Thousands

Germans, Austrians, and Scandinavians have been swarming to Romania for years to take the waters and the mud. But in Bucharest, at Dr. Ana Aslan's Institute of Geriatrics, Romania exerts its prominence in the world of eccentric medical care. Patients—20,000 last year—come to the institute to take a controversial and scientifically unproved medication called Gerovital H_3, both orally and through injections. Its main component is procaine hydrochloride (more familiar as novocaine), and if one wants to accept testimonials from some who have taken the treatment, it comes as close to the Fountain of Youth as anything available today.

Dr. Aslan, who is now in her late 70's, developed Gerovital H_3 more than twenty years ago for the treatment of rheumatic diseases. "But it also proved effective in other ailments, such as mental depression, high blood pressure, and general weakness," said Dr. Vladimir-Iulius Gusic of the institute. "Most of all, Gerovital H_3 is effective against the disease of aging, the deterioration of the capacity to feed the cells."

Treatment records at the 25-year-old institute claim some astonishing results: memory regained, hair again grown on heads long bald, life prolonged beyond expectation. Dr. Gusic invited me to see for myself. The first person to enter the small room where we sat was Justine Paun.

"When she came here for treatment 14 years ago, she had very high blood pressure, but now it is normal," Dr. Gusic said. He asked me how old I thought she was, and I guessed about 55. He said she was 81.

The next woman to come in was almost immobile when she started the treatment, according to Dr. Gusic. "She just hoped to be able to move a little," he said, "but look at her now." There she was, more than 80 years

Fruit's in and a line forms at a Sibiu grocery store well before its single door swings open (**left**). Romania's emphasis on industrial production results in some shortages of consumer goods and long workdays for the average family; rush hour for foot and bus commuters in Bucharest comes at 6:30 a.m. (**below**). Prized goal of the Romanian worker, a domestically built Dacia automobile costs the equivalent of six years' wages. The government has been seeking widened trade links with capitalist countries, but as yet few Western cars have been seen on the tree-lined streets.

THIS BIG PIGGY *went to market, but not without mishap. Farther down the cobbled street in Walachia's Hoteza, the pig tried to change the rhyme and run away, but proved no match for its quick-footed mistress. Country customs still abound in Walachia, homeland of Dracula—a prince who may have been bloodthirsty but was hardly the vampire of Irish author Bram Stoker's novel.*

old, bending down and touching her toes.

Investigations are being conducted to determine if the drug should be approved for distribution in the United States—but *only* as an antidepressant. Meanwhile, many Americans travel to Romania for the treatments. And if they return home none the better for it all, they will at least have seen Bucharest.

The capital city is a feast of gingerbread, an arboretum of urban greenery, a museum of monuments and memories. Clean, open, and flooded with the light of Romania's southeastern plains, Bucharest is now more than five hundred years old—years chronicled in the architecture. Here, the arabesques of the baroque swirl in the shadows of modern construction (pages 694-5).

To keep pace with industrial growth, 30,000 apartments are built in Bucharest each year, mostly on the outskirts. New construction in the city's core is limited largely to commercial and public buildings, such as hotels and a strikingly modern National Theater.

Bucharest is a city for walking, for taking the shade of linden trees on a warm summer day. Lilacs and roses lend sweet smells to the air, while color cascades from the flowerpots hanging from balconies.

Pensive Teacher Turns Inventor

In the Cişmigiu Gardens, a tapestry of lakes, flowers, and paths in the center of the city (page 696), I listened in through an interpreter as clumps of men verbally dissected the latest performance of Ilie Năstase, Romania's premier tennis player. At nearby museums I spent several hours with the sculpture of Constantin Brâncuşi and the paintings of Nicolae Grigorescu, two Romanians who have greatly enriched the world of art. And at the University of Bucharest I learned for the first time about Petrache Poenaru.

Poenaru taught school in Bucharest in the 1830's. Before that he studied in Paris, and, being without funds to purchase books, he copied manuscripts. He carried quills and a container of ink wherever he went, until one day he sat down and gave some thought to the matter. Poenaru didn't stop thinking until he had invented a fountain pen. "And that," I was told by a Poenaru admirer, "was 50 years before Waterman."

From Bucharest the road south leads to the Danube, which flows for nearly 700 miles along the southern rim of the country, coming within 35 miles of the capital (map, page 693).

In 1972 the Iron Gate Dam bridged the river between Romania and Yugoslavia, where the Danube cuts through the Carpathians. River traffic now moves through locks that have tamed 60 miles of rapids. The dam, built jointly by Romania and Yugoslavia, produces more power than any other hydroelectric installation in Europe outside the U.S.S.R.

Birds Abound Where Danube Unravels

In Romania the Danube comes apart, like a frayed rope, before merging with the Black Sea. The delta spreads over some 2,000 square miles in a soggy and spectacular expanse of canals, lakes, pools, and patches of land crusted with reeds and willows.

About 300 species of birds are found in the Danube Delta. Among them, swans and cranes and pelicans frequent the shallows choked with white and yellow lilies. A vast variety of fish includes sturgeon that come in from the sea laden with black caviar.

I threaded the maze of canals in a small motorboat. Setting out from the town of Tulcea, I was drawn into the heart of the delta like someone stumbling through a house of mirrors. Birds rose at my approach, and a wild boar crashed through a thick growth of downy ash. Willows on opposite banks arched over the waterway.

Finally I came upon a village—one of the thirty or so in the delta—and the fishermen there offered me plum brandy (plums, I concluded, are better used in preserves) and sour meatball soup. I was guided to the main channel as night fell to wrap the delta in a darkness broached only by the pulses of fireflies.

Elsewhere on Romania's Black Sea coast, a galaxy of new seaside resort communities with such names as Venus, Saturn, Neptun, and Jupiter accommodates Germans and Scandinavians and other vacationists.

Venus is much like Saturn, and Neptun is a copy of Jupiter—all have been stamped out

As if brushed by an angel's wing, the painted walls of Moldoviţa Monastery sing with the fervor of four centuries' worship; the frescoes helped educate churchgoers who could not crowd within interior walls. Assured of religious freedom by their constitution, nearly 15 million communicants still heed the call of bell and incense in the Romanian Orthodox Church.

of a government mold: a bowling alley and miniature golf course for each, hotels with the charm of concrete bunkers, and restaurants where rock groups play loud and late.

Mamaia is different. Romanians favor this older resort, where the sand is probably the whitest and finest of all the beaches in the littoral.

Twenty-five years ago Mamaia had 500 beds available for tourists. Today it has 32,000. "And we still have a lot of room to develop," said Gheorghe Mureşanu of the National Tourist Office. "Only four miles of the beach at Mamaia are in use. We hope to double the capacity by the year 2000."

Romania Reveres Her Woods

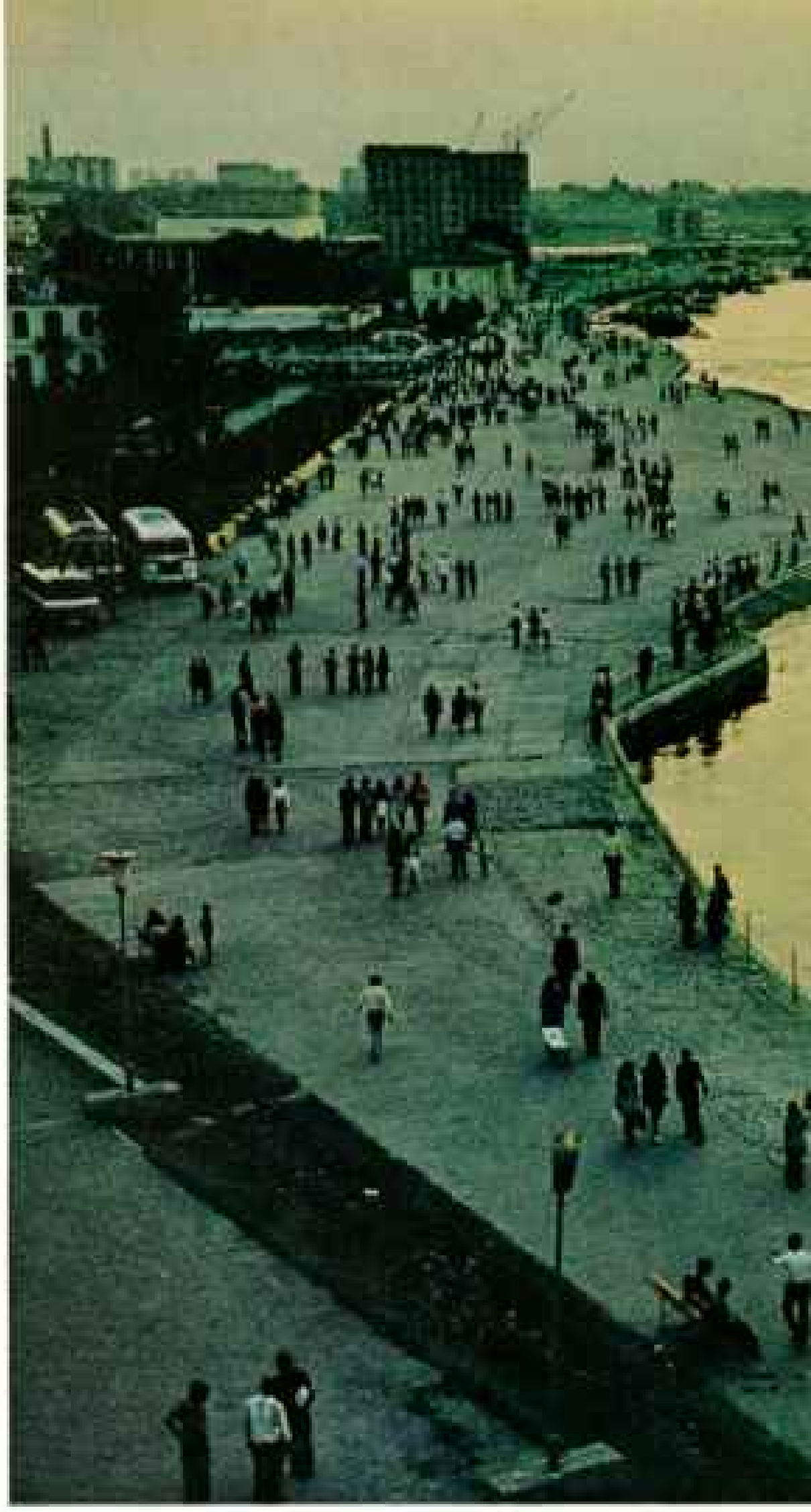
Both the low coast and the marshy delta are alien to the character of Romania, for this is a land bold with the strength of mountains and forests, a land where stags ramble among the snow junipers—a land with an abiding appreciation for the goodness of wood.

Dumitru Balaci is a wood-carver, one of the best in all Romania. He lives in Bucharest, in a small house near the center of the city. A short, slight man with winglike tufts of white hair, he spoke to me with deep emotion about the importance of wood to Romanians:

"For more than a thousand years barbarians came through our land, killing and burning. There was fire here, and our people were obliged to take refuge in the forests after their villages were destroyed. They had to stay in the forests a long time, and learn to make everything they needed out of wood; that included most of the tools to make everything else." Out of that developed the very purest use of wood. When making a canteen, for example, woods of different ages would be used to allow for natural expansion and moisture-proof joints.

"Our country was desired by the Russians, the Turks—all our neighbors," Balaci continued. "Wars, wars, nothing but wars. Our people had had no chance to learn. Even the princes couldn't read or write. They brought monks from Greece to handle their correspondence. And the peasant? He was still in the forest, working with wood."

Nicolae Saramet is descended from those peasants who took refuge in the forests. He is a farmer, a man with callused hands and a chest that strains his shirt. But he sits in an office now, supervising the work of 380 families. He is president of the Codlea Co-op



Guardian of the Danube, Tulcea glows in the late light of afternoon. Below this port the great river fans out into the delta, two thousand square miles of marsh and floating reeds harboring one of Europe's largest concentrations of birdlife. Where the Danube spills into the Black Sea, fishermen net sturgeon in hopes of a bonus—caviar.

On a launching pad of oil, the stacks of a refinery at Ploieşti shoot toward the sky (**right**). Allied bombers in World War II braved curtains of antiaircraft fire to knock out the fields that made Romania then as now second only to the Soviet Union as a European oil producer. The nation's urgent need for oil has outstripped its supply, however, and like the United States it has had to turn to the Middle East to power a growing economy.

Farm. Codlea was established in 1950 by bringing together 47 family farms. Saramet became a member of the co-op in 1954, and was elected president seven years later. He is extremely efficient at his job, keeping work records up to date, calculating earnings—"the more they produce, the more they earn."

Most of all, Nicolae Saramet is unswervingly dedicated to collective farming. "By working communally," he said, "we can use the land to its best advantage. Our members get both money and produce, according to their production. They also receive a pension at age 62—60 for women—and free medical care. It all works very well here."

Codlea is in the interior of the country, where many villages have been settled for centuries by Germans and Hungarians. The Hungarian houses usually sit in a yard enclosed by a fence and heavily carved gate; German houses front the road. But old Romanian customs are observed in both.

What's an Ism Among Friends?

Whether the village was of German or Hungarian bent I do not recall. But it was in the mountains, and there was a chill in the air on the morning I arrived. The first person I saw was an old man who pitched out of a tavern, fell into his pony cart, and slept while the animal pulled him home.

And then I saw a bunch of fresh flowers attached to a high pole. This was a signal that the man of the house would be serving drinks to all visitors because his name was George, and this was St. George's Day.

He offered me, alas, plum brandy, at ten in the morning. The village policeman stopped by, and so did the man who raises and lowers the barrier at the railroad crossing. Also there was the local party representative. He was reserved at first, saying little and smiling less. But then he turned to me, raised his glass and said, "To the United States."

"To Romania," I replied.

"To capitalism."

"And socialism."

And with that, all the isms in that room vanished, swept away in an outpouring of friendship and understanding. More toasts followed: to the Danube and the Mississippi; to stuffed cabbage and butane lighters; to the Irish Sweepstakes and the sponge fishermen of Tarpon Springs.

George said he couldn't remember when he'd had a better day. □

All together in the altogether, bathers on

a males-only beach at Eforie slab themselves with mud they believe combats arthritis.

Like Medusa's locks, garter snakes entwine while mating in a shrub near Narcisse, Manitoba. Another of the reptiles rears defensively (**right**). Each spring thousands of the harmless animals emerge from hibernation in limestone sinks. After mating, they disperse for the summer to outlying marshes, then mysteriously return in autumn. A continuing study headed by the author seeks clues to this and other puzzles of the pits.

Manitoba's Fantastic Snake Pits

By MICHAEL ALEKSIUK, Ph.D.

Photographs by BIANCA LAVIES

NATIONAL GEOGRAPHIC PHOTOGRAPHER

I STARED IN DISBELIEF as thousands of snakes milled around me. They were everywhere—the surface of the ground seemed literally in motion! The countless elongate bodies slithering through the dry, brittle grass of spring made an eerie rustling. Although I was used to snakes, I couldn't help feeling a little uneasy.

I was standing near the bottom of a limestone sink—a pit perhaps fifteen feet across and ten feet deep. As I watched, it struck me that in spite of their unceasing movements the snakes seemed to be moving aimlessly. They crawled among the rocks, up small shrubs, even over my feet. Tongues constantly flicking in and out, they investigated everything, but didn't seem to find anything.

"What the devil are you doing down there?"

Startled, I whirled around and looked up. A large man stood at the edge of the pit, hands on hips, glowering down at me.

Reluctantly, I stepped through the writhing mass of snakes and climbed out of the hole. I suppressed my annoyance, recalling what had brought me to this bizarre place.

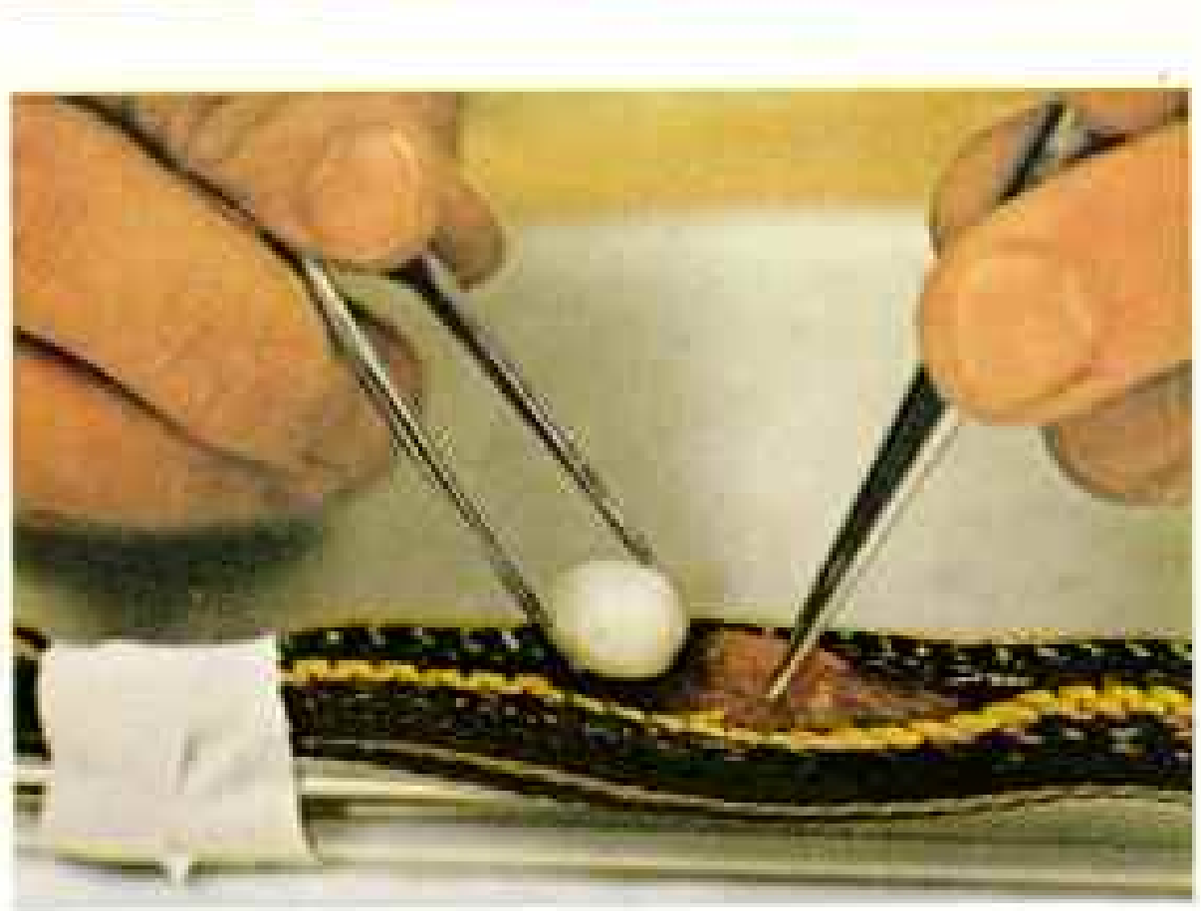
Wild stories about snake pits had reached me ever since I had arrived in Manitoba a year earlier. At first I was skeptical. Finally I had located and journeyed to this snake pit in the aspen parklands 60 miles north of my Winnipeg home. I had verified the fantastic numbers of snakes and recognized their potential for scientific research.

"I lease the rights to this pit," the man gruffly informed me, "and I need 20,000 snakes for my customers this year. You can't take any of these snakes!"

I explained that I was a zoologist from the University of Manitoba, and the snakes were of major research interest to me and my colleagues. "We're trying to learn how these snakes survive and reproduce," I added.

The man's face brightened. "I'm sorry," he said, "I thought maybe you were one of my competitors."

Stan Spakowski introduced himself and explained that he was a professional snake and frog collector, selling to biological supply



Collecting for science, Dr. Aleksiuk scoops up a double handful of snakes (**above**). The 32-year-old scientist warns that professional collectors supplying snakes by the tens of thousands to school laboratories and pet shops have seriously depleted the population.

Red-sided garter snakes converge on the same limestone sinks each fall to seek shelter from winter's freeze. Springtime temperatures bring the animals back to the surface, where they mate before leaving for marshes as far as ten miles away—there to feed on frogs and toads. To keep track of them, thousands were marked by removing scales from each in a variety of patterns (**left, upper**). With uncanny accuracy, most migrating snakes return to the same pits. A current experiment implants transmitters (**lower**) to study the snakes' reactions to varying temperatures.

houses. Naturally he had a proprietary interest in his sources of supply.

"Please feel free to study them as much as you wish," he added apologetically.

I left the snake pit aware that I was dealing with the red-sided garter snake, *Thamnophis sirtalis parietalis*, a subspecies of the common garter snake. However, I didn't know much about its habits.

Back on campus I found the university library confirmed what I suspected: Such large aggregations of land snakes appeared to be unknown to the scientific world. What I had observed probably occurred on this scale nowhere else. Here was a scientific gold mine! Elated, I immediately prepared for another trip to the snake pit.

Next morning a macabre scene greeted me at the pit. The masses of snakes were nowhere in sight—only several bloody individuals lying here and there in the grass and among the rocks. I picked one up and examined it. There was a gaping hole in its belly, and its liver was missing. Others in the grass revealed the same condition. Still alive, the snakes crawled away weakly when I put them down.

I climbed down into the pit and touched one of the few snakes visible among the rocks. Most of its head was missing. Though mortally wounded, it struck out at me blindly, its survival reflexes still working.

Warmth Is Key to Reptiles' Ways

What a contrast to the swarming activity of the previous day! Because snakes are cold-blooded and depend on the sun for heat, in colder regions they are almost always inactive at night, and whenever it is cool and cloudy. This explained the inactivity; it was still only 8 a.m. Most of the snakes were apparently hidden beneath the broken rocks in the pit. But in spite of my best efforts I could find no clue to what had caused the mutilations.

I chose a shaded part of the pit and sat stock-still. Within an hour snakes began to emerge from the rubble and mill around. A pattern seemed to develop. Although male and female snakes are difficult to tell apart, males seemed to be chasing females. The snakes were mating.

Activity increased as the sun warmed the torpid snakes. Soon countless males were courting females. The competition was fierce. Sometimes as many as a hundred males attempted to mate with one female at the same time. This produced huge "mating balls," in which the female often couldn't even be seen.

After mating, most females tried to leave the pit. But in many cases they were caught by a tangle of males and the whole mass of bodies tumbled back to the bottom. Usually, the females managed to escape the pit within an hour or two after mating.

The males did not leave after the first mating attempts, but waited for more females to emerge. Although it was difficult to make a reliable estimate, I believe that a male probably remains in the pit area for about a week after first emerging from underground.

Snakes Fall Prey to Mice and Crows

Watching the activity, I found the answers to the mutilation mystery. At one point, a partially beheaded snake slowly crept from a crack. Fresh blood oozed from the wound. Cautiously, I felt the victim: It was still ice-cold from hibernation. Earlier, I had seen a mouse scurrying from crevice to crevice in that area. I concluded that mice and shrews nibble at the heads as the snakes slowly work their way up through the rubble.

Later, the flapping of wings and a raucous cawing heralded the arrival of a crow. The crow hopped up to a newly emerged, torpid snake and grabbed it with one foot. It pecked swiftly at the snake four or five times, ate something, and moved to another victim. I jumped up with a yell, and the crow flew off, complaining hoarsely.

I picked up the snake: The skin had been broken only in the area of the liver, and that organ had been neatly excised. Nothing else had been touched. How the crow performed the surgery with such precision is a mystery.

Back in Winnipeg that afternoon, I asked a colleague, Dr. Kenneth W. Stewart, about the probable origin of the limestone sinks.

"Acidic groundwater percolating through fissures in the limestone slowly dissolves it, forming caves," Ken replied. "At one time the region between Lakes Winnipeg and

Snarl of mating snakes mats the floor of a pit on a hot spring day (**following pages**). As many as a hundred males attempt to mate simultaneously with a female. Underlying caverns protect the reptiles from Manitoba's harsh winters, and close quarters in the pits virtually guarantee reproduction of the species.

Manitoba must have been underlain by an extensive network of caverns.

"The weight of ice during the last glaciations probably collapsed the roofs of many caverns, leaving rubble-filled sinks. The roofs of others have perhaps been weakened by centuries of freezing and thawing of water, finally to fall in, leaving more of these bowl-shaped depressions."

The existence of caverns explained how so many snakes were able to disappear into the bottoms of the pits.

According to my friend Henry Yakielashek, whose home is near the pit, there were at least four large limestone sinks used by snakes in that area. "But there aren't as many snakes around as there once were," he added. "Maybe the collectors are getting most of them." The snakes first begin to emerge in late April, Henry told me, two to three weeks after the snow disappears.

By mid-May mating was at its peak. I watched almost daily, but the numbers of snakes in the pit began to dwindle rapidly until finally, at the end of May, few were left.

Back in my office at the university, I pondered the information I had obtained—and the questions that it posed. What made the snakes come out of the caverns when they did? What caused the vigorous mating in May? Where did the snakes go after leaving the pit? When did they come back? Why did the snakes congregate at the pits? How did they survive the region's extremely long, cold winter? These questions formed the basis for several years of intensive research.

Ten-mile Journey in Search of Frogs

Patrick Gregory, a graduate student, undertook a study of the snakes' seasonal movements. Working at several pits, he marked about 6,000 by removing scales in various patterns from the tail of each (page 716). Then he spent the summer combing ridges, fields, forests, and marshes, looking for the ones he had marked.

His study showed that most of the snakes spend the summer in marshy areas, where they feed on abundant frogs, as well as on toads, slugs, and earthworms.

Pat found some snakes as far as ten miles from their pits—a remarkably long journey for a snake only 18 inches long! It is while the snakes are dispersed in their summering areas that the females produce their offspring. Most births occur in mid-August, as many as 40 in a litter, though the average is 15. Born alive, the young are capable of rapid activity within hours. Completely independent of the mother, they must fend for themselves from the moment they are born.

All summer I kept a careful watch on the principal snake pit. It was lifeless, except for an occasional mouse. Then on August 20, during a routine check, a small movement caught my eye. A snake slithered over the rocks into the shelter of the crevices. The fall

Varied reactions greet migrating snakes that pass twice yearly through Inwood, Manitoba. Mrs. Margaret Lillequist pauses during dinner preparations (**left**) as "George," a regular visitor, inspects the fare. Unlike most people in Inwood, Mrs. Lillequist enjoys the reptiles. "They were here many years before us," she explains, "and we have to respect them."

A next-door neighbor, Mrs. Eleanor Dombrosky (**right**) disagrees. She stays a broom's length away from snakes that her dog Kelly has thoughtfully brought home.

MICHAEL ALEKSIUK

Special delivery. After a three-month pregnancy, a mother (**left**) gives birth while another infant just minutes old lies across her back gathering strength. Mature females deliver as many as forty eight-inch-long babies in less than an hour. Garter snakes develop inside the mother, and are born alive, encased in clear membranes. A two-headed infant (**right**), a rare quirk of nature, lived for ten days. Red-sided garter snakes in the wild have a five-year life expectancy.

Braving winter's bite, University of Manitoba graduate student Al Hawley (**top**) records the temperature in a ten-foot-deep pit. Beneath the snow-covered rubble lie thousands of dormant snakes. A future experiment will monitor their hibernation by radio and may resolve unanswered questions about the lives of these reptiles.

migration back to the pit had already begun.

By the middle of September, the pit looked much as it had in mid-May, with two major exceptions. Instead of moving outward, the snakes were now funneling down into the pit. And, once in the pit, the snakes lay motionless. In contrast to the frantic activity and rustling of spring, an uncanny silence now prevailed. Heads poised elegantly, the snakes seemed to be waiting for something. At one point I estimated there were some ten thousand pairs of unblinking eyes fixed on me. It was a spectacular sight.

Home to a Pit They Never Knew

Keeping close watch on the pits, Pat Gregory found that not only did many of his marked snakes return, but nearly all made their way to exactly the same pit where they had been marked. This meant that a snake probably uses the same pit year after year.

Traveling to a distant marsh in spring, and back again in fall, these small snakes somehow navigate across broad reaches of forest, pasture, and swamp, like migratory birds. How they do it with such accuracy is an important subject for future research.

Even young snakes born in summer eventually return to the sinks. It would be easy to speculate that they learn the route from their mothers, but the theory does not hold water. For one thing, the young spend little time with their mothers. And Pat's work showed that the young don't even spend their first winter at the pits. Where they do hibernate that first cold season isn't known. Somehow, on their own, the yearlings migrate to pits they have never seen, through miles of totally unknown territory.

In early October, fewer and fewer snakes could be seen in the pit. They were moving underground, beneath the rubble, where they would spend the winter. By late October the pits were once again apparently lifeless.

Because these garter snakes are inaccessible during the winter, we made preparations to conduct winter studies in the laboratory. Together with Anne Ismond, then a graduate student at the University of Manitoba, I had captured about five hundred snakes in September and placed them in a controlled environment room. To simulate winter, we kept most of them at 39° F. and in constant darkness.

From time to time we removed a few snakes from the dark holding room for study. In late January something totally unexpected happened: When I brought a number of snakes out into a warm, well-lighted laboratory, they mated vigorously! I tried again, and again the change somehow triggered mating activity.

Al Hawley, another graduate student, took up a study of the environmental regulation of mating behavior. He dug snakes out of the pit in late April before they emerged naturally, transported them to the lab in an icebox, and held them in a cold, dark room. He could then transfer them from simulated hibernating conditions to various conditions of light and temperature.

It worked out beautifully. Snakes transferred from 35° F. and darkness to 86° F. and light always mated within one hour. Thus the snakes, within certain time limits, will "mate upon command."

"Built-in" Timer Ensures Spring Mating

Al also demonstrated that temperature, not light, is the important variable in mating. Furthermore, it seems the snakes must be exposed to winter cold for a minimum period of about five months before transfer to higher temperatures will induce mating. These results neatly demonstrate nature's way of timing mating behavior to the spring.

Although many questions remain, we have come to understand much about how this remarkable animal is able to cope with the rigorous climate of Manitoba. Nature has produced a specialized snake capable of overcoming problems not faced by subtropical and tropical reptiles.

The red-sided garter snake is clearly a prime subject for further research in environmental adaptation. But after years of study, I see it as more than that. To me it is a living work of art—intricate, yet simple in its design. Indeed, as the ever-evolving product of natural selection, it is the handiwork of the grandest Master of all. □

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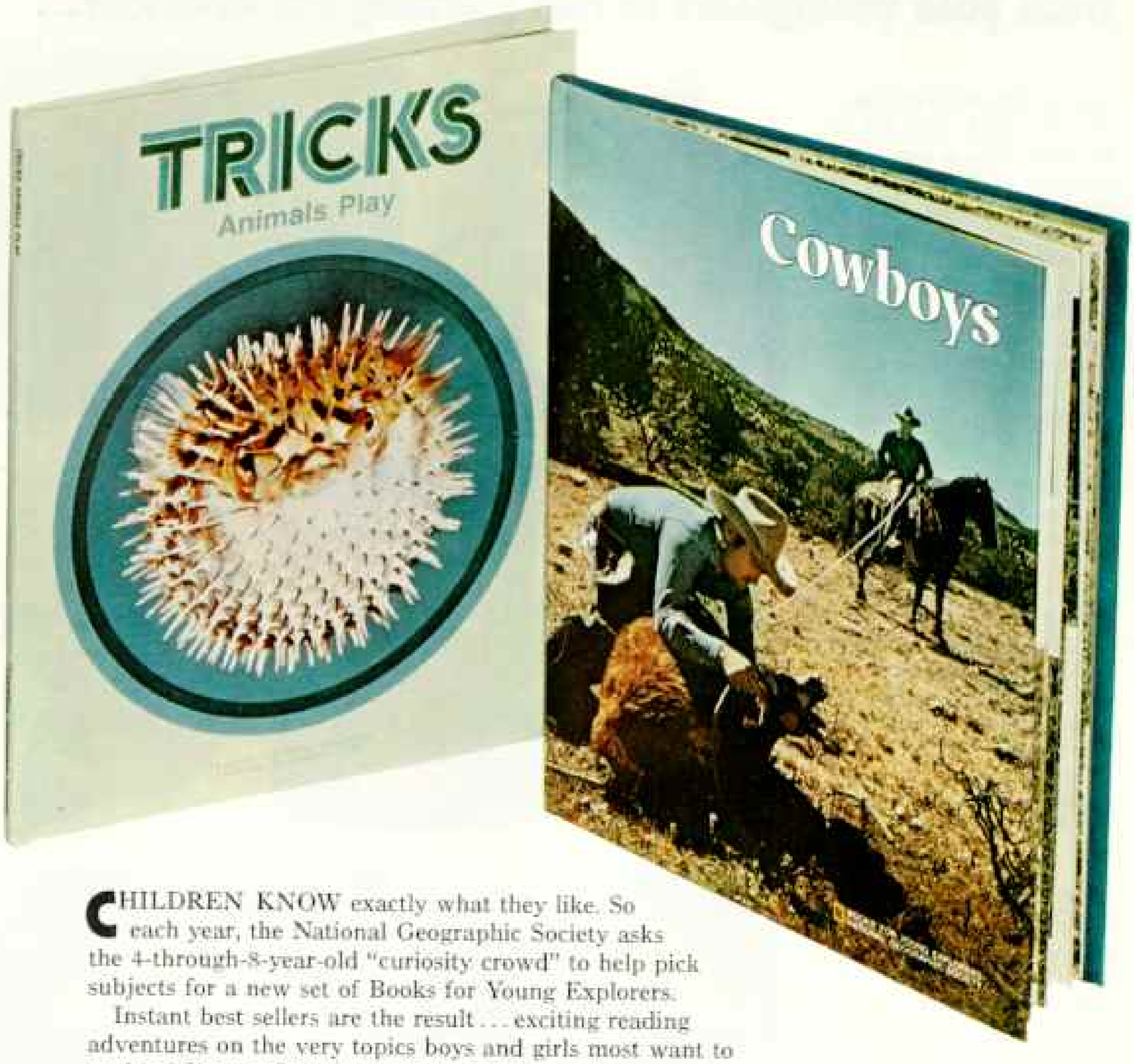

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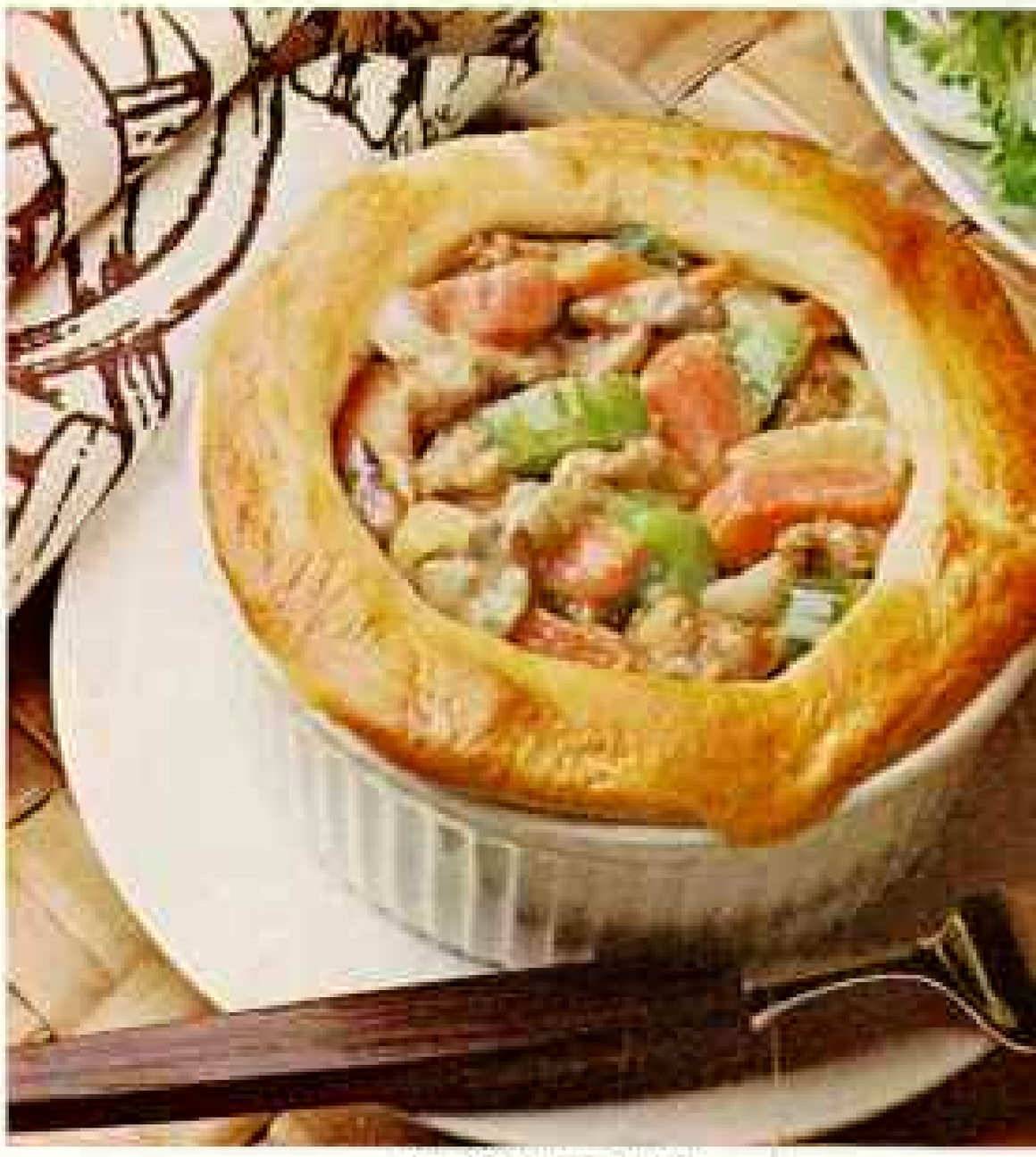

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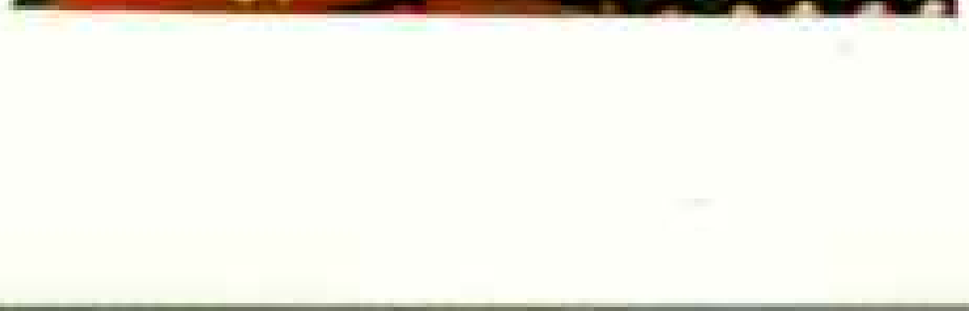

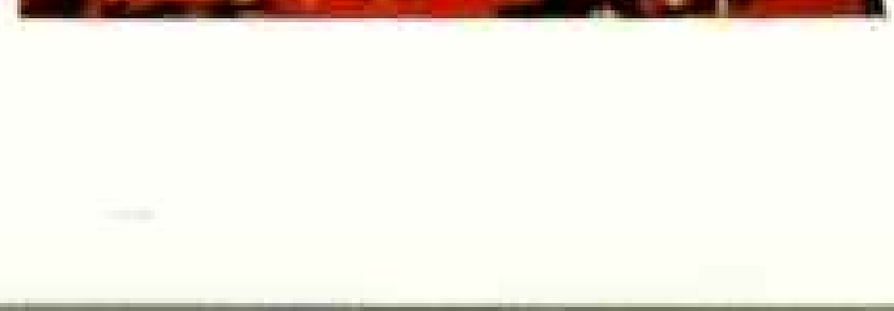

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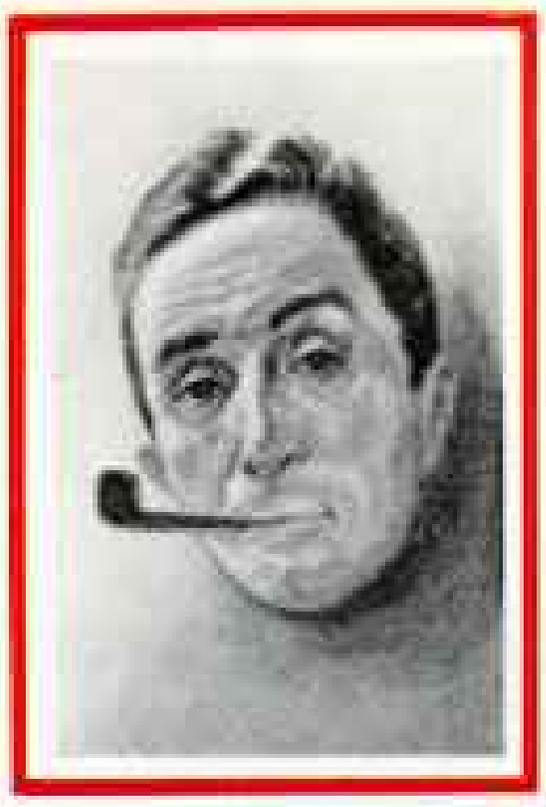
PPG helps you live more graciously with mirrors of High-Fidelity® float glass. More safely with Herculite® K tempered safety glass. And save energy, too, with Twindow® insulating glass and Solarcool reflective glass.

For more information contact your builder. Or write PPG Industries, Inc., Dept. N4115, One Gateway Center, Pittsburgh, Pa. 15222.

PPG: a Concern for the Future

PPG INDUSTRIES

The First Norman Rockwell Bell



Norman Rockwell, America's most beloved artist, fondly portrays the spirit of life in America, from the awkwardness of youth to the contentment of old-age. He has given us works of unsurpassed significance and variety.

Here are some of the American classics that have been selected to provide a most memorable Norman Rockwell collection. Together, they are truly the best of this great artist's works. . .

Doctor and Doll

The Discovery

No Swimming

Saying Grace

Circus Clown

Grandpa Snowman

. . . *from the Danbury Mint*

"Doctor and Doll"

A Limited Edition

- ★ **The first in a series of beautiful porcelain bells, to be issued by the Danbury Mint, honoring the finest works of America's most beloved artist, Norman Rockwell.**
- ★ **Each issue in this series will illustrate a different Rockwell American classic. The first bell is based on Mr. Rockwell's famous painting, "Doctor and Doll".**
- ★ **Limited edition, available at original issue price only until December 31, 1975 and only from the Danbury Mint. Not available in stores.**
- ★ **Each bell will be hallmarked and registered by the Danbury Mint.**
- ★ **Bells are hand decorated and trimmed with 22kt gold.**
- ★ **A perfect collectible for yourself or as a gift. Priced at only $27.50.**

Norman Rockwell stands alone as the artist whose works best illustrate life in everyday America. His warm picture stories lovingly capture typical people in typical settings with amazing accuracy. He is America's most beloved artist.

Now, for the first time, the best of Norman Rockwell's paintings will be presented on a series of limited edition fine porcelain collector bells from the Danbury Mint.

The first bell, based on the famous Rockwell painting, "Doctor and Doll", is typical of the richness of Rockwell's creativity. This limited edition will be available at original issue prices only until December 31, 1975.

The first Norman Rockwell bell is made of highest quality porcelain which produces a clear, delightful ring. In addition to its fine basic quality, each bell will be carefully hand decorated in vivid colors and trimmed with bands of precious 22kt gold.

Only those who acquire this first Norman Rockwell bell can ever hope to have a complete set of the bells in this important collection. Accordingly, we urge you to order your "Doctor and Doll" bell *now* while it is still available at original issue prices.

Actual Size 7" Overall *©Saturday Evening Post 1974*

★ The Danbury Mint

A 31

The Danbury Mint
10 Glendinning Place
Westport, Conn. 06880

All orders must be postmarked by December 31, 1975

Please enter my order for _____ "Norman Rockwell Doctor and Doll Bell(s)". My check or money order is enclosed at the rate of $27.50 (plus $1.25 postage and handling—total $28.75) per bell.*

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

*Connecticut residents remit $30.76 per bell to include 7% Sales Tax. Make check or money order payable to: **Danbury Mint**

☐ Check here if bell is to be given as a gift and print recipient's name below so bell can be registered in that name. Allow 3 to 4 weeks for delivery.

RECIPIENT'S NAME _____

Readers of the National Geographic are invited to

Enjoy collecting a stirring panorama preserved for future generations.

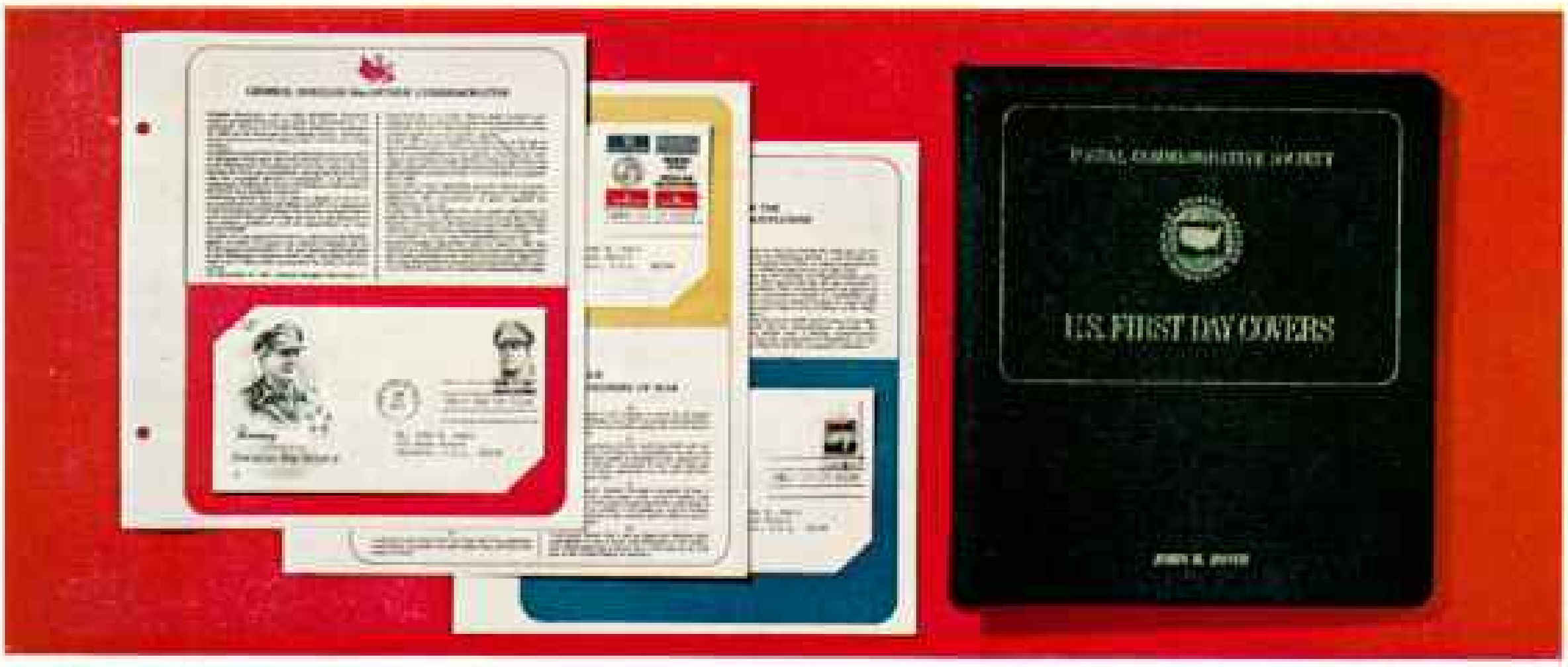
- At a surprisingly modest cost, you can receive official First Day Covers for each new commemorative stamp issue of the United States.
- Each First Day Cover will be individually addressed and sent automatically to the name and address you designate.

WHAT IS A FIRST DAY COVER?

The United States regularly honors the important men, events and places in its history through the issuance of official U.S. commemorative postage stamps. When a new stamp is to be issued, one, and only one, post office is officially designated to provide . . . on one day only . . . the authentic "First Day" cancellation. The specially designed envelope bearing the new stamp, cancelled on the exact date of issue at the officially designated post office, is a First Day Cover.

First Day Covers are fascinating collectors' items. As you can well imagine, the combination of a historic stamp, cancelled on the first day of issue at an officially designated post office on a specially designed envelope, results in a collector's item of the first order. One that has been prized by collectors like Dwight D. Eisenhower, George C. Marshall and Franklin D. Roosevelt, plus others with the foresight to preserve yesterday and today for tomorrow.

The best time to obtain these prized collectors' items is when they are issued. This is now made easier than ever by the Postal Commemorative Society.



Postal Commemorative Society members receive everything they need to build and maintain a personalized "mint condition" collection of U.S. First Day Covers. For each cover issued, the Society provides an exclusive custom designed display page, especially made for the member's personalized album.

# of U.S. history. To be treasured now and

First Day Covers combine art and history in a tribute to our American heritage. Eisenhower . . . The Battle of Bunker Hill . . . the writing of the Star Spangled Banner . . . the landing of astronauts on the moon . . . such are the subjects chosen by the United States for commemorative postage stamps. Nothing trivial or unimportant or dull is ever chosen for national honor.

Further, the post office chosen for a first day of issue usually bears particular significance to the subject commemorated. For example, a first day cover of the Eisenhower stamp was one cancelled at Abilene, Kansas.

The nation's leading artists and designers are called upon to portray the subjects chosen. Such commissions naturally are highly prized, and bring forth the best efforts of the artists involved.

Membership in the Postal Commemorative Society makes it possible to easily collect First Day Covers as they are issued. The Society will guarantee your receiving a personally addressed First Day Cover of every U. S. commemorative stamp issue. All details of arranging for your First Day Covers to be sent to you will be handled by the Society.

Commemorative stamps normally are issued by the United States at the rate of about 18 a year. You will receive up to this many issues at a basic cost of just $14.50 per year plus an annual membership fee of $5.00 (total yearly cost of $19.50).

As a member, you will also receive the Society's exclusive display page for each new issue. Each beautiful, specially designed page is die-cut to hold the First Day Cover, and contains a full description with all important historical information about the subject of the commemorative issue. *These pages are available only to members of the Society.*

Becoming a member now brings you an important collector's bonus at no additional cost. The Postal Commemorative Society makes available to its members a handsome collector's album with the member's name hand-embossed on the cover. This album, specially designed to hold the Society's display pages, makes it possible for members to keep each new First Day Cover in "mint" condition. *It is yours free, if you join now!*

MEMBERSHIP APPLICATION NG 115

Postal Commemorative Society
1 Glendinning Place
Westport, Conn. 06880

No payment required. Simply mail this membership application to this address.

Please enter a one-year membership as indicated below and bill me for $19.50 to include membership fees plus First Day Cover service for one year. Send me the collector's album which is free to new members.

My First Day Covers should be addressed as follows:

Mr., Mrs., Miss _____

Address _____

City _____ State _____ Zip _____

Please emboss the personalized album as follows: _____
Print name to be shown on album

☐ In addition to my own personal membership, I wish to enter a gift membership for the person(s) indicated on the separate sheet of paper attached.

☐ As a convenience, I prefer to pay 19.50* now for each membership for which I have enrolled. Simply mail the completed application with your check (payable to P.C.S.) to the address above.

*Conn. residents pay $20.87 for each membership to include tax.

Shook up

Because just good gas mileage and a low price aren't enough anymore.

You want that good mileage and a low price in a car that lasts. So a Toyota really gets shook up before it gets put together. We actually take a prototype model and shake it until it breaks. So that when the going gets rough your Toyota won't give you rough going.

And so it won't let you down when temperatures go up, a prototype is toasted to 150 degrees. And frozen. Drenched. Crash tested.

And the checking doesn't stop with prototypes. That's just a start. Your Toyota—like every Toyota that rolls off the assembly line—is checked completely.

In 1975 EPA test the Celica GT got 32 MPG on the highway and 17 MPG in the city. Your actua

Toyota Celica GT with standard gas-saving 5-speed overdrive transmission.

Toyota.

The engine is checked 10 different ways to make sure it works right for you. The body is checked even more ways, to make sure it looks right to you. That the trim's in line. The seams match. The doors, windows, hood, trunk, glovebox all shut tight.

That the reclining bucket seats recline. The power front disc brakes brake. The rear window defogger defogs.

You see, the Rockies may crumble, Gibraltar may tumble. But we want your Toyota to be the most dependable, trouble-free car you've ever owned.

TOYOTA

Get your hands on a Toyota. You'll never let go.

mileage may vary with road and weather conditions, equipment, driving habits and maintenance.

...We get people talking (To 23,000,000 people we're the telephone company)...We brighten their lives (Sylvania lighting for home, industry and photography)...We entertain them (Sylvania color TV and stereo)...and we serve their needs in a lot of other ways: street lighting, microwave systems, earth stations for Comsat, electronic telephone equipment, powder metallurgy, specialty inorganic chemicals, television picture tubes, data transmission, quadraphonic receivers, circuit breakers, telephone directories, mine-drilling bits, printed circuit boards, alumina ceramics, motor control centers, electrical metering equipment, electronic security systems, tungsten wire, video terminals, projector lamps, welding electrodes, Sun Gun™ movie lights, airport electronics, automotive flashers, electro-optic systems, digital multiplexers, transceivers.

...We're General Telephone & Electronics, a growing concern for your growing needs.

General Telephone & Electronics, One Stamford Forum, Stamford, Conn. 06904

Take away the fancy Le Sueur label and what do you have?

Fancy Le Sueur Peas.

These are small, tender peas with a rare, delicate flavor that rivals the French petits pois. The silver foil label shows they are special. But there is more to Le Sueur peas than meets the eye.

Le Sueur Vegetables. Every bit as special as they look.

New ITT Magicflash® pays for itself.

Add this electronic flash and save 25¢ per flash* over the list price of flashbars. That's how the Magicflash unit pays for itself. Pays off in convenience, too. Easy to attach and use. Gives uniform light, color balanced to match your SX-70 film. If you don't find it where you usually buy your camera supplies, write ITT Photolamp Products, Dept. 16, Clark, New Jersey 07066.

* After initial cost of the Magicflash unit.

The electronic flash for all Polaroid SX-70™ Land cameras.

ITT Magicflash

The best ideas are the ideas that help people

GULF COAST HUNT

In the Louisiana wetlands, sportsmen use dexterously carved and painted decoys to attract migratory waterfowl. Phillips Petroleum also hunts here, but what we seek lies thousands of feet below the marshes and bayous.

There are no decoys in our business to help us find oil and natural gas. Only years of research, experience and hard work. And if we happen to find oil or gas, we make sure they are produced in a way that causes the least possible disturbance to the environment.

We respect the Louisiana wetlands. So we take the precautions necessary to keep the hunting good — both for the sportsmen and for us.

PHILLIPS 66

The Performance Company

Illustrated: Pintail drake and gray duck decoys in the collection of Charles W. Frank Jr., collector, carver and author of *Louisiana Duck Decoys*.

There's no such thing as too much comfort. 1976 Caprice Classic.

1976. Chevrolet makes room for America.

There comes a time when you think, "I deserve it, and so does my family." That's the time for Caprice Classic. It comes with the kinds of features that expensive luxury cars do. At a Chevrolet price. There's the comfort of tasteful surroundings: deeply padded seats, instrument panel courtesy lights, rosewood vinyl accents on the instrument panel and trim. There's the comfort of being blanketed from outside noises with a special sound insulation package. There's the comfort of easy-driving features like power steering, power disc brakes, automatic transmission and steel-belted radial ply tires. All this and so much more, in a car with room for six and lots of luggage. The 1976 Caprice Classic. You deserve it.

Chevrolet

Experience what the world was like without man...

Discover THE WORLD'S WILD PLACES

What was the world like when nature was still undisturbed—before man emerged from his early beginnings to populate and change the globe?

Now you are invited to find out. Discover exotic lands where man has made few inroads and where nature still reigns as it did many thousands of years ago.

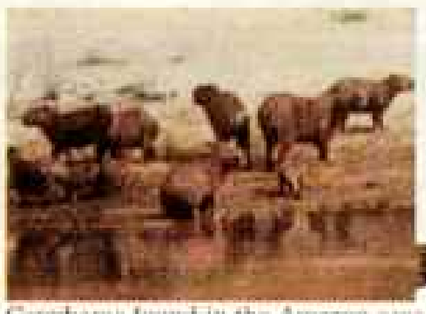
They are THE WORLD'S WILD PLACES . . . and the subject of a series of spectacularly illustrated volumes from TIME-LIFE BOOKS.

As a subscriber, you'll journey to *The Himalayas, The Sahara, Africa's Rift Valley, The Great Barrier Reef, Wild Europe, The Andes, Borneo, Lapland, Soviet Deserts and Mountains* and other areas. And you'll learn about a host of fascinating natural wonders such as those on this page.

Explore *The Amazon* for 10 days FREE

To start your journey through THE WORLD'S WILD PLACES, send for the introductory volume in the series, *The Amazon*. Examine it for 10 days free. Then decide if you want to keep it and be sent other volumes in the series as described on the reply card. There is no obligation for you to buy any of these books and you may cancel your subscription any time. Mail the special reply form today for a 10-day FREE examination.

The fennec of the Sahara is the world's smallest fox. It hunts at night, and burrows into sand dunes to keep cool during the day, with its huge ears conducting away excess heat.



Capybaras found in the Amazon area are the world's largest rodents, growing to a length of four feet and a weight of 160 pounds.

Howler monkey in the Amazon forest. One variety of monkey found here uses its "hands" to box with its enemies.

As desolate and dramatic as a lunar landscape is this area of the Soviet deserts and mountains. One portion of this area is so harsh it's called Barsa Kel'mes—the place of no return.

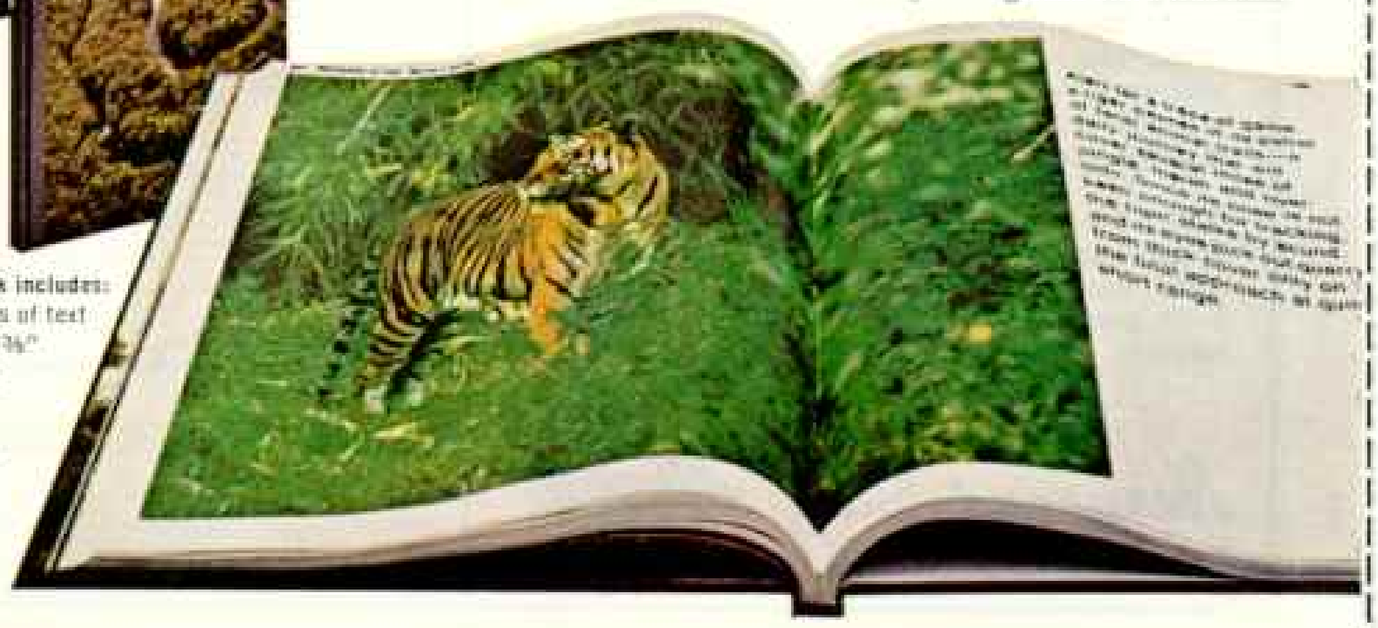
The Great Barrier Reef off Australia is home to a host of fascinating fish, including this carpet shark. It relies on the camouflaging seaweed-like fringe of skin around its mouth to remain unnoticed by its prey.

The gharial crocodile found in the "moist lands" at the base of the Himalayas grows to 20 feet and is fearsome to behold—yet if approached by a human, it will simply sink into the water.

Mt. Everest, the world's highest peak, at sunset. Located in the Himalayas, it towers over 29,000 feet—almost half again as tall as Alaska's Mt. McKinley.

Great White Pelican found in Africa's Rift Valley. Pouch on beak distends to huge size while bird fishes, holds two gallons of water and serves as a scoop.

The Cannon Ball Tree of the Amazon—so named because its fruit are as hard as iron and fall to the ground with a loud crash.



TIME LIFE BOOKS

Each hardbound book includes:

- About 35,000 words of text
- 184 pages, 9" x 10⅞"
- Approximately 100 photos and illustrations, many in full color.

Books shown here are just some of the beautiful volumes in this series.

Detach entire flap along dotted line

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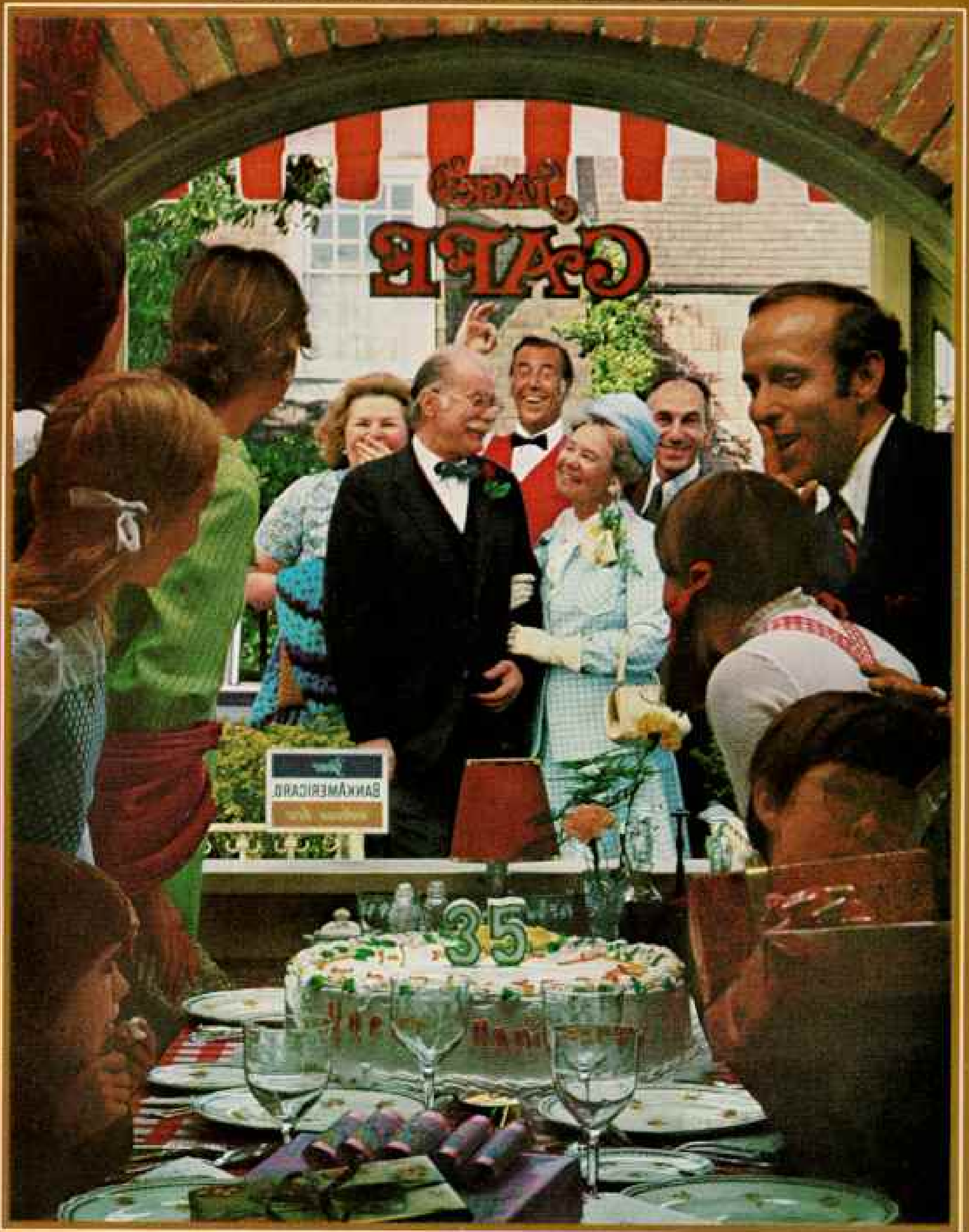

Sometimes, a celebration says the things you can't find words for.
Sometimes, BankAmericard® can make all the difference.

In 1910, unmarked highways caused travelers confusion. It was simply a problem of communication which Union Oil solved by issuing its first road map.

Every year, hundreds of thousands of new scientific books, articles, and papers are published, so much new information that it's virtually hopeless for anyone to keep up. But in the scientific community, scientists must keep in touch with research going on elsewhere. That's why Dr. Homer Rea, a research engineer at Union Oil, set to work on this communications problem.

Computers obviously were capable of storing an index of the available information. It was a matter of finding a fast, efficient system of retrieving this information from the computer. Dr. Rea developed a program for this "information dissemination" called UNISRCH. His program quickly searches the data banks for relevant information and then makes the information available on a television screen. UNISRCH can handle up to 50,000 characters a second, compared to the standard teletype system which prints 15 characters a second. Thanks to Dr. Rea and UNISRCH, scientists at Union Oil can quickly and effectively search more than 250,000 documents dating back more than 10 years.

Solving communications problems that can hinder the solution of other problems is an example of the kind of dynamic research that goes on at Union Oil. Aggressive, spirited research that needn't wait for slow answers. If you are interested in knowing more about UNISRCH, write Union Research Center, Brea, California 92621.

union 76

The pioneering Spirit of 76. It wasn't just then, it's now.

Today, the pioneering Spirit of 76 is men like
Dr. Homer Rea closing the scientific communications
gap with a system called UNISRCH.

Announcing the most advanced color TV in the world.

Read why Magnavox is years ahead of all the others.

Only Magnavox color TV combines the latest advances in picture-tube technology, chassis design and reliability testing; a total engineering concept exemplified by STAR™ System, the first color TV with a built-in digital computer.

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Just push the buttons, and go straight to the channel you want. Instantly. Silently. Electronically. No clunk-clunking through any of the channels you *don't* want.

These innovations, added to advances common to all Magnavox Videomatic color portables, place Magnavox at the leading edge of the electronic art.

Digital remote control. It's like holding the future in your hand.

Crisp, clean color.

Magnavox color portables boast the precision in-line tube. Its pictures are crisp, sharp, astonishingly bright; colors clean and natural. And they'll stay true to hue. The parts that control purity are permanently bonded into place.

Extra testing for extra reliability.

Of all leading solid-state color TV makers, only Magnavox checks *every* set an *extra* 24 hours after production.

Adjusts its own picture to changing roomlight. For a great picture in any light.

This aid to viewing (and energy conservation) makes Videomatic one button tuning the most complete, most automatic you can buy.

The only way to walk out with the most advanced color TV in the world is to walk into your Magnavox dealer. For the name of the one nearest you, call 800-243-6100, toll-free. (In Conn.: 1-800-882-6500.)

STAR Contemporary Model 4471, 19" (diagonal). Cabinet crafted of wood products and non-wood materials. Simulated TV picture.

Magnavox.
Quality in every detail.

IMAGINATIVE DESIGN AND SUPERB CRAFTSMANSHIP together create the classic beauty of fine Krementz jewelry. A heavy OVERLAY OF 14KT. GOLD gives these pieces much of the wearing quality and all of the rich beauty of solid Karat gold. You will always take special pride in giving this finer jewelry—at Christmas...for birthdays...anniversaries...weddings...or to yourself.

Krementz

Jewelry illustrated: UPPER LEFT: Rose Bracelet $50; Locket $32.50; Pendant $13.50; LOWER CENTER: Rose Earrings $40;* Brooch $37.50; LOWER LEFT: Forget-me-not Pendant $25; Earrings $25;* Brooch $50; UPPER CENTER: "76" Pendant $13.50; Liberty Bell Pendant $20; Jade Butterfly Brooch $50; UPPER RIGHT: Coral and Jade Pendant $60; Bracelet $60; LOWER RIGHT: Coral and Jade Brooch $45; Earrings $35; Scrimshaw Cardinal Pendant $60; *14Kt. Gold for pierced ears. In fine leatherette gift cases. Wherever fine jewelry is sold.

Write to Krementz & Co., 47 Chestnut St., Newark, N.J. 07101 for a free copy of "THE STORY OF KREMENTZ GOLD OVERLAY JEWELRY AND WHY IT'S DIFFERENT"

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Give an authentic piece of American History.

Imagine a pewter pen containing an authentic relic of the signing of the Declaration of Independence. A bit of wood that was a part of Independence Hall in 1776 when America became a nation, is embedded in the crown of this Parker 75 Americana pen. Each limited edition pen sold is individually numbered. Presented in a handmade mahogany case with brass fittings which itself is a replica of an 18th Century artifact. Available at select retailers as a unique pen, soft tip pen or ball pen. An exquisite gift for the free spirit who loves America and respects the lasting power of the written word. $100

PARKER 75

A gift of immediate and lasting value.

The bison's comeback, a saga of survival

"A wonderful composition of divers Animals," the bison was described by an awed 16th-century conquistador. "It has crooked Shoulders, with a Bunch on its Back like a Camel; its Flanks dry, its Tail large, and its Neck cover'd with Hair like a Lion." Bison once ranged from Mexico to Canada, from Oregon to the Eastern Seaboard. They thundered across the western plains some 60 million strong—the greatest spectacle of herd animals ever seen.

The shaggy beasts were indispensable to Plains Indians. They butchered the animals for fresh meat and made pemmican of it dried and mixed with berries. The Indians fashioned moccasins and leggings from tanned hides, stitched scraped hides together to cover tepees, and slept under warm buffalo robes. Tribes used rawhide for saddles, ropes, shields, and cooking pots. They boiled hooves for glue and carved spoons and ladles from horns. Bones served as tools; sinew made bowstrings. On the treeless prairie buffalo chips fueled campfires.

In the great Indian wars of the late 19th century, the vast herds were all but wiped out. "Every buffalo dead is an Indian gone," calculated Gen. Philip Sheridan. Professional hide hunters continued the slaughter. "Buffalo Bill" Cody shot more than 4,000 animals in 18 months. Passengers on trains fired at stampeding herds—a popular sport.

Hides sold for $1.25 each, tongues for 25 cents. Most of the rest was left to rot. By 1889 fewer than 1,500 bison survived in the United States. But even these were not safe. A remnant band of just 21 animals remained in Yellowstone National Park when President Cleveland signed a bill protecting them. Today, thanks to an enlightened wildlife-management program, there are more than 20,000 bison in North America, several hundred of them thriving in Yellowstone.

The bison's comeback inspires hope for other endangered creatures—the whooping crane, for example. Conservation of wildlife remains a continuing challenge. That fact of life—and death—is stressed repeatedly, as members know, in the pages of NATIONAL GEOGRAPHIC.

HOW WE'RE KEEPING AMERICA'S

PHONE SYSTEM THE BEST IN THE WORLD.

90,000 tons of pure copper recycled by Bell System to save resources, cut costs.

We started recycling metals more than 30 years ago. Last year, we saved as much copper as a good-sized mine produces.

By using recycled copper, we also save energy. So we save three ways—resources, energy and money. And keeping our costs down helps us keep your phone bill down.

Recycling. One of the ways we're keeping America's phone system the best in the world.

Bell System

"It won't be long and all our tanks may be empty."

"I've never run out before—not even during the shortage."

Oil shortage. Energy crisis. Chilling realities? Half truths? Or myths? Which? There are arguments to support any view.

The crisis is out of the headlines. The wait-lines are gone from the gas stations. We can run boats. Snowmobiles. Fly planes. Travel. True, our bills are up. But there were no "brown-outs" last summer. There's electricity to wash, dry, sew, mow, heat, cool, light, type, iron, compact trash, lift garage doors, cook, warm blankets.

But many people view this apparent abundance as a mirage. A tragically false hope. They fear the world's oil and gas may be gone in our children's time. Priced way beyond today's levels long before. Even our nuclear fuels, they fear, might not last until the end of the century.

Nobody doubts oil and gas supplies are finite. Even at curtailed consumption rates they will be gone one day, as fuels, chemicals, lubricants. But there are three things we can do. First, we can slow our energy use through conservation. An estimated 30% of all energy used in the U.S. today is wasted.

And we can turn to coal. Coal can buy time to research other energy sources. It is abundant. Quickly available. We are advancing technology to mine and convert it at acceptable environmental costs. Coal to electricity, to oil, to gas. Coal to petrochemical substitutes.

Finally, we must speed up nuclear development: the breeder-reactor and fusion developments that would assure centuries of clean energy.

Caterpillar makes machines used to mine coal and atomic fuels, to reclaim lands and to prepare power plant sites. We also are vitally interested in helping to solve America's energy problems.

There are no simple solutions. Only intelligent choices.

CATERPILLAR

Caterpillar, Cat and the are Trademarks of Caterpillar Tractor Co.

Delta is an air line run by professionals, like Tom Sineath. He has had a busy career with Delta. He's worked in cabin service, behind the ticket counter, at the boarding gate, handling many thousands of travelers.

Now Tom is a Delta Passenger Service Agent. And he's ready for anything. A bewildered tourist who speaks no English. A rock group with a ton of instruments. A 14-year-old who lost her purse with her ticket in it.

Tom's job is helping people get where they're going. And when it comes to people, Tom Sineath–like all the other 28,000 Delta professionals– couldn't care more.

Delta is ready when you are.

This is Delta's Wide-Ride™ L-1011 TriStar® an $18 million superjet. Cabins are almost 19 feet wide. All 250 seats are two-on-the-aisle.

We built this Delta 88 for John Andersen, who needed a car that could stand up to his ultimate endurance test.

His three kids.

Nice kids, actually. They just don't know their own strength. That's why John needs a strong, dependable car with room enough for rumpus—and toughness enough to survive it.

What's more, people like John find Delta 88 compares favorably in value to the so-called "low-priced three." That's because some cars list as "options," things that Delta 88 lists as standard: a 350 V8, automatic transmission, power steering and brakes, steel-belted radial tires, high-energy electronic ignition system. And then, there's the good feeling of having an Olds around you.

Delta 88—the beautiful, comfortable Olds that is big enough, and tough enough, to handle John's kids. Too bad he didn't build his family room the way we built his Delta 88.

1976 DELTA 88 Oldsmobile

Can we build one for you?