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COVER: *In custom-conscious Kyoto (pages 836-59), a flower vendor wears a traditional cotton kimono. Photograph by George F. Mobley.*

GUATEMALAN ARTIST Rafael González G. had never seen the devastation of an earthquake, yet something impelled him recently to paint this scene of stricken countrymen fleeing their shattered village. The painting was sold, by even stranger coincidence, on February 3, 1976. A few hours later, before dawn on February 4, Central America's greatest recorded natural disaster wrenched the land, leaving 100,000 dead or injured, more than a million homeless.

Naturally enough, the "omen" went unheeded. Nor, in fact, did a volcano erupt during Guatemala's earthquake. But suppose a respected scientific voice, armed with data from instruments that gauge earth's silent strain and creep and tilt, had been able to warn the populace hours—even *minutes*—before the quake? How many thousands might have escaped collapsing roofs and falling walls?

For the articles beginning on pages 810 and 830, a GEOGRAPHIC team surveyed tragic ruin in Guatemala while another staff man probed scientific minds on the disaster's implications. One thing became clear: An effective earthquake warning system would be of incalculable value to man.

In China, some 10,000 persons are studying how to predict earthquakes; in the U. S., only 200. The Chinese monitor some 5,000 sites. We monitor a thousand. The Chinese program already has saved countless lives by forecasting a major shock in Manchuria on February 4, 1975—ironically, one year to the day before the Guatemalan disaster.

Gilbert M. Grosvenor

"...no other had so much natural wit, boldness, or knowledge..."

ANTONIO PIGAFETTA

His eyes would dare to scan the earth's farthest mysteries. A will of steel pledged his small lame body to the great adventure, the first circumnavigation of the earth. With a broadside salute, Ferdinand Magellan and his fleet bid farewell to Europe at Spain's Sanlúcar de Barrameda (**below**), setting off in the fall of 1519. Magellan lost his life in the Philippines, but one of his five ships succeeded in circling the globe.

ARTIST UNKNOWN, PORTRAIT FROM MUSEO DE ARTE MODERNO, MADRID (ABOVE); PAINTING BY BJÖRN LANDSTRÖM

Magellan

A VOYAGE INTO THE UNKNOWN CHANGED MAN'S UNDERSTANDING OF HIS WORLD

By ALAN VILLIERS

Photographs by BRUCE DALE

NATIONAL GEOGRAPHIC PHOTOGRAPHER

First Voyage Around the World

THE QUIET EVENING SCENE in San Julián Bay, on the far southern coast of Argentina, was misleading that night of April 1, 1520. Reflections of five sturdy ships, now more than six months and 6,000 sea miles out from Spain, shimmered on the surface of the bay as the masts and spars rolled slowly under the stars.

The little fleet, bearing fewer than 300 men under the able and ruthless Portuguese soldier-adventurer-seaman Ferdinand Magellan, had come in for winter quarters. As a place to wait the winter out, San Julián suited well. It was sheltered and had fish and fresh water. It also had tribes of friendly wandering "giants"—big men with huge feet (perhaps just thick grass-filled foot wrappings). Since big feet are *patagones* in Spanish, Magellan called them Patagonians, and their land Patagonia.

The bay also seemed a convenient springboard for finding the object of the voyage, that rumored but still-undiscovered strait from the Atlantic to the sea of the Indies and the riches of the Spice Islands—if such a road existed. But those weakly rigged, shoelike little ships dared not sail farther into such rough waters in worsening weather. Though no one then knew it, they were approaching the toughest corner of the sailing-ship world—the savage tip of South America where Atlantic and Pacific meet near Antarctica.

They must wait at least until spring, though Magellan was aware that idleness at anchorage soon swells discontent. There was already plenty of that. Magellan was a Portuguese commanding an expedition for the King of Spain; though he had changed his nationality to Spanish two and a half years before, he still appeared a foreign upstart to the Spaniards accompanying him. What is more, they considered him more fanatic driver than questing seaman, determined to force ships and men to the uttermost ends of the earth—for what? An alleged seaway through to the westward, which, if there, might lead to the Lord knew what! Magellan said to the rich Spice Islands. Maybe.

But here they were at the forlorn end of a barren coast in drafty, cold, uncomfortable ships. They, the ship commanders and senior officers, were gentlemen of Spain, while their leader was this ruthless soldier with a battle-lamed leg, to them a renegade whose own king would not back him. So they planned sudden mutiny there in San Julián, to dispose of him and his ideas once and for all.

The day after the ships anchored, Magellan invited the captains and senior officers of *Concepción*, *San Antonio*, *Victoria*, and the tiny caravel *Santiago* to dine aboard his flagship, *Trinidad*. But not one Spaniard came, an obviously coordinated and defiant act. Then they sent a boat to Magellan to announce the independence of three of the ships.

Magellan could deal with *that*. This was mutiny, punishable by death. Spaniards were by far in the majority in Magellan's fleet, but King Charles of Spain had given him "rights of rope and knife" over all of them—life and death. Those powers were for use.

That same night Magellan acted. He sent a boat to *Victoria*'s captain, the noble fleet treasurer Luis de Mendoza, delivering to him an order to report aboard the flagship immediately. Mendoza threw his head back, sneering, and began to laugh.

It was the last thing he did, for the well-briefed messenger instantly grabbed him by the beard, jerked his head farther back, and slashed his throat with a dagger.

ANOTHER BOATLOAD of Magellan's men swarmed aboard, and *Victoria* surrendered immediately. *San Antonio*, cut adrift as she prepared to sail, was raked by gunfire from *Trinidad*, and a boarding party led by Magellan himself quickly put her captain, Gaspar de Quesada, in irons. A third mutinous captain, Juan de Cartagena, a favorite of the Spanish king and by his order the *conjunta persona*, or "person jointly responsible" for the fleet with Magellan, was seized aboard *Concepción*. The mutiny was over before it got going.

The Italian chronicler, Antonio Pigafetta, sailing in Magellan's ship, fortunately wrote an account of the first world-circling voyage.* His record of the mutiny is stark:

*All quotations from Pigafetta are from his journal, *Magellan's Voyage: A Narrative Account of the First Circumnavigation*, as translated and edited by R.A. Skelton © 1969 Yale University.

"The masters of the other . . . [three] ships conspired against the captain-general to bring about his death. . . . But the treachery was discovered . . . the treasurer [Mendoza] was killed by dagger blows, then quartered. . . . Gaspar Quesada had his head cut off, and then he was quartered. And the overseer Juan de Cartagena . . . was banished with a [disaffected] priest, and put in exile on that land called *Patagoni*."

That's all. But Magellan's authority would not be challenged again by would-be mutineers. *Trinidad* and the little *Santiago* had remained loyal. *Santiago* was lost a month later on a coastal surveying passage. But, as Pigafetta wrote, "all the men were saved by a miracle, for they were not even wetted."

It was no miracle, however, that saved Magellan in San Julián Bay. A hesitant leader would have lost everything, but Ferdinand Magellan was a forceful, determined man.

"He was a navigator and made sea charts."

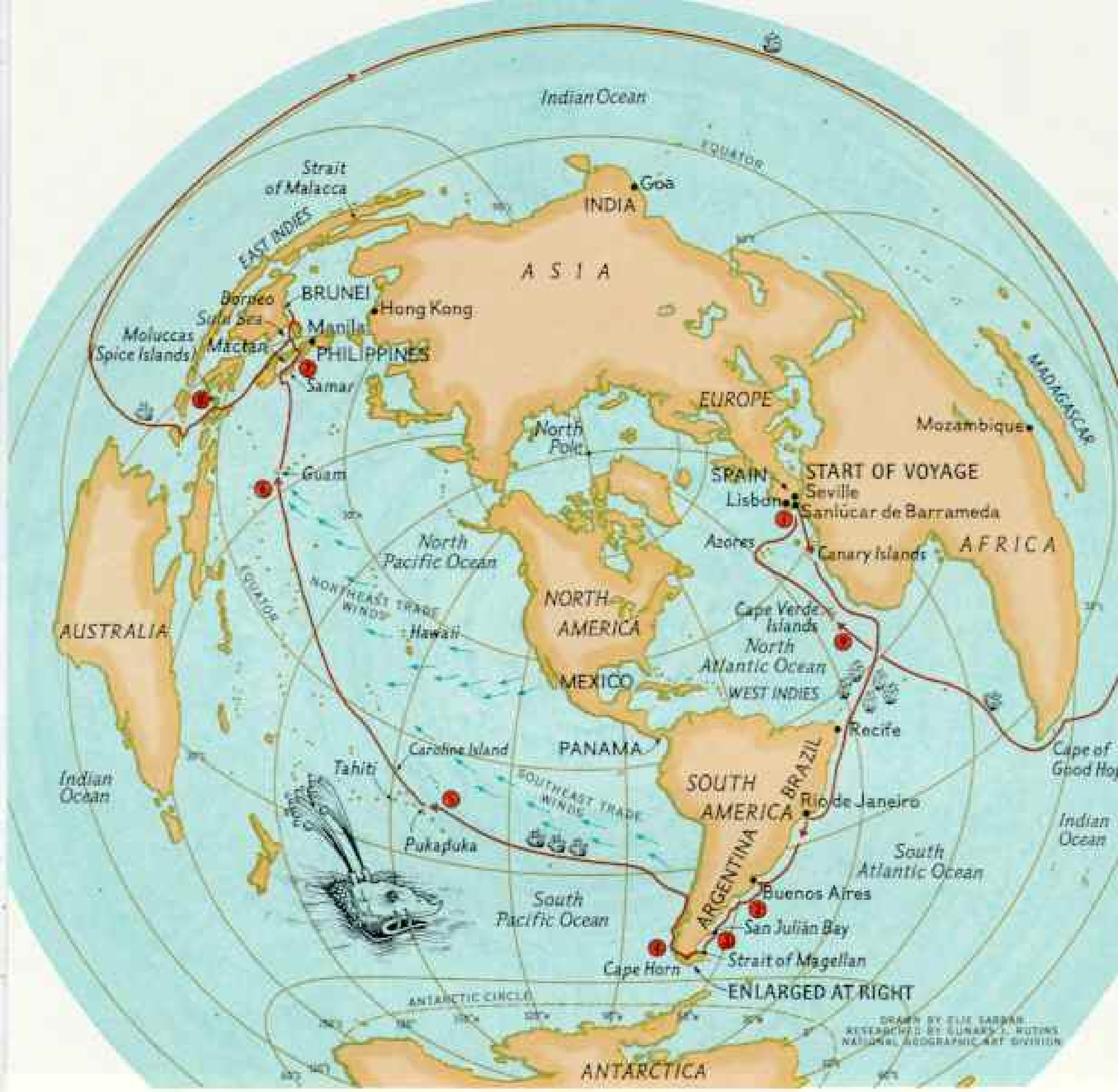
An orphan of good family, born about 1480, Fernão de Magalhães grew up as a page at the Portuguese court in an unprecedented age of discovery: Bartholomeu Dias's rounding of the Cape of Good Hope, Vasco da Gama's reaching of India, the voyages of Columbus, Cabot, and Vespucci.

Portuguese maritime excellence, still evident in the fishing fleet at Estoril (**below**), had ascended to the meridian. Yet Portugal's King Emanuel would not support the navigator's plan for an even greater voyage. So Magellan, as he came to be known, turned to Spain and its young King Charles I.

After calms, storms, and incipient mutiny on the Atlantic passage, the fleet found a welcome anchorage in Rio de Janeiro (**above**), in territory then called Verzin. There Magellan traded for stores for his Armada of the Moluccas, so-called because its mission was to find a rumored strait and cross the South Sea to the Moluccas, or Spice Islands.

His crew, motley in its international composition, may well have sported on beaches under the brow of Sugar Loaf (**left**).

"... we crossed to a land named Verzin.... In which place we replenished our provisions.... The men and women of this place are of good physical build."



Columbus had pioneered what was mainly a simple passage, a sunny trade-winds run to the West Indies. By comparison, this stubborn, grim Portuguese had to drive an unwilling fleet nearly to Antarctica to find a way around America—and who knew how much farther to reach the Spice Islands.

In those days cloves and other cooking spices were a source of riches, and they grew chiefly in the Moluccas. Magellan's theory was that these islands lay not far beyond the New World, and sailing this way would be shorter than round all Africa.

Four and a half centuries after Magellan's voyage, my wife, Nance, and I set out to track the life of this extraordinary man. Near a village named Sabrosa in the hilly north of Portugal, two plaques on a stone house beside a vineyard record that Magellan was born on the site, in or about 1480. He left home, orphaned at age 10 to 12, to be a page at the Portuguese court.

IN SEVILLE, Spain's royal city where later he organized his great voyage, the honors seem reserved not for Magellan but for the Spanish Basque Juan Sebastián del Cano. A young commoner, who was involved in the mutiny of the Spanish officers but whose life was spared, he had no command

Magellan's search for a western spice route

WITH A HEARTY "AYE, AYE," naval historian Samuel Eliot Morison joins in the opinion that Magellan's voyage was the "greatest single human achievement on the sea."

From the frigid fifties of south latitude, through the strait that was to honor his name, and across the Pacific, Magellan drove his little fleet through waters no European had sailed before. His route proved impracticable for the spice trade. The captain himself never reached home, and his heirs got not one ducat. Reviled in Portugal, defamed in Spain, Magellan left one legacy only—knowledge of the world as it is.

1 September 20, 1519. The Armada of the Moluccas departs Spain with 20,000 hawkbells and other goods for barter. Unknown to captain or crew, "land sharks" have shorted the ships' provisions.

2 After leaving Rio, the fleet arrives in San Julián Bay, March 31, 1520. Wintering there, Magellan suppresses a mutiny of his Spanish captains.

3 October 21, 1520. The strait is discovered. *San Antonio* later deserts the fleet and returns to Spain.

4 November 28, 1520. *Trinidad*, the flagship, *Concepción*, and *Victoria* enter the Pacific. Though Balboa had sighted it in 1513, Magellan is the first European to put it under his keel.

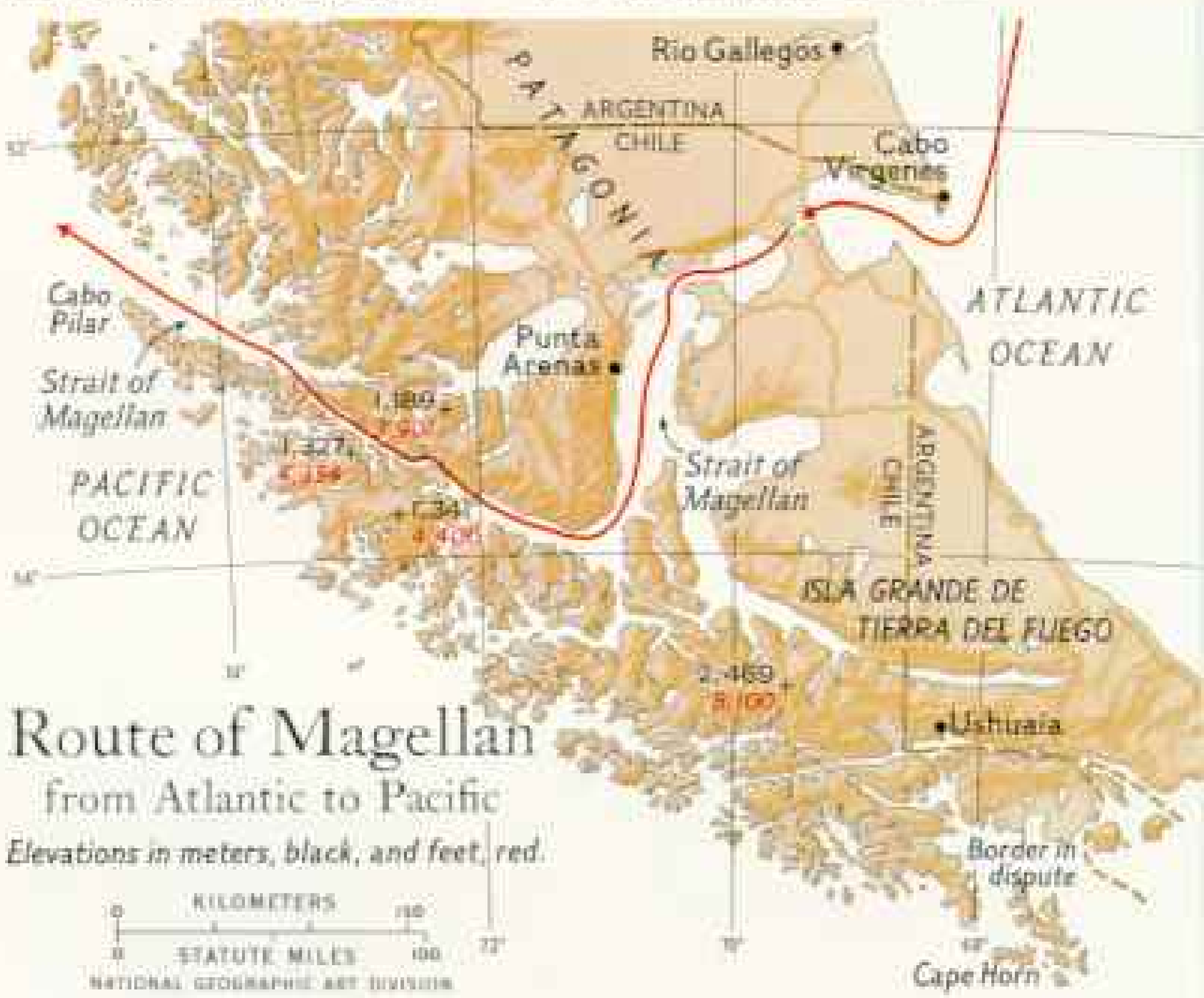
5 The ships sight the "Isles of Misfortune"—Pukapuka, January 24, 1521, and the "Isle of Sharks" (probably Caroline) February 4, but find no anchorage.

6 Magellan presses on to Guam (Islas Ladrones—"Isles of Thieves") March 6, 1521, and the first anchorage and fresh food in almost 100 days.

7 April 27, 1521. Magellan killed in a futile battle with natives at Mactan Island in the Philippines.

8 After *Concepción* is scuttled, *Trinidad* and *Victoria* finally reach the Moluccas, November 8, 1521, and fill their holds with precious cloves.

9 *Trinidad* left behind, *Victoria*, under former mutineer Juan Sebastián del Cano, sails far south across the Indian Ocean, around the Cape of Good Hope to the Cape Verde Islands, and on to Spain, September 6, 1522.



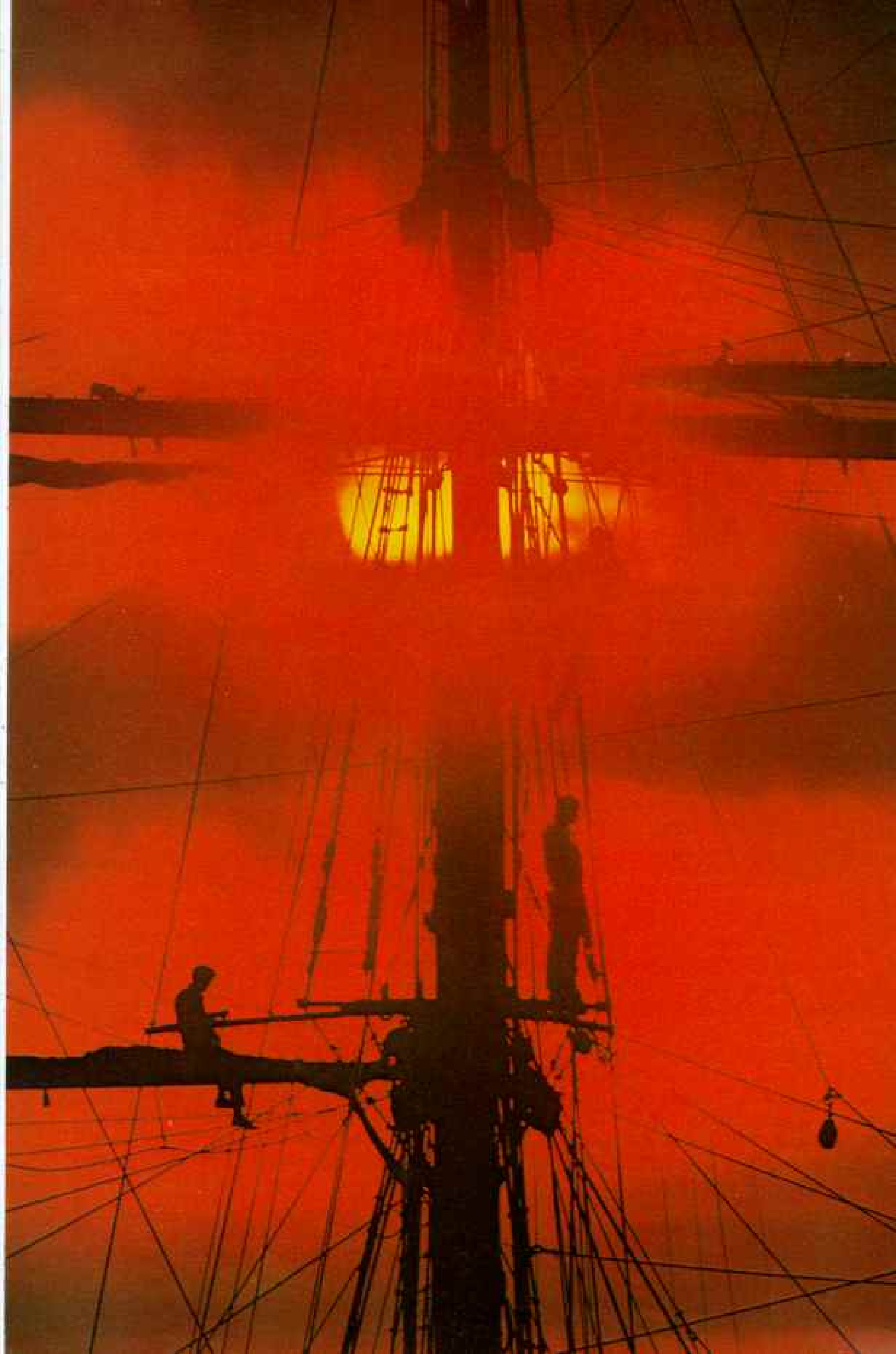
until Magellan was killed in the Philippines. He survived to bring one tired ship home, with a cargo of cloves that repaid some of the expedition's costs. A tall statue of del Cano today overlooks Seville.

Despite this overshadowing of Magellan in Seville, my wife and I felt we really were on his trail there. The medieval Tower of Gold he knew still stood. At least one statue (of Santa Maria de la Victoria) that he and his men knew was still there, and greatly venerated.

We drove to the pretty mouth of the Guadalquivir River at Sanlúcar de Barrameda, smiling in the sunshine. It was easy to imagine the Magellan fleet anchored off there in the summer of 1519. The stubby ships' incredible smallness for the great voyage they were about to begin would astonish the modern mind. The *San Antonio* was 120 tons (as they were reckoned then), *Trinidad* 110, *Concepción* 90, *Victoria* 85, and *Santiago* 75. The largest was smaller than the *Mayflower*, and she was not as big as a modern harbor tug!*

From Sanlúcar it was an easy sail for Magellan's fleet to the Canary Islands, where more provisions and 25 more seamen were brought aboard. Then, perhaps to avoid Portuguese

*Captain Villiers sailed a re-creation of the *Mayflower* from England to America, writing of the project in the GEOGRAPHICS of May and November 1957.



warships sent out to intercept him, Magellan detoured southward along the bulge of West Africa before crossing the narrows of the Atlantic to the Brazilian coast near Recife.

This tropics run was new to Magellan, though he had sailed around the Cape of Good Hope to India and Malacca and back again. But neither he nor anyone else had attempted the dangerous voyage in far southern waters that lay ahead. He had read and heard enough to convince him that a strait existed, and that the Spice Islands lay beyond. But the way through remained to be found.

After two weeks' rest at Rio de Janeiro, he searched for his strait farther south: in the great estuary of the Río de la Plata, where Buenos Aires was to flourish, and on down the Patagonian coast. There were obviously no shortcuts toward the East Indies in either of these areas. So onward the fleet groped, ever southward, westing, and the vast land stayed with them.

AT LAST, after leaving San Julián Bay late in the southern winter of 1520, Magellan found the beginning of the way through. The triumphant event occurred on October 21, the Feast of the Eleven Thousand Virgins. Pigafetta's report is laconic:

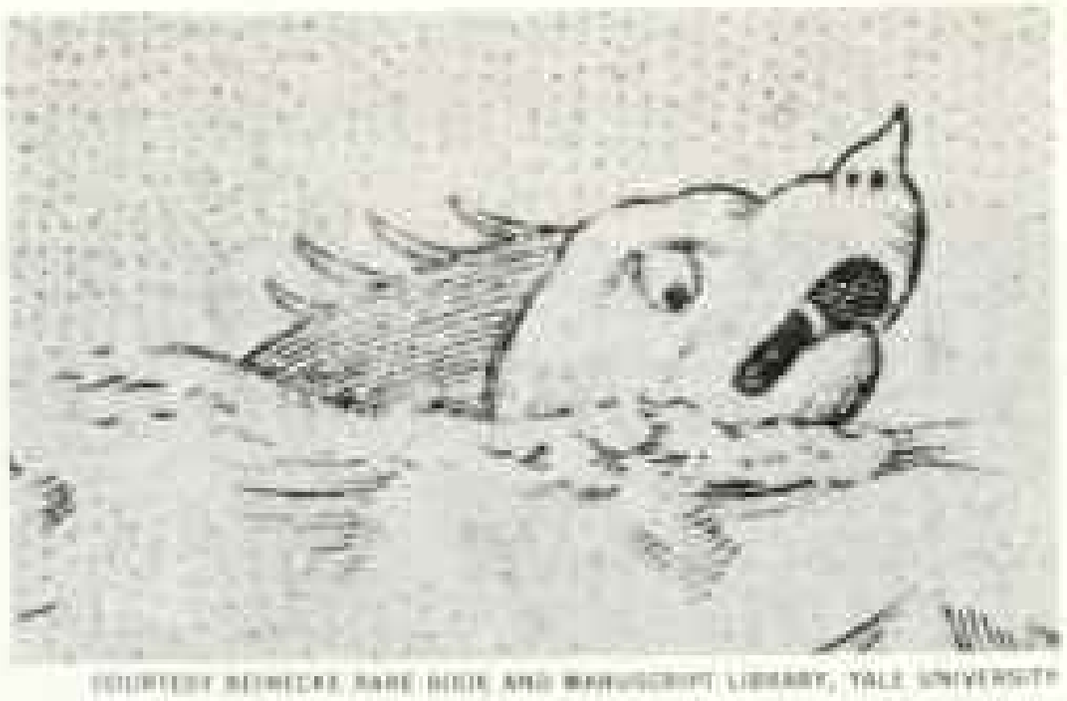
"After going . . . to the fifty-second degree [of latitude] toward the said Antarctic Pole, on the festival of the eleven thousand virgins, we found by miracle a strait which we called the Cape of the Eleven Thousand Virgins. Which strait is in length one hundred and ten leagues. . . . And it falls into another sea called the Pacific Sea. And it is surrounded by very great . . . mountains covered with snow."

As Magellan felt his way through the strait, he sent *San Antonio* and *Concepción* ahead to search out points of danger and useful anchorages. On the second such trip *San Antonio* did not return. Instead, her officers and crew overpowered their captain, doubled back by night, and sailed home to Spain.

According to Pigafetta, the mutineering pilot of the *San Antonio*, Estevão Gomes, had one motive for his desertion—pure hatred of his Portuguese leader. When he got back to Spain, he made dire charges against Magellan —and, though jailed briefly, in the end went unpunished.

Sadly, after searching for the *San Antonio* for many days, *(Continued on page 733)*

". . . great fish called 'Tiburoni' approached the ships. They have terrible teeth and eat men. . . ."



COURTESY BEINECKE RARE BOOK AND MANUSCRIPT LIBRARY, YALE UNIVERSITY

"**And even the small ones** are not much good [as food]," said chronicler Antonio Pigafetta of sharks (**above**, from a chart published in 1584, and **below**, a head left by Uruguayan fishermen). Sunrise behind the Argentine training ship *Libertad* (**opposite**) suggests the electrostatic effect known as Saint Elmo's fire, which played about the masthead of Magellan's flagship.

"...I determined...to experience and to go...that it might be told that I made the voyage and saw with my eyes the things hereafter written, and that I might win a famous name...."

PAINTING BY ALÖNN LARSTRÖM

A kindly providence and an eye for posterity guided the fortunes of Italian knight and diarist Antonio Pigafetta (**above**), who shipped as a gentleman adventurer. After witnessing the fates of the mutineers (background), sailing into the Strait of Magellan (**right**), and fighting at Magellan's side, Pigafetta survived to write the history of the voyage. His closest call was falling overboard at an anchorage. Luckily, he caught a dangling line and cried for help; apparently he couldn't swim.

"... one day ... we saw a giant who was on the shore, quite naked. ... These people have the hair cut short and shaved like friars, with the tonsure."

In silent lament, the figure of an unknown Indian at Punta Arenas, Chile, on the Strait of Magellan seems to mourn the virtual extinction of his people. Just as Magellan presented one with "a mirror, a comb, bells, and other things," modern visitors deck the statue with memorial tokens. The feet are kept shiny for those who believe that to touch them guarantees good luck.

At first Magellan traded peaceably with Indians he met. Then, to catch "the two youngest to bring them to Spain," he tricked them into leg-irons.

Compared to the conquest of Mexico by Cortés, well under way at the time, the incident seems trivial. Yet it was cut from the pattern of the age. To serve God, prince, and self was all the same—and justified any behavior toward the people one found in "heathen" lands.

Magellan and his three remaining ships went on through the strait, anchoring or mooring to rocks by night. They were sometimes confused by apparent openings leading nowhere.

It was not all hardship. The weather was generally good. Often the scenery was magnificent, and in the comparatively narrow waters they experienced few of the sudden wind squalls characteristic of the region.

"And we called it the Pathagonico strait," wrote Pigafetta. "In it we found at every half league a good port, and anchorage, good water, and wood . . . and fish like sardines. . . .

"ON WEDNESDAY the twenty-eighth of November, one thousand five hundred and twenty, we issued forth from the said strait and entered the Pacific Sea, where we remained three months and twenty days without taking on board provisions or any other refreshments, and we ate only old biscuit turned to powder, all full of worms and stinking of the urine which the rats had made on it, having eaten the good. And we drank water impure and yellow. We ate also ox hides which were very hard because of the sun, rain, and wind. And we left them . . . days in the sea, then laid them for a short time on embers, and so we ate them. And of the rats, which were sold for half an écu apiece, some of us could not get enough.

"Besides the aforesaid troubles, this malady [scurvy] was the worst, namely that the gums of most part of our men swelled above and below so that they could not eat. And in this way they died, inasmuch as twenty-nine of us died . . . But besides those who died, twenty-five or thirty fell sick of divers maladies, whether of the arms or of the legs and other parts of the body [also effects of scurvy], so that there remained very few healthy men. Yet by the grace of our Lord I had no illness.

"During these three months and twenty days, we sailed in a gulf where we made a good four thousand leagues across the Pacific Sea, which was rightly so named. For during this time we had no storm, and we saw no land except two small uninhabited islands, where we found only birds and trees. Wherefore we called them the Isles of Misfortune. . . . And if our Lord and the Virgin Mother had not aided us by giving good weather to refresh ourselves with provisions and other things we had died in this very great sea. And I believe that nevermore will any man undertake to make such a voyage."

Nance and I did our best to follow in Magellan's unprecedented tracks. We had the chance of going through his strait in the big cruising liner *Gripsholm*. What a difference! The lovely 20,000-ton liner offered every comfort of a luxury hotel as she steamed along those wonderfully scenic passages, with the glorious mountains spilling glaciers into the dark waters. Upright and steady, she cruised leisurely through in two days at 18 knots. It took Magellan 38 days in all, as he sailed thrice over a good part of the strait's 310-nautical-mile length.

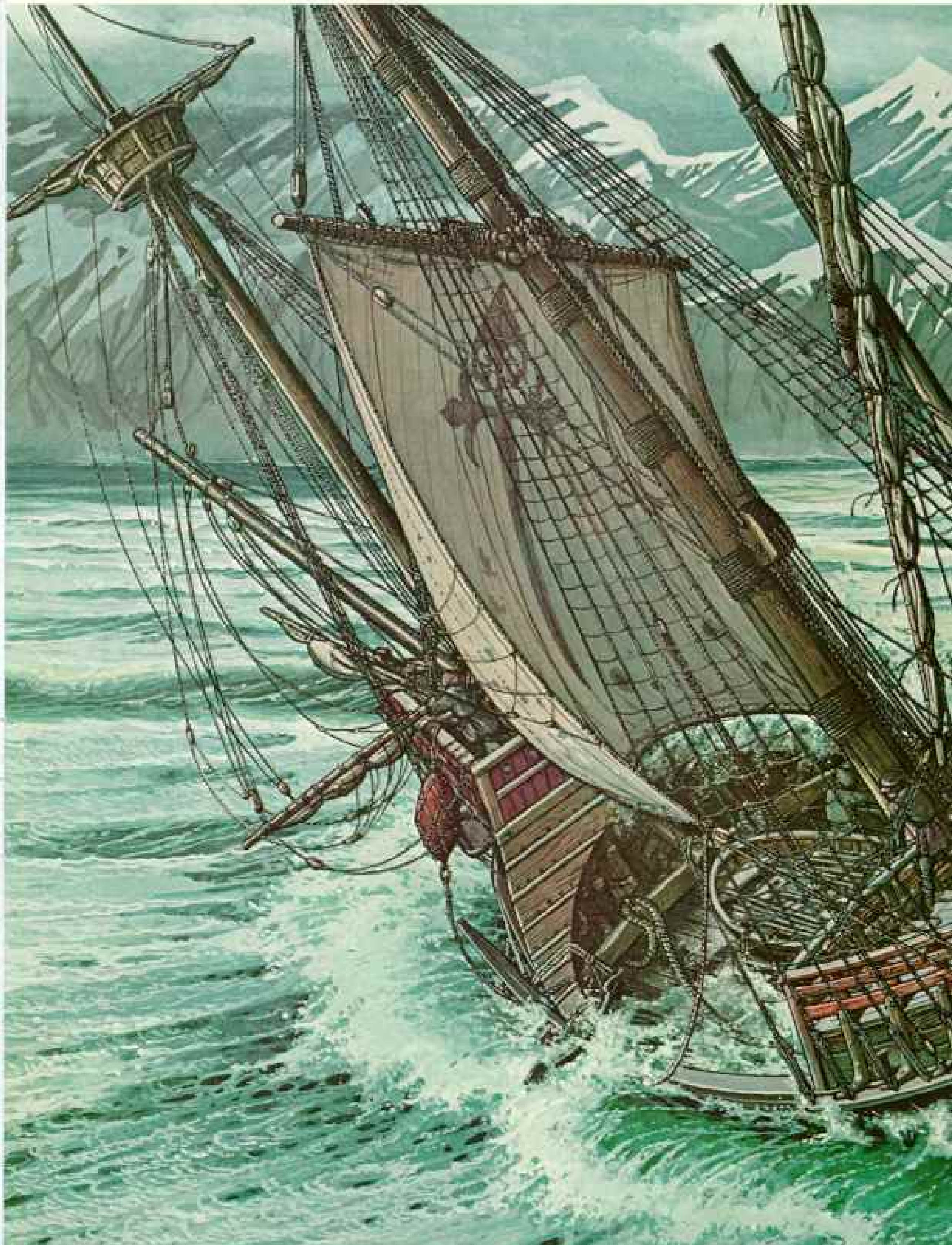
At Punta Arenas, partway through the strait, the *Gripsholm* anchored for a while. I went ashore to salute Magellan's statue, high on its pedestal in the pleasant town square there (page 735). It is one of the very few statues to the man in the world.

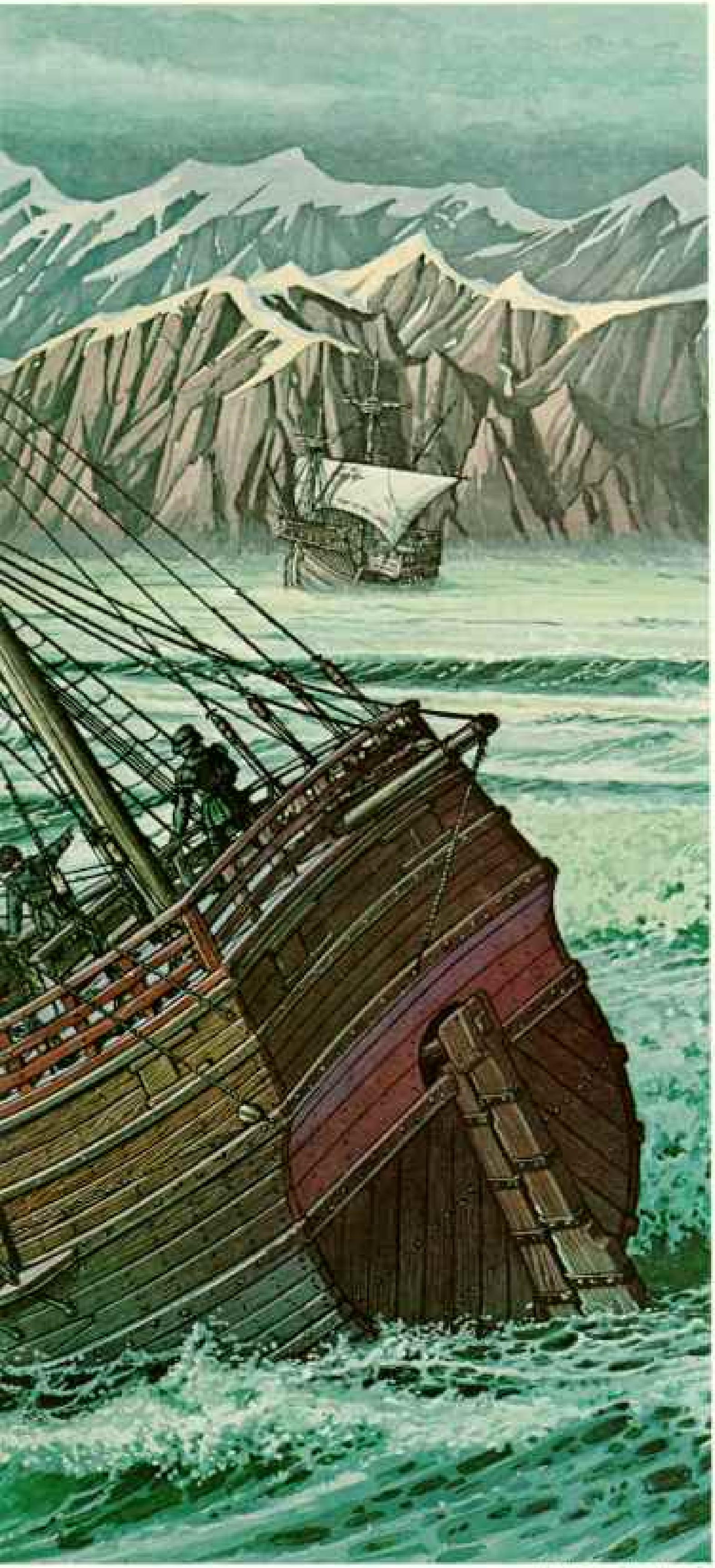
I was pleased to note that the route Magellan so bravely pioneered is being increasingly used, as some oil tankers and bulk ore carriers are so huge that their beam, draft, and length keep them out of the Panama Canal. They *have* to go south around South America. We sighted several of these monsters of a quarter of a million tons wallowing along like pieces of moving mountain.

Magellan was obviously a seaman who appreciated progress, or he would not have been down there himself, changing the maritime world of his day. I think he would have enjoyed seeing those monster tankers and our cruise ship using his strait.

WHAT FOLLOWED for him and his men, however, may have caused him to regret ever sailing through that strait. Except for an occasional flying fish that blundered aboard in the tropics, or a few tuna his men caught, he found no opportunity for replenishing the ships' provisions.

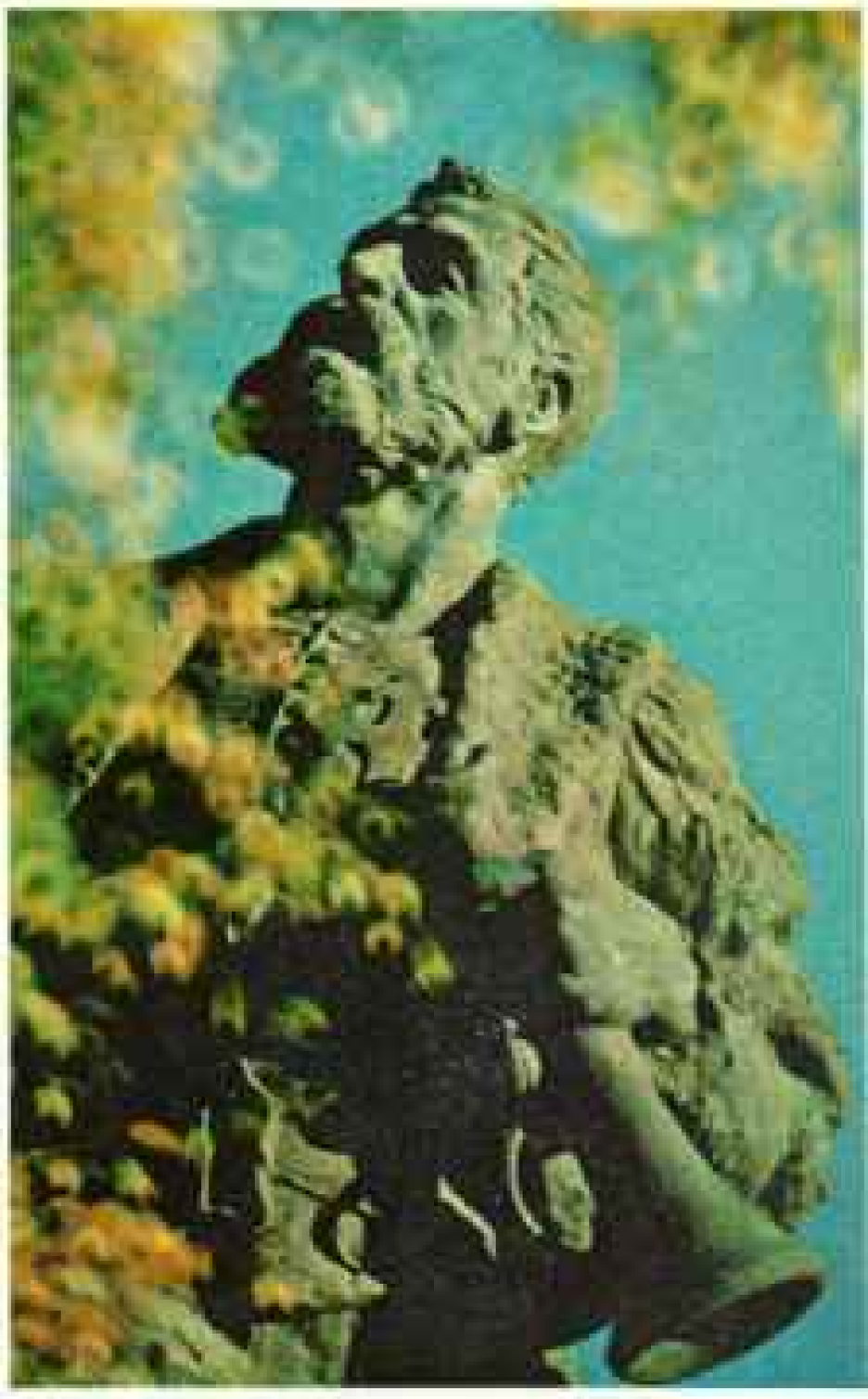
As beautiful day followed day, and the Pacific trade winds wafted the small ships along, the same monotonous, empty horizon encircled what appeared to be the last three ships on earth. The crews, by then gaunt, wild-eyed men, fiercely hunted over their craft for something, anything to sustain life. As Pigafetta recorded, they not only pursued rats to make into stew, but they also cut down the leather chafing mats for food. These mats





PAINTING BY BJÖRN LANDSTRÖM

"... we were compelled to raise the anchors, and to let the ships ply hither and thither...."



Tougher than the metal of his statue in Punta Arenas (**above**), Magellan had resolved to sail as far as Antarctic latitudes to find the open passage he could know only by rumor or conjecture.

A sudden storm greets the fleet (**left**) as it probes yet another bay in hopes of finding a corridor to the west. "Like desperate men they threw themselves into it, so that perforce they discovered the strait." *Victoria* and *Trinidad* reach and run under lashing winds to avoid going aground.

"The women . . . are handsome and delicate . . . hair, very black and hanging down to the ground."

As comely as her forebears, Emily Cheguina crosses her family's garden above Umatac Bay on Guam. There, most authorities believe, Magellan first dropped anchor after constant sailing through three months of perfect weather and perfect misery.

Even though the natives swarmed aboard, taking what they could, the "Isles of Thieves," as Pigafetta dubbed them, provided fresh food and water to relieve the starvation and scurvy of the Pacific passage.

were lashed in the rigging to save vital spots from the rubbing of rope against wood, canvas against tarred hemp. This hard sunbaked stuff they soaked for days, then beat it as soft as possible with belaying pins, and boiled and boiled it. The soup tasted like old hides and provided little nourishment. The leather could be chewed. Perhaps it had "hope" value. I tried some, centuries later. All I got was boils.

This diet led to the scurvy Pigafetta described. Matters would have been even worse except for the few flying fish that came over the bulwarks, fleeing pursuing schools of bonito and albacore.

Some of the seamen had been fishermen and knew how to catch those hunters of the flying fish. From the bowsprit they flicked a barbed hook in a piece of white rag secured to a chip of wood. The rag flicked out of the crests like a flying fish, and the hungry albacore and bonito leaped for it—their last leap! Without these fish for food and rain squalls

when they reached the doldrums to replace the stinking fresh water kept in barrels in the hold, most of the seamen would have died. In the first month, before the rains came, the barreled water had become so putrid and stinking that the seamen had to hold their noses to gulp down a few mouthfuls.

For almost a hundred days the slow sea crawl continued, the seamen hollow-cheeked, so weak that it took six or eight to do what had been the work of one.

The fates were both against Magellan and his men and kind to them, on that longest leg of his voyage. By chance of the route he took, he sighted only two lonely islands of all the great South Pacific groups, and could not land on those. He saw none of the many isles where he might have found glorious fruits and fat fish. But had he sailed among them, he might have struck a hidden reef and been lost in mid-Pacific.

NINETY-EIGHT DAYS from the strait (or 99—the exact dates are uncertain), in March 1521, *Trinidad*, *Victoria*, and *Concepción* reached a good island at last. It had coconuts and sugarcane, tasty fish, bananas, and yams—the island of Guam, well to the north in the North Pacific.

That tremendous 9,000-nautical-mile sail from South America nonstop to Guam was a magnificent piece of seafaring. Of course the enormity of this ocean had been unknown to Magellan before, or to anyone else in Europe. Only a master mariner of steel will, tremendous competence, and leadership qualities could have kept the ships going.

The fruits and coconuts of Guam came in time—just!—to save the cadaverous, staring men, eyes in deep sockets, clothes in rags. The fruit arrested the scurvy, but it went down hard because so many had lost teeth.

The ravaged Magellan must have known that the unforeseen and tremendous length of the passage ended his fondest hopes—the very foundation of his voyage. For this was obviously no practical route to the Spice Islands. The Good Hope route was better and shorter. What he had found was a vast ocean that neither he nor any other European had had any idea existed. Balboa had seen nothing but a few square miles from the mountaintop and beach at Panama. That was scarcely the edge of the bucket—and what a bucket! Well, now all men might know far better the size and shape of their world.

At Guam Nance and I found that Magellan's recorded landing place was well tended, with a monument carrying his name. The cabdriver who took us there spoke of the landing as of a recent incident, though Magellan had been in Guam only once, for a few days 450 years before! Obviously a man to remember. Nevertheless, the driver was not a Magellan fan. "He called our islands the Ladrones. That means 'thieves.' We are *not* thieves!" He seemed quite aggrieved.

Actually, Magellan's name may have referred to lateen sails of the natives' swift sailing canoes. Pigafetta noted them admiringly, "like dolphins jumping from wave to wave." But the islanders were also cheerful, swift, and efficient in removal of such items of equipment as the flagship's longboat—vital for communications and landings. This innocent thievery did not go unnoticed, or unpunished. Magellan had still a tremendous way to go and no boats to spare.

He felt that he had to teach these simple people a lesson—"Thou shalt not steal"—even though they had obviously never acquired the Europeans' ideas of property. He ordered crossbowmen to shoot several of them aboard the flagship. Later he led a party ashore, burned a village, recovered the stolen longboat, and gathered a good supply of fresh food and water.

AS MAGELLAN WENT upon leaving Guam, we too headed on westward. This time his extraordinary destiny guided him across a remarkably danger-free area of the Pacific, with the northeast trade wind to blow the ships steadily along. After a perfect week's sail, the horizon was broken by the blue outlines of the Philippines.

After anchoring off Suluan, near lofty Samar, they went on to the larger island of Homonhon, where they put scurvy-sick sailors ashore to recuperate and had their first contact with the people of this far-off place. Local natives came fearlessly in their own praus with presents of bananas and coconuts, called by Pigafetta "figs a foot long" and "cochi." Magellan too presented gifts: red caps, mirrors, hawkbells, and the like. Later, a native chief came out to the ships with a bar of gold and a basket of fresh ginger.

ONE OF FOUR SURVIVING MANUSCRIPT

"And there is no difference between the stern and the bow in the said boats. . . ."

MAGELLAN'S NARRATIVE, COURTESY BEINECKE RARE BOOK AND MANUSCRIPT LIBRARY, YALE UNIVERSITY

More accurate as journal than as art, this French version of Pigafetta's narrative is sprinkled with fanciful illustrations, such as this high-ended outrigger at Guam.

Now at last Magellan knew he was approaching the Spice Islands, and his spirits rose. These outer Philippines were a new discovery to Europeans, but his slave Enrique, whom he had acquired in the East Indies years before, spoke his own native tongue and found that these people understood him.

IN ALL but direct, continuous sailing passage, both Magellan and the slave Enrique now rated in effect as the first circumnavigators. Enrique had been born in the East. Magellan had seen years of military service there. Together master and servant had sailed to Spain by the beaten track across the Indian Ocean, round the Cape of Good Hope, and into the Atlantic. Now they were back again in the East, having sailed in the opposite direction by Magellan's new way: over the Atlantic to Brazil, south to the end of America, through the strait, and thence across the great Pacific.

At Cebu in the Philippines, Magellan led his squadron into anchorage, his largest Spanish ensigns spread proudly to the sun. Here they were west of the Spice Islands, the Moluccas. They had come from the west—the first men to demonstrate in person that the world really *could* be circled.

The harbor was sheltered and commodious and the weather sunny and quiet—a good and restful place for ships and men who had come so far. They had sailed roughly half again the ordinary sailing distance from Seville round the Cape of Good Hope to the Spice Islands. But they were not yet at those fruitful islands, for they had sailed past their longitude.

My wife and I had flown to Manila from Guam in a jumbo jet, which might have carried Magellan's flagship, less masts, in its enormous fuselage. Now a small aircraft put us down on the islet of Mactan, a mile off Cebu. And there, at Mactan, we found the place where Magellan died.

Pigafetta tells the story:

"On Friday the twenty-sixth of April Zzula, lord of the aforesaid island of Mattan, sent one of his sons to present to the captain-general two goats, saying that he would keep all his promises to him, but because of the lord . . . Cilapulapu (who refused to obey the King of Spain) he had not been able to. . . . And he begged that on the following night

"Sometimes they make them joust and fight against one another. . . ."

The game's the same more than 400 years later in Zamboanga in the Philippines. Inside a cage that protects spectators from razor-edged spurs tied to the cock's legs, a handler (**above**) readies his bird for brief, bloody combat. In the crowd of hundreds, two spectators (**above, right**) are absorbed in making a bet.

he [Magellan] would send but one boat with some of his men to fight.

"The captain-general resolved to go there with three boats. And however strongly we besought him not to come, yet. . . . at midnight we set forth, sixty men armed with corselets and helmets, together with the Christian king [Humabon, whom Magellan had baptized]; and we so managed that we arrived at Mattan three hours before daylight.

"The captain would not fight at this hour, but sent . . . to tell the lord of the place [Cilapulapu] and his people that, if they agreed to obey the King of Spain, and recognize the Christian king as their lord, and give us tribute, they should all be friends. But if they acted otherwise they should learn by experience how our lances pierced. They replied

that they had lances of bamboo hardened in the fire and stakes dried in the fire, and that we were to attack them when we would. . . .

"WHEN DAY CAME, we leapt into the water, being forty-nine men, and so we went for a distance of two crossbow flights before we could reach the harbor, and the boats could not come further inshore because of the stones and rocks which were in the water. The other eleven men remained to guard the boats.

"Having thus reached land we attacked them. Those people had formed three divisions, of more than one thousand and fifty persons. And immediately they perceived us, they came about us with loud voices and cries, two divisions on our flanks, and one around and before us. When the captain saw this he divided us in two, and thus we began to fight. The hackbutmen and crossbowmen fired at long range for nearly half an hour, but in vain, [our shafts] merely passing through their shields, made of strips of wood unbound, and their arms. Seeing this, the captain cried out, Do not fire, do not fire any more. But that was of no avail. When those people saw this, and that we fired the hackbuts in vain, they shouted and determined to stand fast . . . they fired at us so many arrows, and lances of bamboo tipped with iron, and pointed stakes hardened by fire, and stones, that we could hardly defend ourselves.

"Seeing this the captain sent some of his men to burn the houses of those people in order to frighten them. Who, seeing their

"The captain, knowing that the wooden image greatly pleased the queen [of Cebu], gave it to her. . . ."

The only surviving relic of Magellan's voyage, this figure of the Christ Child is preserved in the Basilica del Santo Niño in the Philippine city of Cebu.

No menace intended (**facing page**): Cloth mask serves as a sun shield for a girl harvesting seaweed near the Philippine island of Hilutangan.

houses burning, became bolder and more furious, so that two of our men were killed near these houses, and we burned a good thirty of their houses. Then they came so furiously against us that they sent a poisoned arrow through the captain's leg. Wherefore he ordered us to withdraw slowly, but the men fled while six or eight of us remained with the captain. And those people shot at no other place but our legs, for the latter were bare. Thus for the great number of lances and stones that they threw and discharged at us we could not resist.

"Our large pieces of artillery which were in the ships could not help us, because they were firing at too long range, so that we continued to retreat for more than a good crossbow flight from the shore, still fighting, and in water up to our knees. And they followed us, hurling poisoned arrows four or six times; while, recognizing the captain . . . they hurled arrows very close to his head.

"BUT AS A GOOD CAPTAIN and a knight he still stood fast with some others, fighting thus for more than an hour. And as he refused to retire further, an Indian threw a bamboo lance in his face, and the captain immediately killed him with his lance, leaving it in his body. Then, trying to lay hand on his sword, he could draw it out but halfway, because of a wound from a bamboo lance that he had in his arm. Which seeing, all those people threw themselves on him, and one of them with a large javelin . . . thrust it into his left leg, whereby he fell face downward. On this all at once rushed upon him with lances of iron and of bamboo and . . . they slew our mirror, our light, our comfort, and our true guide.

"While those people were striking him, he several times turned back to see whether we were all at the ships. Then, seeing him dead, as best we could we rescued the wounded men and put them into the boats which were already leaving."

Magellan's body was not found or ever seen again by Europeans. Pigafetta writes:

"After dinner the Christian king . . . sent to tell those of Mattan that if they would give us the bodies of the captain and the other dead men, we would give them as much merchandise as they desired. And they answered that they would not *(Continued on page 746)*

"...all at once rushed upon him with lances of iron and of bamboo and... slew our mirror, our light, our comfort, and our true guide."

Invitation to a slaughter—his own as it turned out—sprang from Magellan's plans to attack Lapulapu, a chief of Mactan Island in the Philippines.

Having baptized the sultan and queen of neighboring Cebu and many of their subjects, Magellan offered to rout the sultan's still-pagan enemy. He launched a sortie across a wide bay, so shallow that playing children can stand up in it (**left**). Undermanned and beyond covering fire from his ships, Magellan's small force was cut to pieces (**below**), and he was slain.

Lapulapu has become a minted hero (**above**) for being the first Filipino to repel Europeans.

MURAL BY PRIMO VERI IN MAGELLAN MEMORIAL, MACTAN

give up such a man, as we supposed, and that they would not give him up for the greatest riches in the world, but that they intended to keep him as a perpetual memorial."

Perhaps as an idol? But how? There is no present evidence that such a thing was ever done. A tall column overlooking the bay commemorates the death of Magellan, but in the bright little township a mile or two away, a new bronze statue of Lapulapu, leader of the warriors who killed Magellan, shone in the sun. It seemed that he was now the local hero, which is understandable in the 20th century.

THE DEATH OF MAGELLAN did not end the voyage, for the surviving ships had still to reach the Spice Islands to buy their homeward cargo of cloves and sail from there another 11,000 miles to complete their circumnavigation of the globe. Of the three surviving ships now in the Philippines, the *Concepción* was old and worm-riddled. As there was also a shortage of manpower from disease and fighting casualties (the company had declined from more than 250 in South America to scarcely 100 in the Philippines), *Concepción* was burned. Her people and stores were divided among *Trinidad*, commanded by Capt. João Lopes Carvalho, and *Victoria*, later commanded by the Basque, Capt. Juan Sebastián del Cano.

From Cebu, the Spice Islands of Ternate and Tidore lay to the southward only 600 miles away. A week or less of sunlit sailing should have brought *Trinidad* and *Victoria* there. But instead the two battered ships wandered for three months through the Philippines and the Sulu Sea and along the north coast of Borneo to Moslem Brunei.

In the Brunei city of Bandar Seri Begawan, my wife and I found the cheerful citizens still living much as Pigafetta knew them, many in riverfront houses built on stilts, a mode of construction they prefer from long usage. Their state is rich with oil, and they could be rehoused simply by asking.

"The older people don't want to leave their homes on the water," Mr. Ma, our driver-guide told us. We understood their attitude. Those homes are air conditioned by the river winds, and communication with the shore is exhilarating—by powered canoes, which the

Moslem cap of a boy in Brunei recalls an ancient mixing of cultures. When the fleet reached this wealthy and already Moslem land, it touched an outpost of Arab influence on the edge of the world as it was known until Magellan's voyage.

grinning drivers hurl along at 15 or 20 knots, dodging among the piles beneath the bridge. There is plenty of modernity in Brunei today too—good schools, hospitals, a wonderful new museum, a golden-domed mosque, and a fine new airport.

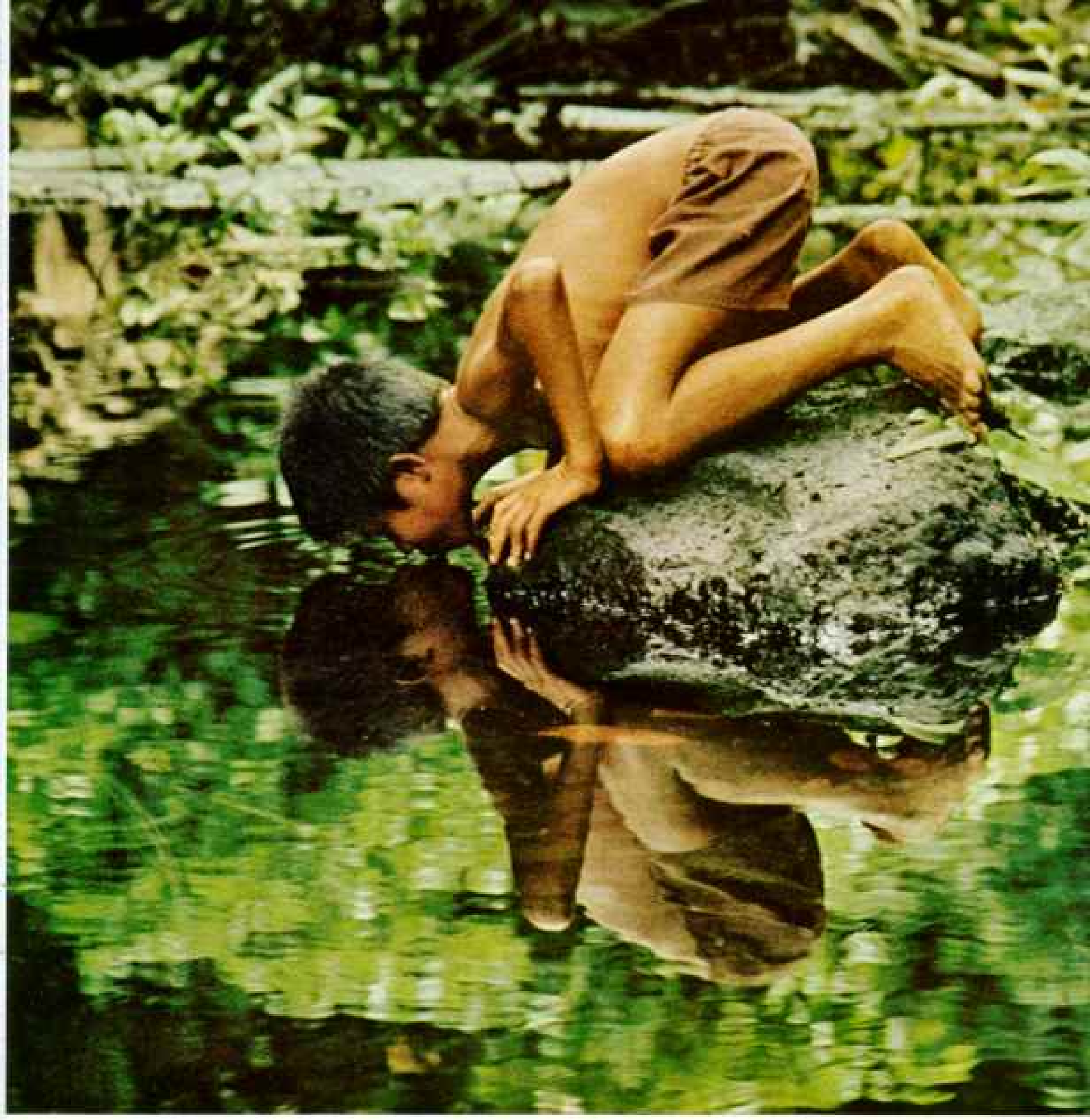
But no one today knows just why Carvalho chose to put in there. The two ships had later to make their way back round the north of Borneo and through the Sulu Sea eastward again, dodging the reefs of the Sulu Archipelago and risking the notorious calms of the region. Calms were hard on sailing ships, flapping holes in weathered sails as they banged against masts and rigging.

When at last they reached the Spice Islands in early November, they began refitting the ships and stuffing them full with cloves in preparation for the long voyage home. But *Trinidad* sprang a leak, and had to be unloaded again for repairs.

Juan Sebastián del Cano now was captain of the little *Victoria*. She was filled up, too, but her seams did not open. Life was good in the sunny Spice Islands, but del Cano must have worried and *(Continued on page 751)*

"For metal, iron, and other large wares, they gave us gold. . . . And they gave us ten weights of gold for fourteen pounds of iron."

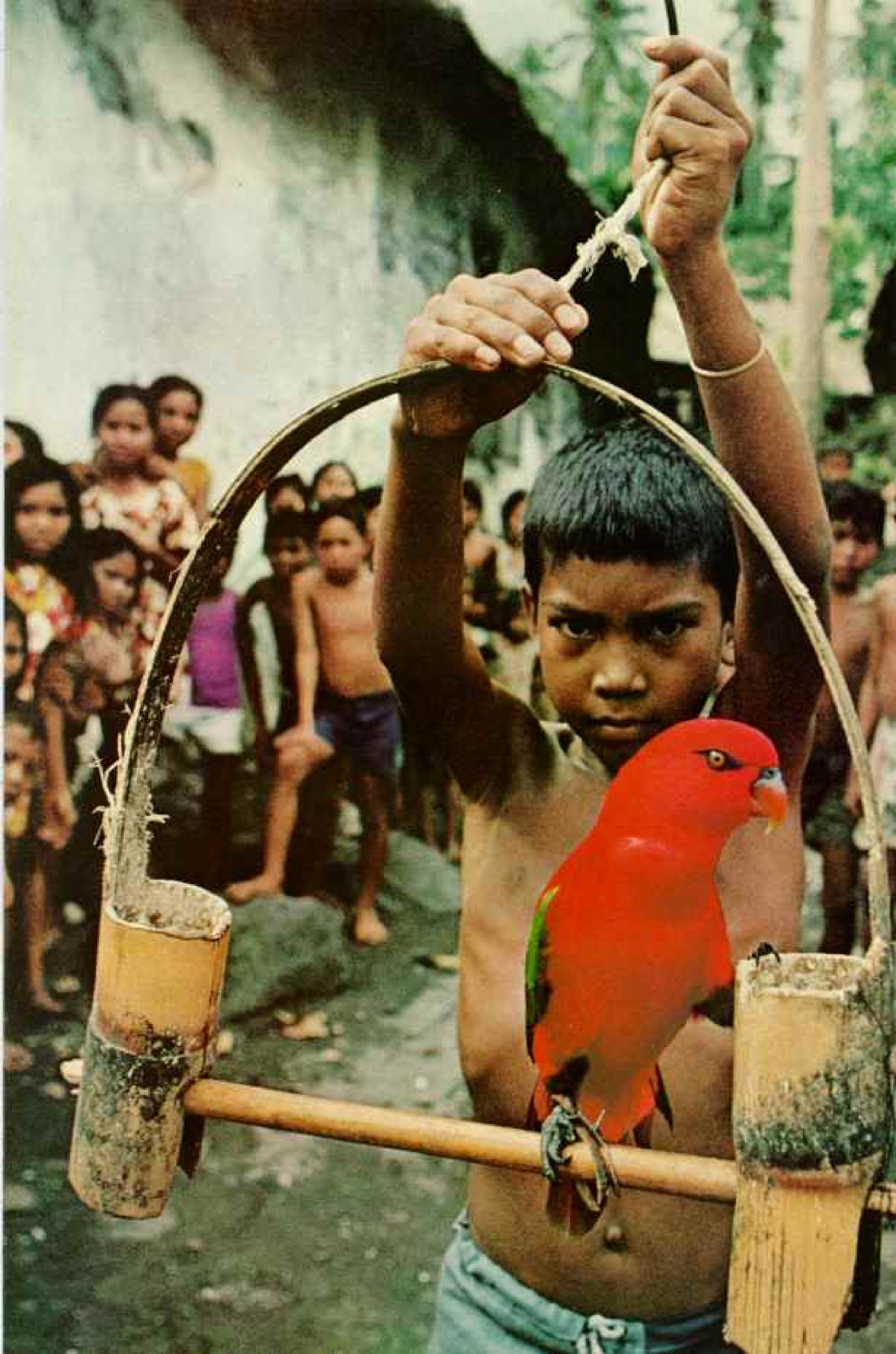
Who was shrewdest when natives eagerly traded abundant gold for scarce iron? That bargain no longer holds, and gold teeth and tooth caps are highly prized in Brunei (**left**); there and in the Philippines (**above**), some flash heart cutouts.



"When the cloves sprout, they are white;
when ripe, red; and when dried, black. . . .
Nowhere in the world do good cloves
grow except on five mountains of those
five islands. . . ."

Fruit of the money tree, a handful of fresh cloves harvested on the Moluccan island of Ternate (**left**) would have brought a handful of coins in 16th-century Spain. A freshwater pool on Tidore (**above, left**) still slakes thirst as it did for the fleet's crew. Loving care will raise a boy's clove tree (**above**).

One ship of Magellan's fleet finally returned to Spain laden with cloves, but with only 18 of the original European company. Despite loss of captain, men, and ships, some of the armada's backers made a small profit.



been in a hurry to sail before the Portuguese caught them as interlopers. The monsoon winds would soon change, and the long voyage that del Cano faced offered a grim prospect. He determined to leave without *Trinidad;* later she would try to recross the Pacific to Panama, but battered by storms she would turn back and eventually be captured by the Portuguese in the Indies and finally wrecked. Neither she nor most of her crew would ever make it home.

Victoria's sails had been replaced in the Moluccas, but the tar preservative in the hempen rigging had long since lost its value. Now she had 11,000 miles still to go! And she might be hunted by the Portuguese as an unauthorized intruder in their islands. The Pope had granted the Portuguese a monopoly on the Spice Islands trade. Del Cano must avoid them. He had enough men, with 47 left of the original company, plus 13 natives. But heavy losses could be expected.

Del Cano was well aware of the usual Portuguese route homeward: via Malacca, Goa, and southward past Madagascar in the Indian Ocean trade winds, then round the Cape of Good Hope. He went to great lengths to avoid Portuguese ships.

Pigafetta relates: "In order to round the Cape of Good Hope we went as far south as forty-two degrees towards the Antarctic Pole. We remained near this Cape for seven weeks with sails furled because of the west and northwest wind on our bow, and in a very great storm. . . it is the greatest and most perilous cape in the world.

"Some of our men, both sick and healthy,

"One of the red ones is valued at a bahar of cloves. . . ."

Still prized—though not so highly as 450 pounds of cloves—a fiery parrot is put on display by his proud owner on Tidore. When *Victoria* sailed homeward, she carried two birds of paradise as a gift from a Moluccan sultan to the King of Spain.

wished to go to a place of the Portuguese called Mozambique, because the ship was taking in much water, and also for the great cold, and still more because we had nothing else to eat except rice and water, since for want of salt the meat which we had was rotten and putrified. But some others, more mindful of their honor than of their own life, determined to go to Spain alive or dead."

To have gone so far south in the roaring forties in such a weakened ship was asking for trouble. But they survived.

FROM THE ATLANTIC side of the cape, southerly and southeast winds bring square-riggers to the Equator; northeast winds carry them on through the tropics; and westerlies in the North Atlantic blow them to port in Europe. But del Cano knew that was just the route along which the Portuguese might be watching for him. If I were trying to dodge them, I know what I would have done: I would have sailed farther west in the Atlantic than usual. This would have taken a lot of courage, for these were cruelly rough waters. But as a Basque, del Cano was used to tough sailing in the Bay of Biscay, not just the kinder Mediterranean.

The only real trouble he had was when he was forced to put in for provisions at Portugal's Cape Verde Islands. Unfortunately, or stupidly, a parcel of cloves was sent ashore in exchange. A Spanish ship bringing spices from a Portuguese monopoly! The *Victoria* had to cut and run, leaving 13 of the crew to their fate in Portuguese hands.

Captain del Cano had to be wary the rest of the voyage, for all that West African coast was more or less under Portuguese control. Keeping well out to sea, he also experienced better sailing winds. Day after day the *Victoria* sailed northward, going as far west as the Azores. Nearly two months more passed before she arrived off the mouth of the River Guadalquivir at Sanlúcar de Barrameda. This was nearly seven months after leaving the Moluccas, and almost three years since the Magellan fleet had sailed from Seville. No news had come for many months, since the return of the *San Antonio*, and the ship was quite unexpected.

Here she was, first ship round the world in history! It was a feat so marvelous that all men were astonished. Many a family was also saddened, when the weeks and months and years passed and there came no other little ship from Magellan's fleet.

The *Victoria* arrived back in Seville with only 18 of the original crew surviving (though the 13 that had been seized by the Portuguese at the Cape Verde Islands returned later, as did four or five survivors from the *Trinidad*). Del Cano led all who could walk to the two shrines of Santa Maria

PAINTING BY BJORN LANDSTROM

The cardinal points of agony seem etched in the face of Captain del Cano (**left**), who drove *Victoria* home from the Moluccas.

Reporting to King Charles of Spain, by now Holy Roman Emperor, del Cano wrote of his passage across the Indian Ocean far south of shipping lanes: "... we touched at no land for fear of the King of Portugal, who had given orders in all his dominions to capture this armada ... and thus there died of famine among us twenty-two men. ..."

Completing Magellan's vision of circumnavigation, del Cano was repaid with scant fortune and fame in his own lifetime. As for Magellan, a 1526 globe (**facing page**) was the first to show his route across half a world be revealed to the other half.

de la Victoria and Santa Maria de la Antigua, barefoot and carrying tapers, chanting slowly as they passed along the narrow roads, to offer thanks to God. The citizens of Seville stopped to watch the little group pass, wondering at their gaunt solemnity. None of the seamen were now recognizable to those who had known them. They staggered along, rag-covered skeletons, the less emaciated helping the scurvy-stricken. All appeared to be old men, with cadaverous countenances, though the oldest had not turned 40.

Magellan had, of course, long been dead when del Cano led this pathetic homecoming. The circumnavigation, the discovery of the strait, had been his idea, rigorously carried through. Perhaps when he threw his life away in the petty warfare at Mactan, he knew there could be no real homecoming ever again for him, either to Portugal or to Spain. His bloody suppression of the rebellious Spanish officers at San Julián, his relentless driving of ships and men through that harsh strait between Patagonia and Tierra del Fuego and across the uncalculated immensity of the great Pacific afterward, his unconquerable spirit and tremendous zeal that some called ruthlessness—these were the essential but perhaps unpopular qualities that had made the voyage possible. Probably those qualities could not ever again fit into the quieter life of the land.

Magellan's widow and only son had died during the time of the voyage. His remaining heirs collected no reward from Charles of Spain for his sacrifice and his achievements —not even the salary due him.

NO GREATER SEA VOYAGE has ever been made than that inspired and organized by Ferdinand Magellan. Nor even now is it as thoroughly appreciated as it should be. A whole great ocean with its isles and island groups added to Western man's knowledge and the extent of his livable world! And a sailing route right round that world! These were feats of staggering immensity. But recognition was slow. Magellan's strait and his new ocean were of little immediate use to Europe.

Even today Magellan's memory is not greatly honored in either Spain or Portugal. His own direct line died out long ago, and the Magalhães family home at Sabrosa has long since disappeared.

But through his voyage and the sustained tremendous vision, competence, and courage that made it possible, the infinitely better known name Magellan shall be remembered with honor while the qualities of vision, faith, competence, and unquenchable resolution are valued on this earth. No one knows where Magellan's bones may lie, but the results of his tremendous voyage are still with us. □

"... we had sailed fourteen thousand four hundred and sixty leagues, and completed the circuit of the world from east to west."

"AMBASSADORS' GLOBE," PAPER ON WOOD. COURTESY BEINECKE RARE BOOK AND MANUSCRIPT LIBRARY, YALE UNIVERSITY

Turnaround Time in West Virginia

By ELIZABETH A. MOIZE
SENIOR EDITORIAL STAFF

Photographs by JODI COBB

I USED TO HAVE a log cabin in Virginia, one ridge over from her western offspring and neighboring state. On evening walks I often perched on a fallen log to wonder at those hills that rolled on to sunset. All I saw from my vantage point was the peace of soft green and golden light and winking windows that called men to their mountain homes.

Yet I knew that West Virginia in the sixties was far from untroubled. Headlines cried of poverty and mine disasters. The world saw pictures of gritty coal towns and sad-faced children. We heard of bad schools and bad roads; some said West Virginia was only a place to be *from*. So, in my search for solace from the frantic weekday world of the city, I kept to my side of the line.

Then, not too long ago, a whisper of hope wafted out of the West Virginia valleys. Mountaineers were coming home. Newcomers were moving in, seeking the simple, spare way of life that has been preserved in the state's isolation. Like the switchbacks on her country roads, West Virginia was turning around. I answered that westering light and crossed to the next ridge.

The state is a rough-cut jewel—virtually all mountains. There are West Virginians who brag that if the state were flattened, she'd rival Texas in size. Countless times as I explored her reaches, I would pull to a stop to catch my breath at the forested spectacle. One autumn afternoon as I stood overlooking the New River Gorge, a weathered mountaineer turned to me and asked, "You ever been to the Rockies?" When I replied that I had, he continued proudly, "Well, so have I, and it ain't no prettier than this."

But West Virginia's riches lie more than soil deep. Arteries of coal course through her depths—enough reserves to last the nation 125 years. Her rocks hold two thousand billion cubic feet of natural gas and 34 million barrels of oil.

Energy Demand Sparks New Prosperity

Why, then, did West Virginians for decades search for a better living in Detroit and Dayton, Chicago and Cincinnati? Why are they now coming home? For the first time in 20 years the state's population is increasing, and her unemployment rate is lower than the national average.

Some of the answers I learned from Dr. William H. Miernyk, economist and director of the Regional Research Institute at West Virginia University in Morgantown.

"Coal is the reason for both the decline and the recovery," he told me. "Until about five years ago any *(Continued on page 759)*

"I guess it's in my blood," says Carolyn Tolley of her newfound love for old-time music. She fiddles for Johanna Hardwick at a festival near Pipestem. Echoing Carolyn's discovery of her own mountain heritage, the growing pride of other West Virginians has beaten back the stigmas of isolation and poverty as they also find new riches in their hills.

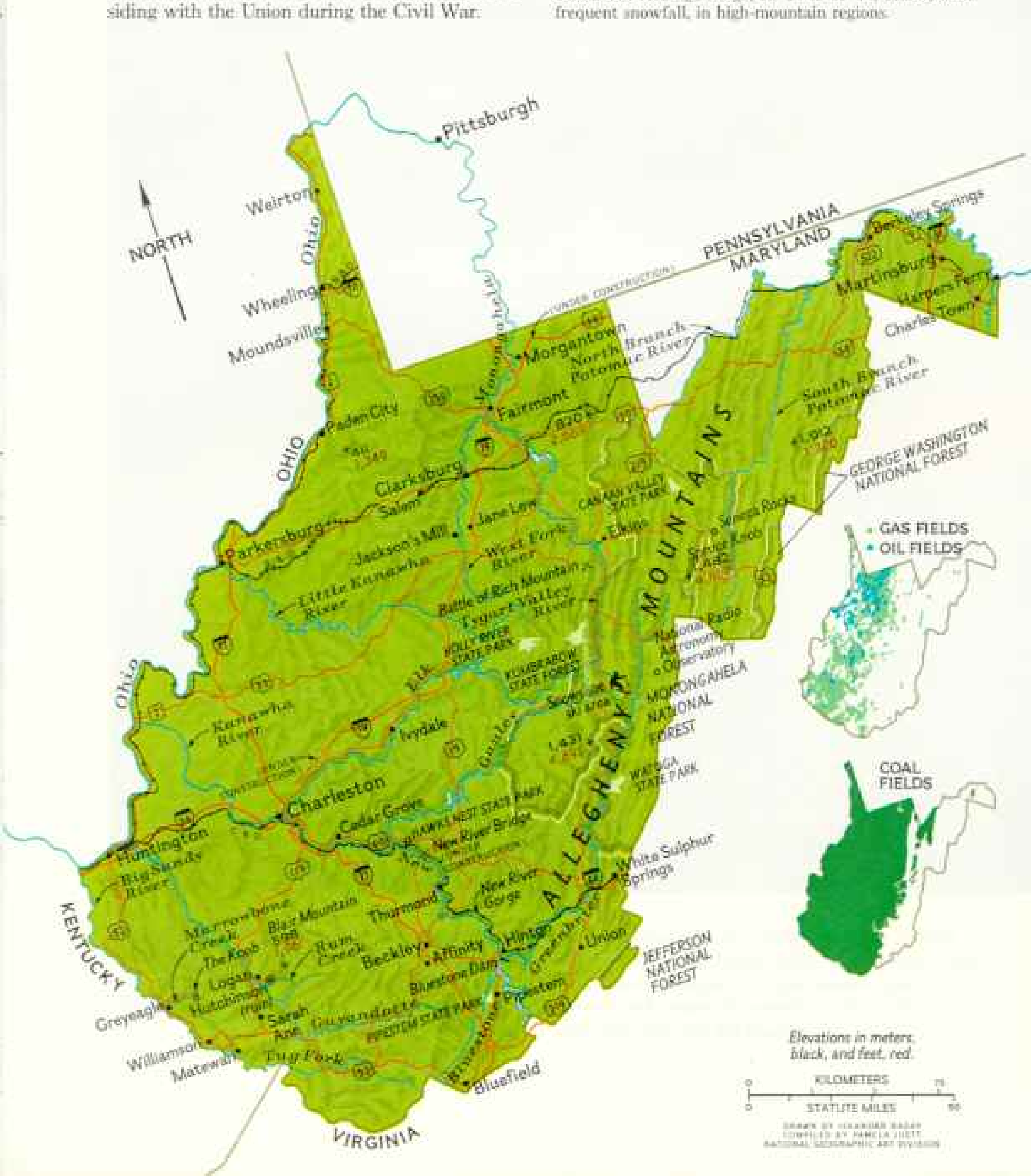
Autumn's bounty spreads a country quilt around Nancy Runion and her weathered roadside home, nestled between the luxury-resort region of White Sulphur Springs and the wilds of Monongahela National Forest.

West Virginia's rugged beauty nowadays attracts about 600 million tourist dollars a year. It's no wonder—about half the nation's population lives within a day's drive of the state. And thanks to new and greater demand for the coal that laces their mountains, many West Virginians who drifted north and west to seek jobs in other states in the 1950's and 1960's—and found there only despair in urban ghettos of Appalachian folk—today are coming home.

West Virginia

"MOUNTAINEERS ARE ALWAYS FREE." The motto rang over the Alleghenies in 1863, when Virginia's defiant western settlers won their own state after half a century of sectional conflict. The westerners, who held few slaves and bristled under unequal taxation and representation, finally severed their ties with secessionist eastern Virginia by siding with the Union during the Civil War.

AREA: 24,181 sq. mi., ranking 41st among the 50 states.
POPULATION: 1,803,000, continuing an increase that began in 1970, when a 20-year decline bottomed out.
ECONOMY: Coal, 102,462,000 tons in 1974, second only to Kentucky in weight and total value, produces and markets more natural gas than any other state east of the Mississippi. Also: chemicals, petroleum, salt, stone, cement, lime, steel, glass, and pottery. Per capita income in 1974 was $4,373, about $1,000 below the national average but almost three times the state's 1960 average.
MAJOR CITIES: Charleston, capital, 253,700; Huntington, 144,000; Wheeling, 100,400; Parkersburg, 90,800.
CLIMATE: Average range, 33° F. to 85° F.; colder, with frequent snowfall, in high-mountain regions.



indicator of growth would find West Virginia close to the bottom. The only place we were close to the top was in unemployment."

Following World War II, Dr. Miernyk pointed out, mechanization of the coal industry and the steadily declining price of oil cost the state 90,000 jobs in the mines alone. Then, in the 1960's, even before the oil embargo, the turnaround began with the nation's incredible demand for energy. The 1973 crisis added impetus, and now coal is more in demand than ever before. In 1975 some 2,100 new miners were employed in the state. Dr. Miernyk predicts a possible 50,000 more jobs by 1990, and corresponding prosperity.

"We rank among the top ten states in our rate of increase in personal income, but it will take years and years to overcome our economic backwardness," he warns.

High Wages Attract Both Sexes

I went to meet one of West Virginia's new miners at Affinity. Here at one of Eastern Associated Coal Corporation's mines stands what must be the state's largest work of art. Italian-born artist Virgil D. Cantini, commissioned in 1972 to brighten up the plant site, created a geometric design in vibrant colors that decorates two huge coal silos. Eastern has 19 mines in the state, and the company estimates an increase of 2,000 jobs over its 1973 employment by the end of 1976.

When I arrived at Affinity, the midnight-to-eight shift was getting ready to head home. Their coveralls begrimed and faces masked by coal dust, the hundred-plus miners seemed stamped out by a cookie cutter. All except one, built more slightly than the rest. Her name was Carol Bain (page 767).

West Virginia's first woman coal miner had been on the job only three weeks when I talked with her. Why did she become a miner?

"Because it pays good money," she said. The average weekly wage for a coal miner today is about $300, one of the highest in industry. Divorced, Carol must support herself and her 9-year-old daughter, Dawn Renee.

"Besides, I think it's a lot more interesting than standing on an assembly line in a machine shop all day, which is what I was doing before."

When Carol and her brothers were in high school, their father moved the family to Indiana to keep the boys out of the mines.

"After he got us all married off," Carol said with a grin, "he came back, and we followed him. Not only the boys, but his daughter too."

When Carol first started to work, some of the other miners' wives picketed briefly, but now everyone seems to have accepted her.

"I do what the men do," Carol said. "I try to pull my own weight. One of the guys in training class with me said, 'I bet five dollars she won't last 30 days.' He came up to me this week and said, 'You haven't been here 30 days yet, but I'm paying off because I know you're going to make it!' "

And make it she has. I learned recently that Carol now works as a roof bolter, one of the most critical jobs in a mine.

West Virginia's increase in population is not restricted to miners. In the more agricultural southeast, refugees from suburbia are seeking a new way of life.

Dr. Robert W. Sandell, a chiropractor, and his wife, Natalie, and their five children moved from New Jersey to an 80-acre farm near Union almost four years ago.

"We were looking for a self-sufficient way of life for ourselves and our children," Natalie told me. "We wanted a rural atmosphere where many people were living in the old ways. We looked in North Carolina, Virginia, and then West Virginia. When we drove into Monroe County, we said, 'This is it.' "

Old-time Ways Foster Self-reliance

The Sandells raise all their vegetables, fruits, and meat—chicken, lamb, and beef. They make cheese and bread, and collect honey from their hives. Reared in a suburban environment, they had had no farming experience other than a backyard garden.

"I'll never forget when we got our first milk cow," Natalie said, laughing. "It was a great big Holstein, and the night after Bob's first attempt to milk her he said he dreamt he had milked 40 cows. We learn by doing. You can't always wait for the vet to treat a sick animal, so you learn to do it yourself. Soon you feel secure about your own capabilities."

The Sandells are not the only newcomers to this area. Natalie told me that perhaps 500 have come here in the past five years, mostly young people with a romantic view of living a spartan existence in a rustic cabin on a remote mountain.

"Some leave, *(Continued on page 763)*

B. STEPHEN SIZELL III (YELLOW)

STERN

Lifeblood on a lifeline: A deckhand moors coal-laden barges at Weirton on the Ohio River (**above**), a major artery supplying West Virginia's steel mills. Burned into coke, coal feeds the furnaces of Weirton Steel, where a worker caps ingot molds brimming with molten metal (**left**). Coal has also fueled decades of strife—like a wildcat walkout last fall that sparked this Charleston demonstration (**right**). Nearly 40,000 United Mine Workers in the state rebelled over a contract that restricted their ultimate weapon: the strike.

but others adjust. I think we are all looking for a sense of community and working together that is lost in urban areas. We want to get away from all the mechanization, and conserve energy. The thud of a churn sounds so much nicer than the buzz of a motor."

Mountaineers have a reputation for being standoffish. I asked Natalie what her family's reception had been.

"The people are very friendly, very welcoming. Our neighbors, the Porterfields—he's 81 and she's 78—are wonderful. Anything I want to know, I just pick up the telephone. They've known all their lives how to make soap, how to tap maple trees, how to quilt. Many of the older people in the county seem to have a real feeling of kinship with us newcomers; they're delighted that we want to recapture the old ways."

I remembered a visit the previous summer with Jenes Cottrell and his sister, Sylvia O'Brien. Both in their 70's, they live in a house Jenes helped his father build. Crowning a knoll above Dead Fall Run near Ivydale, the weathered oak home has turned the color of Sylvia's sassafras tea. A well out back supplies the water, and Sylvia cooks on an old wood stove. Jenes uses a foot-powered lathe to turn the cherry towel racks, persimmon pencil holders, and mulberry potato mashers he sells. I asked if the power company would run electricity to his house.

"Sure. That power line ain't but a hundred yards away. We just want to live like Mother and Daddy did."

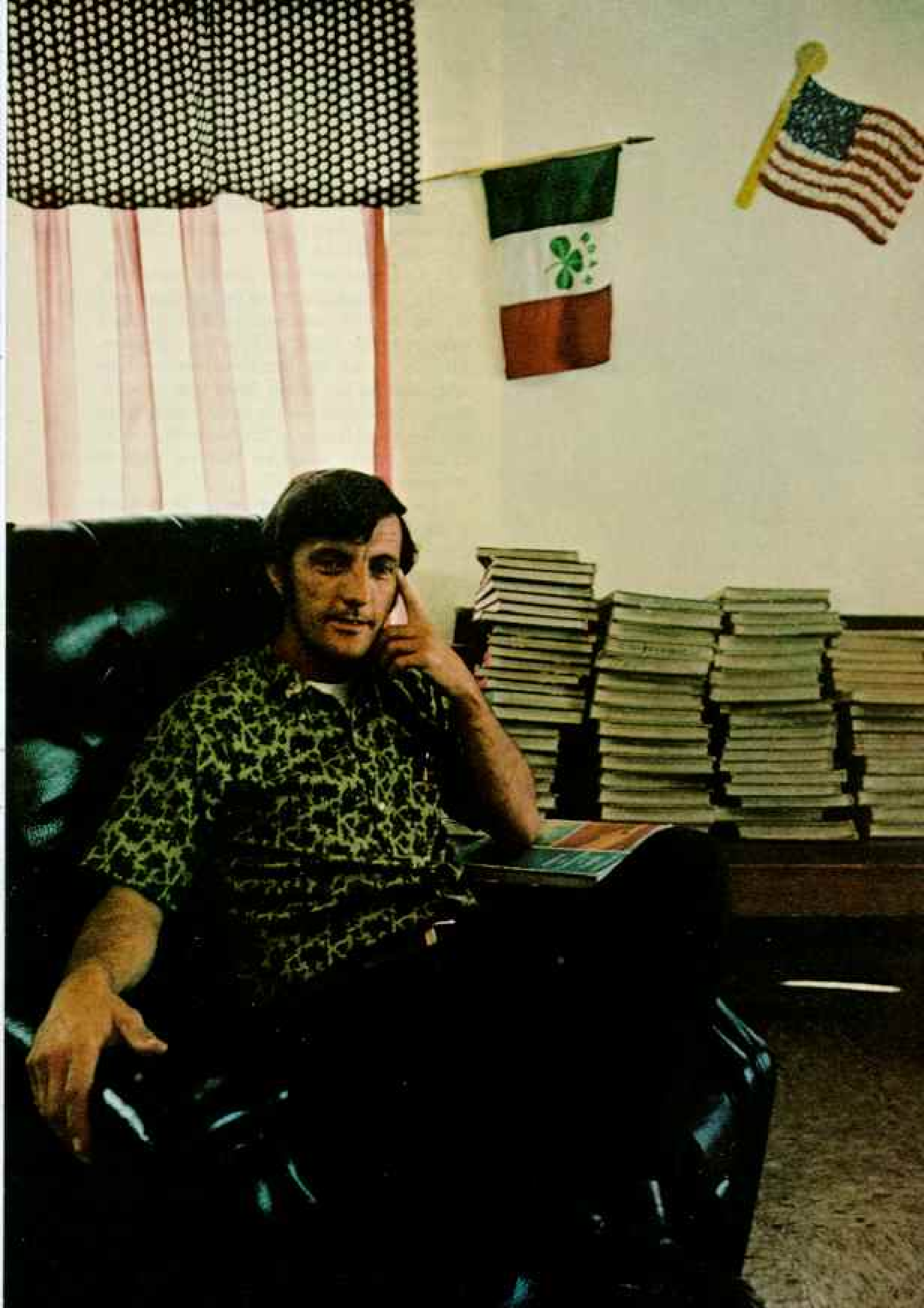
Another spirited septuagenarian, Dr. Margaret Ballard, comes from one of Monroe County's oldest families—and is also one of the state's biggest boosters.

"Do you think West Virginians are getting more pride in their state?" I asked her.

"I think we've always had pride," rejoined Dr. Maggie, as she is invariably called, "but people have put us down so much that we just kept it to ourselves."

Dr. Maggie had practiced medicine in

Dreams of a different march draw a couple away from a parade to a showcase of diamond rings in downtown Charleston (**above, left**). In a nearby residential district (**left**), families share the relative affluence of the heavily industrialized capital.



Baltimore for 39 years, and also taught at the University of Maryland until she retired in 1965 and moved back home. Perhaps retired is not the word. She does genealogical research, belongs to several historical societies, is a director of the regional travel council, helps her nephews run a trucking company, and teaches what she calls "enrichment classes" at a county grade school.

"That's the nicest thing I've been doing," she declared. "I teach a lesson on West Virginia glass, and I show the children a map of where the sand comes from. I give them a lead-crystal glass and let them ring it. Why, 90 percent of all the glass marbles made in the world come from West Virginia."

West Virginia's Birth Recalled

Dr. Maggie paused. "Do you know how we got to be West Virginia?" she asked.

"Well, I know it happened during the Civil War," I replied.

"Yes, but you don't know all of it, because they don't tell you." And she began her history lesson. "We were all Virginians then, but the people on this side of the mountains didn't know what was going on in Richmond. Things just kept happening over on the Eastern Seaboard while the rest of us paid our taxes over here. By the time we'd get a representative over there, the laws were already passed. So the question came up what to do about it. They talked about dividing up the state *long* before the Civil War. Finally, when secession came up, what is now West Virginia voted to stay with the Union."

Her nephew came through the door.

"I'm trying to get the NATIONAL GEOGRAPHIC straightened out," she announced.

Dr. Maggie took me on a drive past the beef and dairy farms that sustain Monroe County, and gave me lessons in two more of the ways of West Virginians: stubbornness and a sense of family.

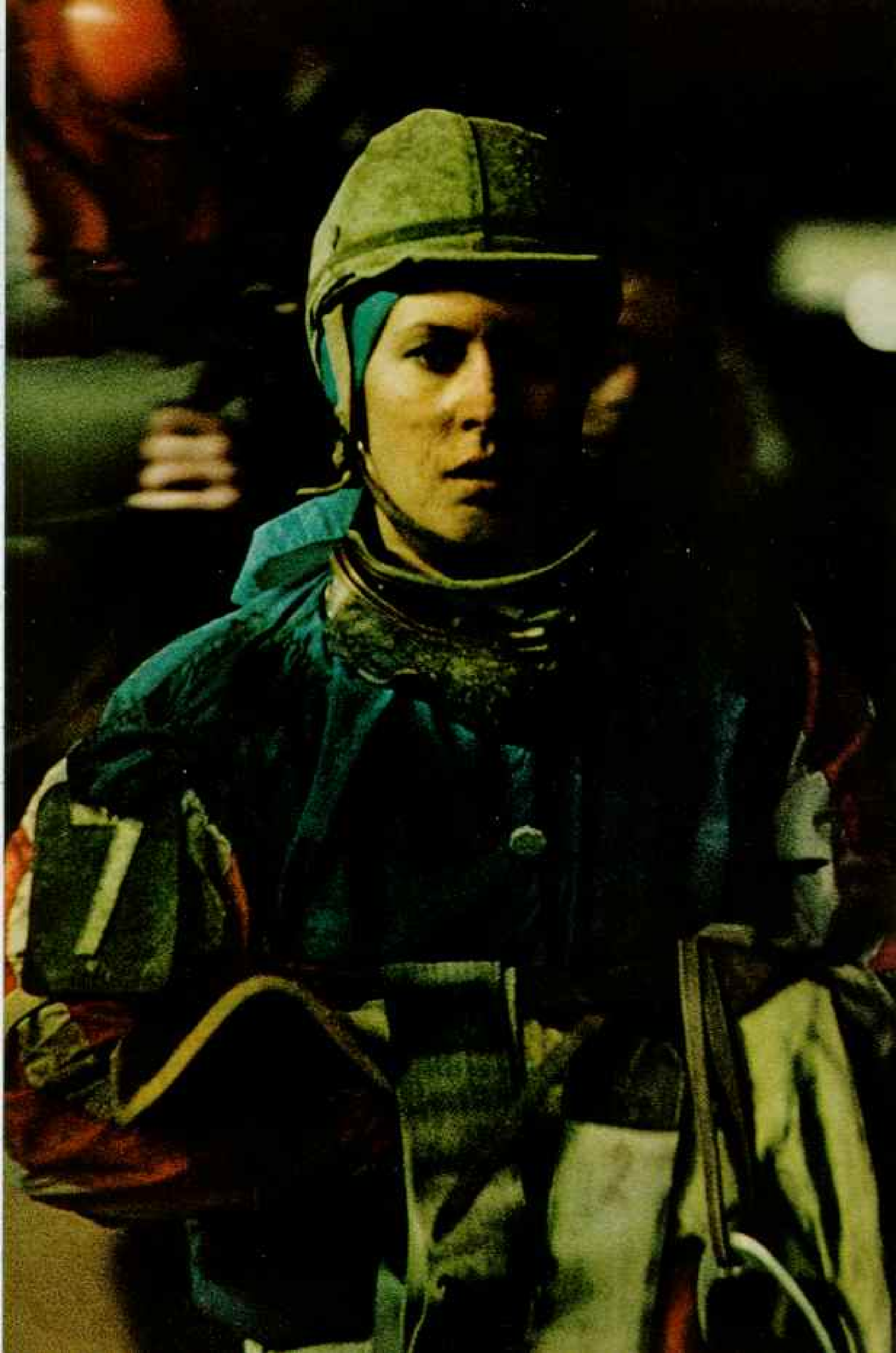
"See that little white house along the hill?" she asked. "The woman who lives there wanted a bathroom inside. She just begged her husband, but he wouldn't fix one for her. So she saved her money for 23 years and put it in herself. Now she won't let him use it."

We passed mailbox after mailbox bearing the same surnames—a common sight here.

"Why, you go up in these hollows," she said, "and you'll *(Continued on page 769)*

Joyful noise saves sinners as the Laymen Quartet performs during the West Virginia Mountain State Gospel Singing Convention (**above**). About 40,000 attended the weekend "sing," praising the Lord for as long as twenty hours a day.

Plumber to preacher to politician: Self-ordained Reverend Avis Hill (**facing page**), now running for Congress, crusades against textbooks that he and other religious fundamentalists condemn as immoral and unpatriotic. Although boycotts and bombings closed many Kanawha County public schools during the 1974-75 year, students still may read the books unless their parents object. Behind Mr. Hill hangs the flag of ROAR, "Restore Our Alienated Rights," the Boston antibusing group.

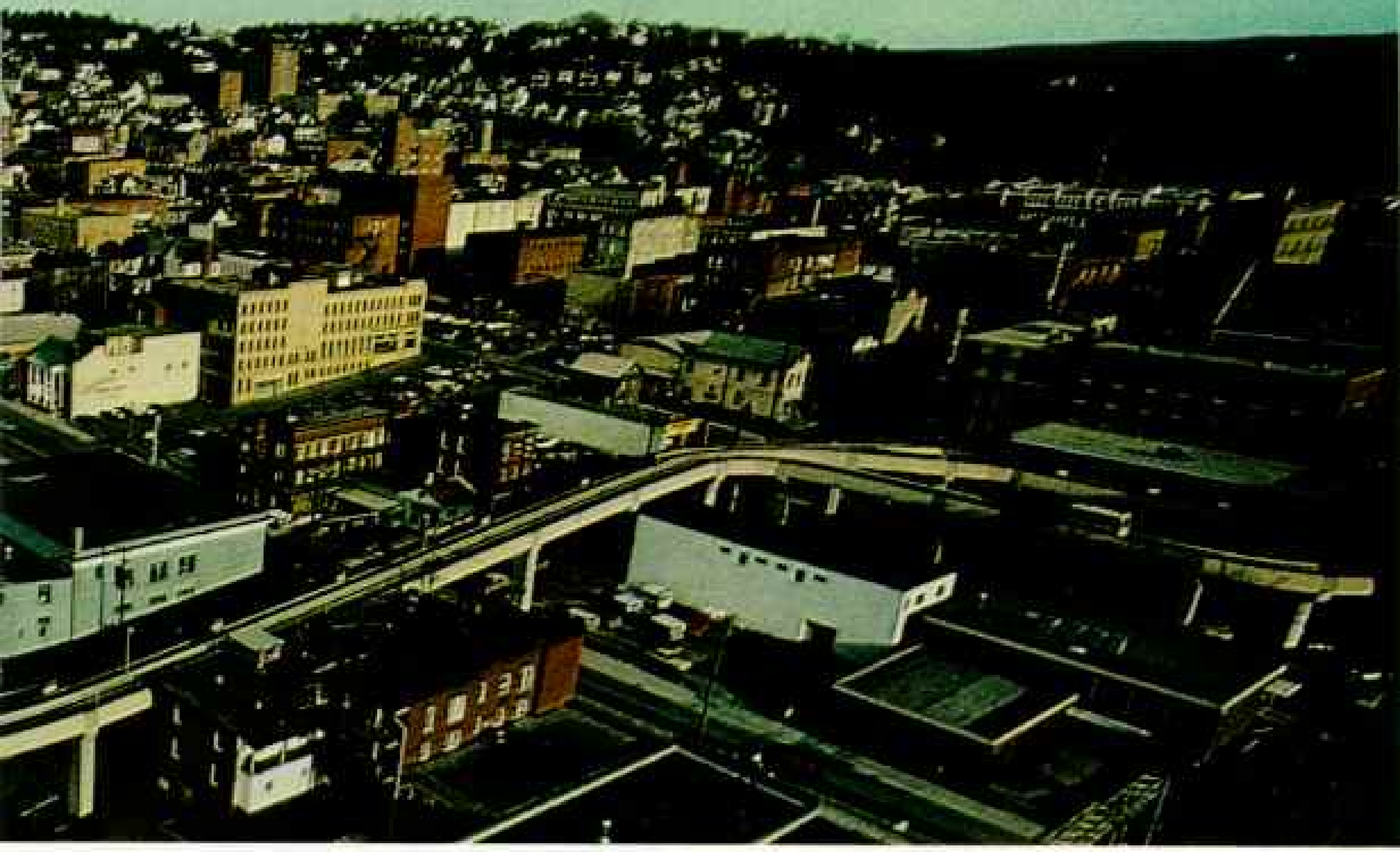


"**She works just as hard** as the rest of us —don't know how she keeps her face so clean." Sprucing up after her midnight-to-eight shift, Carol Bain (**above**), West Virginia's first woman coal miner, has won that kind of respect from the men she works with. How? By crawling with them through the muck, 600 feet down, wrestling heavy rollers for conveyors. Later, to become a roof bolter, she worked with veteran David "Hoot" Frost (**right**).

Another scrapper, jockey Mary Ellen Longan (**left**), got her break at Charles Town's racetracks by getting up early to work a trainer's horses. Although women have raced at Charles Town for seven years, Mary Ellen feels that "we still have to work twice as hard, because the experts pick out our mistakes a lot faster than the men's."

Horizontal elevator: At West Virginia University in Morgantown (**above**), a computerized Personal Rapid Transit system sends cars along guideways at the touch of a button to take students between classes, bypassing snarled traffic.

Shedding light "for the preservation of the mountains, for the perpetuation of their culture," John Fanning (**below**, left), Greg Carannante, and John's twin, Michael, edit the *Mountain Call* magazine in the Fannings' ridgetop home in Mingo County.



find descendants of people who came here two hundred years ago. A lot of them go to the big cities, but there will still be a nucleus." Dr. Maggie told me about meeting a woman in Washington, D.C., whose sister-in-law came from a small village near Union. "I said I bet her name was Wikel," Dr. Maggie recalled with a grin. "She said it was, but how did I know? 'Well,' I replied, 'it had to be either Wikel, or Parker, or Pence.'"

Bitter Times for Bitter Men

As you drive west from Monroe County, the mountains seem to crowd in on one another more and more; the slopes get steeper, the valleys narrower. You see more coal tipples, and more gob piles—waste from the mines that burns slowly and relentlessly.

Much of the history of the southwest corner of the state is told in violence, from the Hatfield-McCoy feud before the turn of the century to the mine wars of the 1920's.

Lingering Civil War enmities and a dispute over a hog in 1873 helped kindle the famous Hatfield family feud that raged for 20 years across the Tug Fork of the Big Sandy River between Kentucky and West Virginia.

Willis Hatfield, last surviving son of clan leader "Devil Anse," is still a giant of a man at 88 (page 773). He remembers little of the feud; he was only a child when his family moved away from the strife-torn Tug Fork area. But Willis is no stranger to danger. His clan was quick to respond to any challenge—and gunfights were still a way of life—well into the 20th century.

"Did you ever shoot anybody?" I asked him as we sat in the den of his son John's house in Logan.

"I'd rather not say," he replied, the twinkle in his eyes inviting me to speculate.

"He was about the meanest fellow I know of back in those days," John bragged, obviously delighted with the Hatfield reputation. "He carried two pistols."

"I did," Willis agreed. "I carried one in my right front pocket and one in my left hip pocket. So if you got my right hand, I'd get you with my left."

I drove with Willis and John's wife, Kathryn, down to the village of Sarah Ann, where Devil Anse died at the age of 81 and lies buried in the Hatfield Cemetery. A statue of the clan leader dressed in a frock coat towers over the graves of his children.

Willis decided not to walk up the steep hill to the cemetery, and stopped off to visit one of his cousins—there are 25 Hatfields listed

in the Logan phone book. On the way home we picked him up, and the gunfighter's gunfighter presented me with a box of chocolate-covered cherries. "He always has been a ladies' man," Kathryn allowed.

One of Willis's relatives was a central figure in the coal conflicts of the twenties that pitted miners, seeking to unionize, against the coal barons of Pittsburgh and Wall Street. Sid Hatfield, police chief of Matewan in Mingo County, sided with the miners, who were then paid piteously low wages and who were forced to live in company houses and to shop at company stores with company scrip. In 1920 seven company detectives intent on evicting miners' families were killed in a gunfight with "Two-gun Sid" and his supporters—marking Hatfield himself for murder a year later.

King Coal Still Rules

Hatfield's death, along with further oppressions by the pro-coal-company sheriff of Logan County, sparked the battle of Blair Mountain. It took the U. S. Army, ready with a small fleet of bombers, to end a four-day war pitting thousands of miners against sheriff's deputies and state troopers.

"Miners' kids around here know more about Blair Mountain than they do about the Civil War," Beth Spence, young editor of the *Logan News*, told me. "And down here people are still divided. You're either all for the union, or all for the coal companies."

I had come to Logan to talk to Beth about the recent eviction of 32 families from the nearby community of Hutchinson on Rum Creek. In 1973, the Dingess-Rum Coal Company said, it had verbally advised its tenants that a new coal-processing plant was being planned for the area at some time in the future. Yet the receipt on September 8, 1975, of a 30-day notice to vacate their coal-camp houses was a hard blow.

"There was no place for the people of Hutchinson to go," Beth said. "Ten companies own surface or mineral rights to 220,000 of the 290,000 acres in Logan County, and they won't sell it or long-term lease it. Families got one three-week extension. Some had to go as far as Ohio to find a place to live.

"These were working miners, retired miners with black lung, and miners' widows," she continued. *(Continued on page 774)*

Stumping the countryside, John D. "Jay" Rockefeller IV parades with his wife,

Sharon, through Cedar Grove, seeking the town's 900 votes. This year the scion of the wealthy family makes his second run for governor, having lost in 1972.

A legend lingers in the crinkled eyes and crackling tales of Willis Hatfield, cradling a pistol once owned by his father, "Devil Anse," who led the Hatfields of West Virginia against the McCoys of Kentucky. Willis, 88, the only living son of the clan leader, spices up the feud's folklore. "One Hatfield man went out and killed seven men before breakfast," he bragged to the author, "then he came back and ate seven eggs —one for each man."

Morning brushes a hollow clad in fiery autumn alongside the Tygart Valley River, shrouded in mist beyond the hills (**left**). An 1861 victory at the Battle of Rich Mountain near here helped catapult Gen. George B. McClellan to the supreme command of Union forces.

"I don't think the company understood what it did. More than tearing up a series of houses, it tore up a community. They say this new tipple will mean 1,000 new jobs, but where will the people live? I feel like southern West Virginia and eastern Kentucky are the national sacrifice in the name of energy."

I left Beth and drove out to Rum Creek. It was winter and snow was powdering the gray-bearded mountains. Beth had told me that I would recognize Hutchinson when I came to it—and I did. All that was left were a dozen brick chimneys, like gravestones marking the death of the community.

Magazine Protests Unwanted Change

Some West Virginians are determined not to be part of the national sacrifice. In Mingo County west of Logan live the Fanning brothers, young in years, and their 84-year-old great-aunt, Edwina Pepper, young in spirit.

John and Michael Fanning and Greg Carannante publish the *Mountain Call*. The monthly magazine tells about mountain people, preaches the message of ecology, and exhorts neighbors to stand fast against the encroachment of strip mining.

Getting to The Knob, the Fannings' home, is a bumpy experience. Turning off Route 52 at the little town of Greyeagle, I started up a hard-top road that John later told me had 1,103 potholes in a seven-mile stretch. About halfway along I came to a sudden halt. A bridge had fallen in and a barricade blocked a nearby ford. A crude sign read: "Go home bus drivers. No bridge, no bus. No bus, no kids. No kids, no school."

A woman emerged from a nearby house.

"What's going on?" I asked.

"That bridge fell in with a truck loaded with sand and gravel," she told me. "The state road commission told us if we would let them cut a road through here, it'd just be temporary until they could get the bridge put back. That was four weeks ago. If the kids have to go through that now, they'll be going through all winter. That water's deep down there; if a bus'd turn over in there it could drown them children. We just can't put up with that." And with that, she gave me permission to pass through.

The hard-top ended and I followed a dirt road along, over, and sometimes through Marrowbone Creek. The mountains in the southwestern part of the state are so steep that the sun had just begun to peek over the ridgetops at 8:30 in the morning. Ponies and cattle roamed at will along the roadside. The final two-mile climb was riddled with ruts, holes, and washouts.

All roads in West Virginia are built and maintained by the state. And while an ambitious superhighway program is opening up new areas to small industries, many back roads sadly need repair.

But the ride to the top was worth it. The Fannings and Ed, as they call their great-aunt, live in a rambling stone-and-wood house they have largely built themselves, set among trees then fired by autumn.

The *Mountain Call* has crusaded for better roads and for small community schools, but many editions nowadays cry out, "Keep Marrowbone Green."

"Recently we were visited by a coal-company representative who wanted to buy Ed's coal," John told me. "The realization that large-scale strip mining was planned around here came as a shock. We want to preserve our small part of the world and its mountain culture. We don't want our streams colored black and our mountains mutilated with spoil banks."

So the people of Marrowbone Creek are presenting a petition to the state government to have their region protected from strip mining.

Gas Firms Face Organized Resistance

The central part of the state is more rolling than the south and east. Not that it hasn't got plenty of hills; it's just that they're more gentle, with the slopes cleared for grazing. Even here, though, the cattle have worn countless mini-terraces as they amble back and forth across the hillsides.

The town of Jane Lew, population 400, claims more Civil War generals per capita than any place in the country: Thomas "Stonewall" Jackson and Joseph A. J. Lightburn. Actually, Jackson was born in Clarksburg to the north and spent his boyhood at nearby Jackson's Mill.

The current Joe Lightburn is about 75 and runs Jane Lew's general store. He was the presidential standard bearer for the Constitution Party in 1964. I met the onetime candidate and half a dozen of his friends in the

home of Jack Shock, farmer and president of Concerned Land and Natural Resources Owners, Inc., an organization determined to get what the members feel is their fair share for natural-gas leases. The area around Jane Lew is rich in natural gas. Pipes in the shape of umbrella handles mark the road crossings of pipelines, and small tanks and valves mark wellheads.

Mineral Rights and Wrongs

In West Virginia it is not at all uncommon for a single piece of property to have a number of owners—the farmer who raises cattle on the surface, two or three coal companies that own the different seams underneath, and a previous owner who still holds the oil and gas rights. Although CLANRO is trying to help its members get an equitable price for their coal, their main dispute is with the gas companies.

"Our problem goes back to the turn of the century," explained Dr. Thomas Bond, professor of chemistry at Salem College and a local farmer. "That's when companies persuaded landowners to sign contracts that would permit them to drill for gas and lease pipeline right-of-way for an annual payment of from $100 to $300 per well."

I asked about the term of those leases.

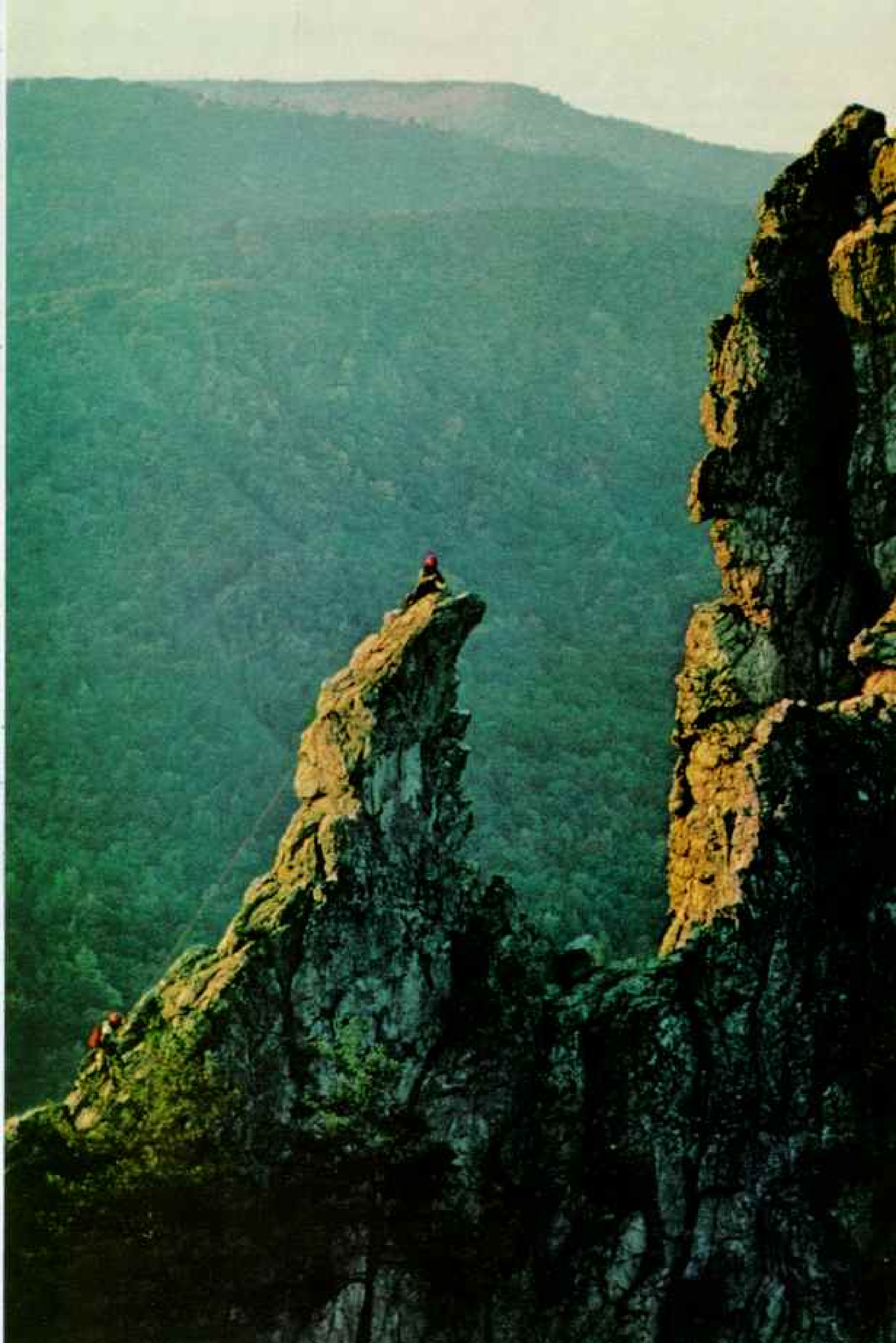
"They run forever," growled Joe Lightburn.

"Just look at the figures," said CLANRO member A. Page Lockard. "Right close to me, I've been told, a well was recently drilled that produces millions of cubic feet of gas a day. The company is paying $200 a year for that gas. The last gas bill *I* paid was $1.41 a thousand cubic feet."

Landowners are also fighting for higher payments for storage wells on their property. The gas companies bring gas from many sources and pump it back into exhausted formations, storing it until peak demand in winter months. Standard payment is only a lump sum of a few dollars, plus compensation for surface damages.

"Here we are, a state loaded with wealth, and the people are getting none of it." Page pounded the table in anger. "Why, did you know that the Huntington papers did a study that shows that outside interests—mainly oil, gas, timber, railroads, and steel companies—control two-thirds of the nonpublic land in the state? It's true, you can ask why our

Daily extravaganza of more than 90 dishes surrounds Donald Shafer, a luncheon chef at the Greenbrier resort in White Sulphur Springs. The soothing mineral waters that smelled "like a half-boiled, half-spoiled egg" first drew non-Indian pilgrims around 1780 and later spawned the Old White, a grand hotel whose elegance was toasted by princes and Presidents. Its successor, the Greenbrier, today attracts 100,000 guests a year to its wide-ranging sports complex.



grandparents were so ignorant as to sign those unconscionable leases. Unfortunately, they got skinned. We don't think we ought to have to live with that skinning."

"Not forever," Jack said grimly. "Seventy-five years ought to be enough." I recalled a joke in the CLANRO newsletter. One day, it said, J. Paul Getty reminded his fellow oil tycoon H. L. Hunt that "the meek shall inherit the earth." Hunt replied, "Yes, but damned if they will get the mineral rights."

Profits Depend on Extraction Costs

How valid are the grievances of these irate CLANRO members? I talked with Jack Hendrickson of Consolidated Gas Supply Corporation of Clarksburg, a major force in the gas industry of West Virginia.

"First of all," he said, "let me point out that Consolidated has not negotiated a new flat-royalty lease in more than a decade. On the majority of our agreements we pay what is called the 'farmer's eighth'—a metered royalty of 12½ percent of the well's income.

"Now let me tell you about squeezing gas out of rocks," Hendrickson continued. "West Virginia's substrata has extremely low porosity, so natural-gas flow is small. That means most of the wells here have a lower productivity—and are less profitable—than wells in other parts of the country.

"Our cost for drilling a producing well at a depth of 1,500 to 3,000 feet is $58,000; a dry hole costs $41,000. At 4,200 to 6,600 feet, it runs $88,000 for a producer."

"What is your average flow from a well?" I asked.

"Giving you an average is dangerous. The first day you have a well feeding into the pipeline is the day that it makes the most gas. It never stops declining. Some wells drop to 100,000 or 200,000 cubic feet a day after starting at a million to a million and a half."

To multiply these flow figures by the $1.41 per thousand cubic feet on Page Lockard's gas bill isn't really valid. How much does the gas company pay for the gas, both from independent producers and from its own production? What is the cost of getting that gas to the consumer? How many dry holes have to be made up for? I don't know. I can reach one conclusion, however: The problem of who owns West Virginia's riches and when West Virginians might reap more benefits from them will not be solved quickly.

The natural-gas controversy seemed remote a week later in the pilothouse of the tug *Elaine G* as she pushed 915 feet of barges a leisurely seven miles an hour up the Ohio River. This major conduit of cargo is owned by West Virginia to the low-water mark on the Ohio side for the length of the boundary.

Photographer Jodi Cobb and I had driven out of Charleston the day before, leaving behind the blue-and-gold dome of the capitol shining through the morning haze. As we drove west along the Kanawha River, we passed—and smelled—huge chemical plants that utilize local brine and fuel, giving credence to Charleston's claim to be chemical capital of the country.

River Ride Allows a Leisurely Look

In Huntington we threaded the tree-lined streets to the Ohio River and our waiting tug. I immediately climbed to the pilothouse to meet Capt. Pete Boggs, a stocky man who, although only 35, had already worked on the river for 22 years.

While we talked, the crew was tying together the barges: 14 of coal—the equivalent of 194 railroad cars—one of scrap, two empties, and a gravel barge. After taking on a new deckhand, we started pushing upriver. Corn tassels waved in the breeze. Occasionally we passed groups of children playing in shallows where generations of youngsters had beaten the shore into hard beach.

The counties that border the Ohio stand apart from the rest of the state. The mountains are usually in sight, but river bottomland supports larger farms, and the tortured piping of chemical plants and the smokestacks of steel companies are landmarks. Here jobs have always been more plentiful than elsewhere in the state, and income higher.

On the tip of a rocky tooth, a climber belays a line for his buddy as they ascend Seneca Rocks in Monongahela National Forest. Each year thousands challenge the sandstone formation, ruled in legend by Snowbird, a Seneca Indian princess; of seven suitors who tried to reach her at the summit, all but one fell to their deaths.

Five of West Virginia's dozen cities lie along the Ohio.

On the second day of our trip Pete asked if I would like to steer the rig for a while. It looked so easy that I eagerly stepped up to the dual set of tillers.

"See that white house on the hill beyond the bend? Head for that," said Pete.

I pushed the tiller to the left. "Not that hard," Pete shouted. "If you go too fast, you'll break the tow apart. Take it nice and easy."

At first I found myself constantly overcompensating, but eventually I felt I had the hang of it. It takes a long time to start 915 feet turning, and it takes a long time to straighten it out.

More and more industry lined the river the farther north we went. Giant power plants, asphalt and cement companies, and oil depots clustered around the towns, while farms still prospered in between.

When Jodi and I awoke on the fourth day, we were in the northern panhandle—steel country. Some of the coal we carried would be unloaded here to fuel huge blast furnaces.

Hot Metal Gets a Saliva Test

"Stand back," hollered Luke Wilson, safety supervisor at Weirton Steel, as thousands of giant sparklers exploded from a huge steelmaking vessel. "They're charging the molten iron and scrap with oxygen." Gas is shot in at twice the speed of sound, he explained, to increase the temperature, stir up the mixture, and get rid of impurities.

Suddenly the vessel started to tip sideways so the men could test the temperature inside. The heat was beyond belief, and the light was almost blinding. I started to lean on a railing —gingerly touching it first. Dave Wilcher, the steelworks assistant manager, grinned approvingly. "That's right," he said. "One of the first things you learn in a steel mill is to spit on it before you touch it!"

"Pure Screamin' Hell" these rapids on the Gauley River have been named—and a paddler upended astern of his raft finds out why. Downstream, his crew picked him up

We were standing in the heart of Weirton's 350-acre complex, the Basic Oxygen Plant. Here two huge new furnaces that produce all the company's raw steel have replaced 14 pollution-producing open-hearth furnaces.

Driving from the river to the plant, Luke had pointed to the surrounding hills. "Those used to be bare from the smoke and chemicals put out by the plants around here. Now with new controls . . . well, it's good to see the trees growing back on the mountains."

Fans Like Their Music Straightforward

Weirton makes its own coke, molten iron, and finished sheets of tinplate and galvanized steel. With this completely integrated complex, the company is the largest single employer in the state, drawing 12,500 workers from both West Virginia and Ohio. The city of Weirton claims the highest per capita income in the state.

Steel is big in Wheeling too, just south of Weirton, but to millions of people across the U. S. and in Canada, Wheeling means radio station WWVA—and good country music.

"It's that Wheeling Feeling. Live from Capitol Music Hall, Wheeling, West Virginia, it's Jamboree USA!" That's how master of ceremonies Buddy Ray opens the popular Saturday-night show. Shrieks and yells and cowbells greet performers at one of the most relaxed live radio programs I've ever watched.

Fans wander to the backstage door, eager to talk to their favorite stars; mothers walk up and down the aisles carrying babies; teenagers and grandmothers run down front to snap pictures while people like Charlie Rich, Johnny Cash, and Loretta Lynn sing their songs about love gone wrong, riding the rails, the hard life of a woman. To West Virginians, country music "tells it like it is," and they like that.

The night I attended the Jamboree, Freddie Hart was the headliner, and the audience

unhurt. "This is one that sneaks up and scares you to death," says the author, who ran both the Gauley and New Rivers, two of the wildest in the white-watered state.

Slice of Switzerland: In a private enclave in central West Virginia's Holly River State Park, Gertrude, Anna, and Freda Balli (**right**, left to right) preserve the heritage of their parents on

the 218-acre family farm. Freda (**top left**), Gertrude's twin, cradles a newborn shorthorn calf. Rich milk from their dairy herd contributes to the farm's best-known product—delicious "Swiss" cheese, made in America (**left**). Their secret? "Makin' a cheese is like makin' a cake—they all turn out a little bit different. You chust have to know your cows," says Anna.

"**The Grand Reaper,**" A. James Manchin, surveys some of 100,000 junked cars he rounded up for recycling while heading the state's REAP plan—Rehabilitation Environmental Action Program. It was born, he says, "to wash West Virginia's pretty face and plant a honeysuckle on her crown."

came dressed in blue jeans, smart pantsuits, and evening dresses.

The Capitol Music Hall looks like the theaters I remember from my childhood, with plush and velvet and gilt, and statuettes decorating the walls. People line up outside the doors well before they open at 6:15. A disc jockey wanders out from WWVA's studios in the lobby to interview the fans.

"I just want to tell Mom that we made it all right and it's good to be here," announced a man from Kentucky into the microphone.

"We've been waiting for years to come to the Jamboree," gushed a platinum blonde from New York, planting a surprise kiss on the interviewer.

Watching people stomp their feet and clap their hands while fiddles sang and guitars twanged and commercial messages lit up the backdrop, I thought this old building must feel schizophrenic on nights the Wheeling Symphony Orchestra performs here.

History and Vistas Lure Tourist Dollars

West Virginia's other "panhandle," thrusting eastward between Maryland and Virginia, is an arm of rolling farms and orchards. It seems a softer, gentler place than the tumbled mountains of much of the rest of the state.

This was George Washington country. He popularized the spa at Berkeley Springs, and his brothers and nephews settled Charles Town. Six mansions built by the Washington family in the area still startle the eye with their magnificence.

It was Charles Town that witnessed the trial and hanging of John Brown in 1859 after his ill-fated attack on the arsenal at nearby Harpers Ferry. The man who wanted to free the nation's slaves found little sympathy in this community, for this was the only region in what is now West Virginia that had a substantial slave population.

The heart of Harpers Ferry has been designated a national historical park. In years past more than one wag suggested that this would be a merciful fate for the rest of the state as well. Those were the days when only sad songs of poverty were being sung about West Virginia, and when coal was the fuel of last resort, and tourism seemed the principal hope for the economy.

The state Department of Commerce claims that today travel dollars employ almost as many people as do the coal mines—and points out that much more of the travel dollar stays in the state. People from around the world come to relax at private resorts such as the luxurious Greenbrier and the new Snowshoe ski area. But most vacationists spend quiet times in West Virginia's wealth of publicly owned parks and forests—

almost a third of the state's total acreage.

I have pitched my tent and hiked the wilderness trails of Kumbrabow State Forest, gloried in the rhododendron thickets of Watoga State Park, and punished my body trying to learn to ski at Canaan Valley State Park—a major winter sports area with a climate more like Canada than the Middle Atlantic region.

West Virginia's premier state park, and one of the newest, is Pipestem. A resort they call it, and rightfully so. Its deluxe lodges, championship golf course, indoor and outdoor swimming pools, and saunas lured President Gerald Ford's son Michael and his bride to honeymoon there.

For all the plushness, my favorite time at Pipestem was spent clinging to a horse on an overnight pack trip.

One June afternoon I joined ten other riders and four guides on a four-hour, nine-mile journey. We rode down a precipitous trail into the Bluestone Canyon, across the stirrup-deep Bluestone River, and up the other side. I dismounted stiffly at our destination for the night, a 125-year-old cabin.

After a satisfying meal of hamburgers, baked beans, franks, and hash-brown potatoes, we sat resting against the logs of the old cabin. I watched the fireflies do battle with the stars while the repetitive call of the whippoorwill echoed from the forest's edge. The winking lights of Pipestem's lodge across the canyon seemed light-years in the future.

I stepped even further back in time on a rapids-running trip through the New River Gorge. Part of an ancient river system, the New courses north from its birthplace in North Carolina, through Virginia, and into West Virginia. Inappropriately named, it flows along the same bed it did millions of years ago.

Surviving the uplift and erosion that befell the ancestral Appalachians, the river has been dammed twice above the gorge and is threatened with a third dam on the North Carolina-Virginia border. From Hinton, West Virginia, to just beyond Hawks Nest State Park, the New still runs free and is under consideration as part of the National Wild and Scenic Rivers System.

Dam's Effect Still Argued

In April 1976 North Carolinians gained similar status for 26½ miles in their state, hoping to block the proposed dam. The battle over the new dam—a pumped-storage facility—has raged more than ten years, and could continue years more. The American Electric Power Company argues the need for more energy and flood control. Opponents say the project would use more power than it would create, as well as ruin valuable farmland, archeological sites, and a portion of the river.

"How will one more dam affect the rapids in the gorge?" I asked Jon Dragan, who runs Wildwater Unlimited, a white-water outfitter headquartered at Thurmond, West Virginia.

"To be honest, I don't know," Jon said. "The power company says it will help by evening out the flow. But from experience, we know that when the dams upstream release large amounts of water, the river rises rapidly, making boating very dangerous."

The day I rafted down the New River with Jon, the morning skies were cloudy but held a promise of sunshine later in the day. We made it through Thurmond Bridge rapid without mishap, paddled furiously through aptly named Surprise—a rapid you can't see until you're practically in it—and headed for Upper Railroad.

After the boat in front of us started into the rapid, Jon gave the signal to get down in the rubber raft.

"Move it, drive it, get the lead out of those paddles!" He shouted like a Roman overseer exhorting his galley slaves. Suddenly a wall of water broke over us as we plummeted over a ledge. Braced in the bottom of the raft, I thrust my paddle into nothingness as the river dropped out from under the boat.

We slammed into another wave. "A guy just flipped out ahead of us," Jon shouted. "Let's see if we can pick him up." I shook the water out of my face in time to see a life-jacketed figure being swept through the foam. His own raft picked him up downstream, none the worse for the roller-coaster ride, except for losing his glasses.

After lunch we ran 17 more rapids, ending with the monster at Fayette Station—a steep, narrow chute that you clear in 14 breath-taking seconds.

There one of the greatest white-water trips in the East ends under the soaring girders of the New River Bridge, now under construction. Destined to have the world's longest main-arch span, 1,700 feet, it will stretch 876 feet above the New River Gorge.

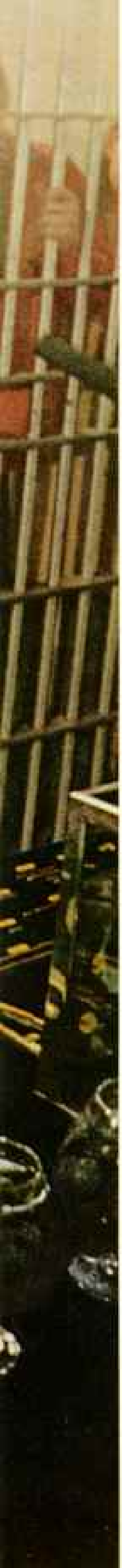
Modern man may bridge the river, but I hope he never tames it.

"West Virginia. . . . Almost Heaven"

Back at base camp that evening, I sat on the riverbank and watched the sluggish current curl toward its first battle with the rocks. The tree frogs were chorusing and the soulful whistle of a train could be heard far down the tracks. It was hard to imagine that my ride on the rollicking river had happened only a few hundred miles from congested cities and antiseptic suburbia.

As megalopolis consumes the East, let there remain the haven of West Virginia, the drama of her mountains and the song of her streams. May her natural resources fire the nation's industries and may her people prosper. But may the beauty of her land remain secure to soothe man's soul. □

Razorback ridges knife through dawn fog south of Charleston, where industrial wealth has brought suburbs to hollows that Daniel Boone may once have explored. New prosperity rises over West Virginia's mountains, linked with new concern that it not destroy their beauty, nor the old free spirit within them.



The Trouble With Treasure

By EUGENE LYON, Ph.D.

After five years of searching, determined divers found remnants of Atocha, *a Spanish galleon that sank off Florida in 1622. But tragedy and legal entanglements have dogged their efforts and, as this article is written, the big prize—more than 90 percent of a treasure worth perhaps 100 million dollars—still eludes them.*

SPECTATORS SAMA AT A TANTALIZING FRACTION OF ATOCHA'S TREASURE IN A CELL OF A LEON COUNTY JAIL IN TALLAHASSEE (LEFT). ROMAN NUMERALS AND A SINGLE DOT ON A 9 1/2-INCH GOLD BAR (RIGHT) INDICATE 21 1/2-KARAT GOLD.

BOTH BY NATIONAL GEOGRAPHIC PHOTOGRAPHER GORDON W. GAHAN

The Trouble With Treasure

NO LAND WAS IN SIGHT from the small salvage boats, anchored where the great shoal met the cobalt depths of the Straits of Florida. Far to the northwest lay the Dry Tortugas, at the extreme edge of the continent. Beyond the northeast horizon were the green islets of the Marquesas Keys and, 70 miles farther, the Florida mainland. Past the Spanish capital at St. Augustine stretched eastern North America, almost empty of European man, for it was the sixth of June in the year of our Lord 1626.

Francisco Nuñez Melián, the Spanish commander, stood at the rail of the ship *Candelaria* with the expedition's priest and Juan de Chaves, the King's auditor. From the boats, all attention centered on diver Juan Bañon, swimming up from the submerged diving bell. His head and gleaming black shoulders broke the surface, and he gasped for a lungful of air.

"It . . . is found!" he shouted hoarsely. "It is found!"

Struggling to stay afloat, the diver clutched a heavy metal bar (facing page). Excited, eager men leaned over the gunwale and hauled Bañon and his prize aboard. A seaman's stubby thumbnail scraped across the blackened surface of the bar. Sunlight glinted on silver.

The exhausted diver waved off the wine jar the others pressed upon him. Juan Bañon stood fully, proudly upon the deck and addressed his commander, Francisco Melián. "Señor!" he cried. "The promise! My freedom . . . I claim my freedom!"

The Spanish salvage chief touched his sword hilt and said quietly: "Bañon, I gave my word that the first man to find the galleons would be rewarded. If he were a slave, he should have his freedom. Upon the honor of a caballero of Castile, you shall be free." He raised his voice: "Now we will all have some wine. Then, all divers into the water! We have much to do."

One of the lost galleons of 1622 had come to light; the other could not be far away, for they had sunk within sight of each other. Melián had found the grave of the *Santa Margarita*.

Three hundred forty-five years passed, and it was June 13, 1971. Although a vast new civilization had risen over the northern horizon, the waters west of the Marquesas looked much as they had in 1626. Gulls and frigate birds still wheeled over the great shoal; sea turtles sounded in the deep channels. Only the smoke of a tanker, hull down in the Gulf Stream, told of the passing centuries—that, and the strikingly different appearance of the salvage boats near where Melián had worked.

Four anchors tethered the diesel workboat *Virgalona* over a widening circle of gray silt churned by her propellers as she dug for treasure. A mile away the trim blue cruiser *Holly's Folly* cut a white wake in the glassy waters, towing a magnetometer in search of more targets to investigate.

Melvin A. Fisher—tall, sun-bronzed, middle-aged—stood on the cluttered stern of the *Virgalona* and watched a scuba diver swim up from below. For five years Fisher had sought the 1622 shipwrecks; he had searched around this area for a year. Finally, two weeks before—on June 1—Fisher had dived and found the first signs of a sunken Spanish ship—some ceramic shards and a single lead musket ball.

Then, earlier this day, his men had located the ring and buried shank of a huge ancient anchor. Later a single blackened Spanish silver coin came up. Don Kincaid, a slim, dark-bearded man, went down to photograph the old anchor. He surfaced, spat out his regulator mouthpiece, and pulled himself up the diving ladder by one hand. The other seemed to drip links of shining gold.

As Mel, his wife, Dolores, and the others crowded around Kincaid, the diver laid out three pieces of exquisite gold chain—nearly eight feet of it.

"Don," said Mel Fisher, "you've earned a bonus!" Quickly they radioed Bob Holloway aboard *Holly's Folly*. Cautious of possible eavesdroppers, they issued a deceptively casual invitation to join them for lunch.

Excitement exploded aboard *Virgalona*. Those heavy golden links meant they had located a rich shipwreck, certainly one of the lost 1622 galleons. The *Santa Margarita*? The legendary *Nuestra Señora de Atocha*? In either case, this was a mere token of the wealth that waited in the coarse sands below.

Don Kincaid's gold chain began a tantalizing trail of discoveries whose true value is

still imprecisely known. While conceding realistically that "treasure is worth just what someone is willing to pay for it," Mel Fisher estimates his crew's finds already total six million dollars.

Yet I wonder if, on that fateful day, those jubilant treasure hunters had known what their finds were to cost—five years of digging on the site so far; enormous expense; troublesome litigation; and, to their greatest anguish, four human lives—might they have given up the search then and there?

TREASURE FEVER struck Florida after the successes of Kip Wagner and Mel Fisher in salvaging several Spanish ships wrecked in 1715.* Fisher, born in the Midwest and trained as an engineer, had lived for years in California, where he operated a scuba school and dive shop. Mel Fisher, however, was no ordinary businessman. His impassive exterior hid all the inner enthusiasms of a born romantic. He could drive a hard bargain, though, and he was persistent in pursuit of his dreams.

In the 1950's Fisher had taken part in treasure-hunting expeditions to Central America and the Caribbean. One of his partners was Fay Feild, an electronics engineer who had developed a sensitive magnetometer to locate shipwrecks by detecting the iron they carried. Among the others was Demosthenes "Mo" Molinar, a Panamanian mechanic who became a fine diver and skilled boat captain. Mel's wife, Dolores, and their four children also took an active part.

Typically, Mel Fisher in 1963 staked all his resources on a gamble. He sold everything and brought his family and crew east to dive with Kip Wagner even before they had signed any contract. The partners, now called Treasure Salvors, Inc., agreed to work without pay for a year, or until they found treasure.

The year was almost over when Mel's inventiveness paid off. Moving deep sand was the biggest salvage problem; he devised the "mailbox," a tubular deflector that directed the prop wash of an anchored craft downward. In late May 1964, the mailbox, scouring the seafloor off Fort Pierce, uncovered an unbelievable sight.

"Once you see the ocean bottom carpeted with gold coins, you'll never forget it," says Mel. The salvors had struck a pocket of gold. In one week they garnered 2,500 doubloons, worth a small fortune.

By 1966 it became clear that the 1715 shipwrecks were yielding less and less treasure. Mel headed for the Florida Keys, where others had long sought Spanish shipwrecks. Treasure seekers had become aware of the possibilities of research in Spanish archives. From Seville they obtained maps and documents about some 1733 shipwrecks, but also learned of the loss of eight vessels, including several immensely rich galleons, in a hurricane in 1622.

Two of those *(Continued on page 794)*

PAINTING BY ROLF GROLER

After the hurricane's fury, which claimed seven other vessels, the Spaniards attempt salvage. Havana slave Juan Bañon surfaces with a silver bar from *Atocha*'s companion galleon, *Santa Margarita*. A barrel with extra air hangs near the diving bell from which Bañon spotted *Margarita*'s cargo.

*See "Drowned Galleons Yield Spanish Gold," by Kip Wagner, in the January 1965 NATIONAL GEOGRAPHIC.

To flex her imperial muscles, Spain stokes up on New World nourishment. In Havana harbor *Atocha* loads casks of wine, water, and gunpowder. A soldier guards chests crammed with silver and gold from South America; slaves carry slabs of Cuban copper. Bales of tobacco and indigo wait in the right foreground, where two men prepare to

PAINTING BY NOEL DOYLE

remove a cover of white canvas from chests containing the personal effects of wealthy passengers. A tarpaulin shields vegetables and jugs of wine and honey from the sun. Of the living creatures who boarded the doomed ship—265 people, plus sea turtles and chickens for food—only five men, and perhaps the turtles, survived.

Golden glitter on the seafloor near Florida's Marquesas Keys told veteran salvor Mel Fisher that he had found a major wreck. Author Eugene Lyon's discoveries in Spanish archives had shifted the search by 100 miles.

First, Fisher found a musket ball and ceramic shards; nearby, using an iron-detecting magnetometer, his team located a galleon anchor—then, paydirt: golden links and silver coins.

One diver surfaced with a gold whistle complete with manicure set and ear spoon (**right**), perhaps once the property of the galleon pilot. A 4½-pound gold disk (**left, center**) bore seals attesting that the royal tax had been paid. Thirty lengths of gold chain were found, some with links as big as acorns.

Bars lacking seals (**left, above**) indicated contraband. A crushed gold cup (**below**), once ringed inside with emeralds, undoubtedly belonged to a person of rank.

Fisher had found cause for celebration—and doubt. The items were surely from a Spanish ship. But were they from *Atocha*?

ROBERT S. PATTON (ABOVE, RIGHT) AND BATES LITTLEHALES, BOTH NATIONAL GEOGRAPHIC STAFF

(Continued from page 789) galleons, *Nuestra Señora de Atocha* and *Santa Margarita*, quickly became Florida treasure legend. Since the salvors had learned that the ships were lost near the "Keys of Matecumbe," they centered their efforts near the islands now called Upper and Lower Matecumbe.

Mel Fisher became almost obsessed with the hunt for the galleons of 1622. At one point he even rigged up an antique autogiro—a predecessor of the helicopter—to tow an airborne magnetometer, but the craft shook itself to pieces before it flew a single mission. After exhausting the possibilities of the middle keys, Mel turned to the northern keys. But neither he nor any of the others found any trace of the 1622 ships. Their location remained a centuries-old mystery.

IT WAS A COLD MORNING in Seville in February 1970. Fog rising from the Guadalquivir River lingered in the city's narrow streets and swirled around the Archive of the Indies. A doctoral candidate in history, I had come to Andalusia to study Spanish Florida and its conqueror, Pedro Menéndez de Avilés, and was working with the colonial accounting papers.

As I stood in the readers' room of the archive, examining the catalog of the Cuban accounts, my eye fell upon an entry: "1622—Account of Francisco Nuñez Melián . . . of the treasures salvaged from the galleon Margarita . . . in the Keys of Matecumbe. . . ."

My longtime friend Mel Fisher had told me of his interest in the 1622 shipwrecks. I quickly called for that item, and the *portero* brought a packet of faded papers to my desk. I hurriedly turned the pages. My heart beat faster: Here was the 17th-century salvor's detailed expense account!

Near the end of the bundle was a badly worm-eaten document. With difficulty I made out that Melián had salvaged the ship near the *"Cayos del Marquez"*—Keys of the Marquis. Careful rereading disclosed the same phrase on many other pages.

Many references to the shipwrecks had placed them near the "Keys of Matecumbe," yet here was a mysterious new element, coexisting with the first. What did it mean?

I examined many old maps of the Florida Keys, beginning with the 16th century. It became apparent that, in the 1620's, the word "Matecumbe" meant *all* the Florida Keys, except for the far-off Dry Tortugas. The Cayos del Marquez specified by Melián were those remote islets known today as the Marquesas Keys. The shipwrecks lay a hundred miles from where the salvors were searching.

At once I wrote Mel and told him I believed that the 1622 shipwrecks lay between Key West and the Dry Tortugas (map, page 801), and that the *Atocha* and *Santa Margarita* were in the vicinity of the Marquesas.

Characteristically, Mel immediately moved to Key West, committing himself completely to a new search near the Marquesas. He could not know then how fully the quest was to challenge his determination.

Before I left Seville for home, I located and ordered microfilm of a number of pertinent documents, and left an open order with a skilled Spanish researcher, Angeles Flores de Rodriguez, for any further material she might locate about the shipwrecks.

Thousands of pages of documents have since unfolded a fascinating tale. I examined the letters of officials in Europe and the Indies about the 1622 shipwrecks; the manifests of the lost vessels; their passenger and crew lists; and salvage accounts. The absorbing story they told took us back to a year of dramatic urgency, a time of supreme testing for imperial Spain.

THE YEAR 1622 was a crucial one for Spain. Young King Philip IV had inherited unwieldy European lands and a far-flung empire. Spain's support of the Catholic German states had led her into the last and bloodiest of the religious conflicts—the Thirty Years' War.

In 1622 the war was going well for Spain, but its cost was great. And as a 12-year truce with the Dutch ended, a horde of enemy ships threatened to descend upon Castile's Indies.

Even though Spain's claims to North America were being challenged by English, French, and Dutch settlements, her rich Central and South American colonies were still intact. Spain's only link with the Indies was her vital marine lifeline—the treasure fleets that carried merchants' goods and royal revenues, arms and soldiers, and passengers.

Philip IV made his merchants pay for fleet defense through assessments on the Indies trade. In 1622 the Crown maintained eight

powerful war galleons with this money, manned by 2,000 soldiers and sailors. This guard fleet convoyed the merchantmen and provided lead vessels, called *Capitana* and *Almiranta*, for the South American ships, which sailed from Portobelo and Cartagena with the treasures of the New World.

The 1622 guard fleet sailed late to the Indies after losing two galleons before it had even cleared Spain; it finally left in April. Among the guard vessels were the *Santa Margarita*, a fine new galleon bought for the voyage, and, serving as an *Almiranta*, the *Nuestra Señora de Atocha*, a ship recently built at Havana for the King. The *Atocha*, a 600-ton galleon, was named for the Virgin of a famous Madrid shrine.

The outbound fleet carried wine, cloth, ironwork, books, and papal-indulgence bulls, granting heavenly merit to those who acquired them. It carried half a million pounds of mercury, a Crown monopoly, used to extract silver from the rich ores of Potosi.

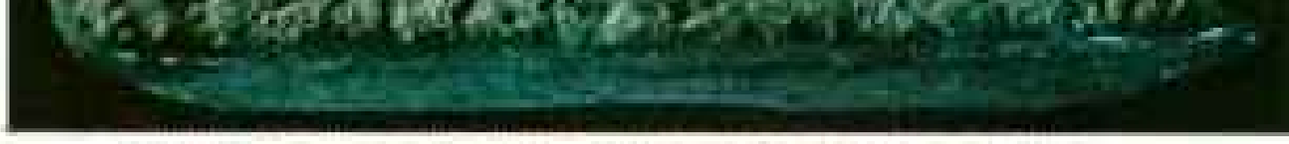
Fleet Commander Lope Diaz de Armendariz, the Marquis of Cadereita, guided his ships safely to the Isthmus of Panama. There, at the great Portobelo fair, European goods were exchanged for the silver of Upper Peru. Sweating stevedores loaded homebound cargoes as the ships' silver masters recorded the goods and bullion in their manifests.

At Portobelo the marquis learned that 36 Dutch ships had recently been sighted at the Venezuelan salt pans, and prudently added another guard galleon, *Nuestra Señora del Rosario*. By July 27 the fleet had reached Cartagena, where gold from the New Granada mines came aboard in abundance, and tons of the King's tobacco was carried up the gangways. More bar and coined silver was also consigned to the silver masters for delivery in Seville. The fleet then left for Havana, its last port of call in the Indies.

Tensions grew as the crowded ships drifted aimlessly during days of flat calm. It was already August 22, well into the dreaded hurricane season, when they entered Havana harbor. The New Spain fleet, which plied between Vera Cruz and Spain, had already gone.

Sailors aboard the *Atocha* cursed the oppressive heat as they shifted 500 bales of tobacco to load hundreds of copper slabs directly on the ballast. *Atocha* carried 15 tons of Cuban copper, bound for Málaga to be cast into bronze cannons for imperial defense. Finally the tobacco was reloaded, together with 300 bales of Honduran indigo. Silver master Jacove de Vreder also recorded more gold, silver, and silverware on the manifest. But now, clearly, the ships could not sail on August 28, as the marquis had hoped.

Fleet officials resolved to leave at the "conjunction of the moon"—during the lunar phase we call the new moon. Mariners then believed that weather conditions prevailing during the conjunction would hold for several days. (Science recently has shown some foundation for this belief.) Thus, if the weather were good about September 5, the day of the conjunction, it might remain fair long enough to see the fleet safely clear of the treacherous Florida coast. The Spaniards could not know, however, that at that very



COURTESY ARCHIVE OF THE INDIES, SEVILLE (TOP), AND GORDON P. GREER

Precious proof. Roman numerals on three silver bars—indicating purity and identification—tallied with bars listed on *Atocha*'s manifest, and the shipper's mark on the top bar matches the mark in the margin of the manifest (**top**). "The bars came from *Atocha*," pronounces the author.

moment a small but growing tropical storm was approaching Cuba from the northeast.

THE MORNING of Sunday, September 4, 1622, dawned, as the marquis noted, "with a serene and clear sky and an agreeable wind." As their sails filled, 28 ships paraded past Castillo del Morro and out to sea, with flags and pennants flying. Each vessel was Castile in miniature, a carrier of the culture, wealth, and power of Spain.

Atocha was a seagoing fortress, carrying 20 bronze cannons, 60 muskets, and ample powder and shot. The 82 soldiers aboard were commanded by Capt. Bartolomé de Nodal, a noted explorer. There were 18 gunners and 115 other crewmen and boys. From his cabin high over the galleon's ornate transom, fleet Vice Adm. Pedro Pasquier de Esparza presided as senior officer aboard.

The wealth of the Indies was crammed into *Atocha*'s holds and storerooms. Chests and boxes of silver and gold ingots and eight-real silver coins represented the returns from many commercial transactions. One shipment contained 133 silver bars, part of the Crown's fifth of the silver mined and smelted at Potosí by the forced labor of thousands of Indians. The cargo also included 20,000 pesos for the heirs of Christopher Columbus, sizable sums from papal indulgences, and Crown money from a head tax on black slaves sold at Cartagena. Together with copper, indigo, and tobacco, *Atocha* carried an immense treasure—901 silver bars, 161 gold bars or disks, and about 255,000 silver coins.

Crowded into small cabins in the ship's sterncastle were 48 passengers—a cross section of Castile and Indies society. The King's exalted Visitor to Peru, Father Pedro de la Madriz, shared a stateroom with three other Augustinian friars. Don Diego de Guzmán, the Corregidor of Cuzco, who ruled the lives of the Indians of his district, had come aboard at Portobelo with wealthy Peruvian merchants Lorenzo de Arriola and Miguel de Munibe. Martín de Salgado, Secretary of the Peruvian Court of Appeals, was aboard with his wife and three servants.

Although the *Santa Margarita* carried only half as much bullion as *Atocha*, she too was crowded with passengers, including the Governor of Spanish Venezuela, Don Francisco de la Hoz. Not mentioned by name on either ship's passenger list were the slaves and servants—"persons of no importance."

The chief pilot directed the fleet into the Straits of Florida, seeking the Gulf Stream's strongest current, near the Florida Keys. But now the outriding winds of the storm, grown into a hurricane, also entered the straits. By Monday morning, September 5, a northeast gale raised vicious seas and flying spray. The vessels dutifully followed the signals of the marquis's *Capitana* as he sought sea room.

Soon conditions worsened, however, and each ship became an isolated, struggling world. To those aboard, shrieking wind and towering seas became the only reality—that, and the hopelessness born of seasickness and the fear of death. As sails and rigging tore away, masts splintered, and rudders broke, the ships became shattered, driven hulks. What followed was described in a contemporary English account: "But as waves roule after waves, one mischiefe followes another: for presently the wind turned to the South . . . then they feared another misfortune, to be thrust or hurried into some creeke or bay of the coast of *Florida* . . . and then there was no hope but either splitting on the sands, or perishing on the shore."

Caught in the wind shift were eight unlucky vessels, including *Rosario*, *Atocha*, and *Santa Margarita*. These were rapidly pushed northward toward the dreaded keys.

GUTIERRE DE ESPINOSA, silver master of the *Santa Margarita*, stood on the heaving deck of his cabin and made personal preparations for disaster. He ordered his aide to sneak part of the cargo—several gold and silver bars, silverware, a silver alms dish, and a chocolate pot—into his own sea chest. Espinosa then had the chest tightly bound so that it would float. Others aboard took less material precautions. Kneeling around priests and friars, they began to pray.

After the descent of a howling darkness, *Santa Margarita* lost her foresail. The thrashing of her hull in the mountainous waves then broke her mainmast, tiller, and whipstaff. She drifted steadily northward.

Near dawn on Tuesday, September 6, the pilot reported shallow water; disaster was near. Several brave seamen struggled to raise another foresail and claw back out of danger, but it blew away. As the ship crossed

the Florida reef, she dropped her anchors, but they failed to hold. Suddenly she struck and grounded fast upon a shoal.

As it grew light, Capt. Bernardino de Lugo, commander of the ship's infantry force, clung to the bulwarks of *Santa Margarita*. Then, as the fleet commander recounted de Lugo's report, "At seven in the morning he saw, one league to the east of his galleon the one named Nuestra Señora de Atocha . . . dismasted except for her mizzenmast. While he watched, she went down and . . . nothing could be seen of the ship. . . ." Then his own ship began to break up. De Lugo grasped a spar and floated free. Amid shouts and screams, 67 others found bits of wreckage for support. In the words of the English account, ". . . the passengers when it was apparant they could not escape, saw as little mercy in the Sea, as they had endured in the Winde."

One hundred twenty-seven drowned.

The wind dropped as the day wore on; the sun emerged and beat down on a desolate scene: a heaving sea, a jumble of broken boxes and barrels, shattered planking.

By chance, that afternoon a vessel from Jamaica passed close by. The dazed survivors were taken aboard, where they met the five survivors of the *Atocha*—two ship's boys, Juan Muñoz and Francisco Nuñez; Andrés Lorenzo, a seaman; and two slaves. These told how *Atocha* had struck a reef and sunk quickly in deep water. The other 260—all the important people aboard—were gone.

A few days later Capt. Bartolomé Lopez of the small vessel *Santa Catalina* happened by the disaster site; he sighted *Atocha*'s hulk, with only the stub of her mizzenmast above water. His sailors spied a chest floating nearby, broke it open, and divided the silver and gold they found inside. It was the sea chest of Gutierre de Espinosa, the drowned silver master of the *Santa Margarita*.

In the Dry Tortugas, *Rosario*'s survivors stood on land near their stranded galleon's hull and wondered at their escape from death. Eastward, the shipwrecks were spread out for more than fifty miles: first a small Portuguese slave ship, then a fleet courier, then *Santa Margarita* and *Atocha*. Beyond, a small Cuban coast guarder had gone down; somewhere offshore two small merchantmen had sunk without trace.

Altogether, 550 persons had died and cargoes worth more than a million and a half ducats—in modern terms, perhaps 250 million dollars—had been lost. Spain had suffered a shattering disaster, one which she could scarcely endure in 1622.

DRAMA OF A DIFFERENT SORT—an epic search on a scale hitherto unknown—began for Mel Fisher on June 1, 1970, when he organized his new hunt for *Atocha* and *Santa Margarita*. Mel had to cover a huge front westward from the Marquesas for 25 miles and several miles wide from the outer reef to the great shoal.

In Key West there was a man uniquely fitted for such a search. This was Bob Holloway, a lean, tanned adventurer from Indiana, with a fine cruiser, *Holly's Folly*. Like Fisher, he was a dedicated treasure hunter.

Mel struck a deal with Holloway and obtained a state search contract far to the west, near Rebecca Shoal. The State of Florida supervises salvors, granting search and salvage contracts and maintaining field agents who help protect shipwreck sites and monitor their salvage, and who take charge of recovered materials. In return, the state retains 25 percent of the finds, to be kept as the patrimony of the people of Florida.

Mel set up a steel observation tower on the hull of a stranded freighter. From there, a man peered continuously through the cross hairs of a theodolite at *Holly's Folly*, monitoring her track. Aboard the search boat, Bob's sister, Marjorie Hargraves, and Kay Finley dropped a marker buoy whenever the wavering magnetometer needle showed a significant underwater iron contact. Then *Virgalona* would come to dig and send down its divers to check out the reading.

The crews made hundreds of contacts and a hatch work of penciled course lines crept over the chart, month after month. Holloway logged thousands of miles and wore out two engines. Mel moved the theodolite tower repeatedly as he completed one area after another. These waters are used as a practice bombing range; divers found rusted bombs and even a sunken World War II aircraft—but no Spanish shipwrecks.

In September 1970 a packet of transcribed documents came from Seville with a copy of de Lugo's eyewitness report of *Atocha*'s sinking, said to have taken place "east of the

There's glamour in finding treasure —and a lot of hard work in looking for it. Using a theodolite (**left**), salvors track a boat carrying a magnetometer, a device that indicates the presence of ferrous metals. False alarms are many, with or without the instrument: divers located muskets but also found fish traps and a World War II aircraft.

Exploring the area where metals have been located, the *Southwind*, a former Mississippi River tug (**above**), trails a plume of sand as she blows craters in the seafloor; clustered pits, right, yielded so many coins that divers dubbed the place the "Bank of Spain." Another method, for deep retrieval: a water jet and hydraulic dredge (**right**) that removes mud.

DAVID SCHERLEY (ABOVE) AND SON KANGAU

last key of Matecumbe." Mel immediately shifted his operations to the east of the Marquesas, where he searched during the rough fall and winter months. When I received microfilm of the original documents, I found an error had been made in deciphering the antique script: De Lugo had actually said the shipwrecks lay to the "veste," or *west* of the island. Now Mel moved back west, to an area ten miles from the Marquesas.

It was there on June 1, 1971, that *Holly's Folly* recorded a strong magnetometer contact. In that place, named the Quicksands, Mel and his men found the musket ball, silver coin, the galleon anchor, and three lengths of gold chain. Since they were found in 20 to 25 feet of water, the shipwreck was assumed to be that of the *Santa Margarita*, which had been lost in that depth. Soon afterward, around the anchor, *Virgalona*'s crew found many pieces of eight, several matchlock muskets, three swords, and a gold coin from the Seville mint.

As *Virgalona*'s propellers slowed at the completion of a "blow," divers Rick Vaughan and Scott Barron surveyed the walls of the crater. Suddenly the fresh brightness of gold shone in the coarse sand. One diver surfaced with a bar in his glove, shouting, "Gold! Gold!" His companion soon came up with yet another bar.

THE SLIM BARS, about six inches long, bore faint round markings but no inscribed numbers. Mel asked me, "Gene, which ship do you think they came from?"

His question set me thinking. We had just received microfilm of the ships' manifests, 2,000 pages written in a notary's difficult script. I studied them and found, near the end, the listing of gold items; each was described by weight and karat markings.

Our unnumbered gold bars appeared on neither manifest, however; we concluded that they were contraband. Up to a quarter of most galleon cargoes at that time were illegally smuggled goods. I had noticed, though, that bar silver was also listed, and described by its tally number, weight, and silver fineness. The idea came to me: We could identify a Spanish shipwreck from numbered items on its manifest.

That winter, 1971-72, brought severe windy weather and hard financial times for Mel Fisher. He had brought his *Golden Doubloon*, the galleon replica he had made into a floating treasure museum, to Key West. To finance his operation, Mel sought investors to buy company stock or furnish capital in return for a percentage of treasure. At times the company depended on museum gate receipts to cover day-to-day expenses.

As the spring of 1972 brought a new diving season, enthusiasm rose again. But aside from some coins, muskets, and other artifacts, little was found. Clearly the wreck was scattered, and it lay blanketed by sand—as much as 20 feet deep. Mel Fisher put his mind to the puzzle. Unless he could solve it, all his efforts would have been for little.

AFTER THE 1622 DISASTER the Spaniards, too, had a large area to search and a great deal of sand to move. After learning from Captains de Lugo and López of *Atocha*'s location, they found the stranded *Rosario* in the Tortugas and rescued her survivors. The Marquis of Cadereita sent Capt. Gaspar de Vargas from Havana to salvage the wrecks.

He first came to *Atocha* and found her intact in 55 feet of water. Since the submerged hatches were still tightly secured, Vargas could remove only two cannons before passing along to salvage *Rosario*. Meanwhile, another hurricane ravaged the area. When the salvor returned to the *Atocha* site, he found that the storm had broken up her hull and scattered the wreckage.

The Viceroy of New Spain sent Vargas a skilled engineer, Nicholas de Cardona, with slave divers from Acapulco, while Indian pearl divers came from the Caribbean. The marquis himself came to Florida to supervise; the island where the camp was built for him was named "*el cayo del Marquez.*"

Several months of difficult work followed. Vargas noted: "... every day we leave this key with the two boats ... at four in the morning and it took us until seven to arrive. ... We work until two o'clock and it takes us all the rest of the time to get to land at night."

The Spaniards found a few remnants of *Atocha* in the deeper water, but nothing more. No matter how expert, the divers could work only briefly before surfacing, and Vargas had no way to move quantities of drifted sand. By 1623 these two factors had defeated

him. The Spaniards had spent more than one hundred thousand pesos without finding either *Atocha* or *Santa Margarita*.

Trouble continued to plague the Spanish efforts. In 1625 Francisco de la Luz and his whole crew were lost on a mission to maintain buoys over the general site of the shipwrecks. But now a man appeared who would partly redeem the failure of Gaspar de Vargas: one Francisco Nuñez Melián, who had served as the King's treasurer for indulgence offerings in Cuba. Like Mel Fisher, Melián was inventive and persistent—and a gambler.

Melián made a contract with King Philip IV for the salvage: he and the Crown would each get a third of the recoveries, and the salvor's expenses would be repaid from the remaining third. His elaborate accounting of these expenses—faded and worm-eaten after three and a half centuries—gave us the first clue to the shipwrecks' true location.

Melián had invented a secret weapon for the salvage. With it, he said, "A man might observe the most hidden things . . . this is something never before seen . . . in addition to my being the first inventor of so new and admirable a device, it cost an infinite sum to bring it to perfection and so happily realize the results of this philosophy. . . ."

The device was a 680-pound bronze bell, fitted with a seat and windows, that Melián had cast in Havana. It was designed as both a search vehicle and a diver's station.

Melián sailed to the keys in May 1626 and set to work, slowly dragging the bell through the water while the man within scanned the sandy bottom. It was on June 6 that slave diver Juan Bañon surfaced with a bar of silver from the *Santa Margarita* and won his liberty. The Spaniards then quickly recovered 350 silver bars and thousands of coins, several bronze cannons and many copper ingots.

For more than four years thereafter, Melián sent expeditions to the keys in all kinds of weather. His men fought off three assaults by Dutch raiders; he pacified the fierce Florida Keys Indians with bribes of knives and syrup after they had burned his salvage camp on the Marquesas.

Melián was rewarded for his work with the governorship of Venezuela. A deputy continued to salvage *Santa Margarita* and to search for the *Atocha*. After Melián's death in 1644, the effort tailed off. A Spanish report of 1688 notes that, as of that date, *Nuestra Señora de Atocha* remained among the missing. Her great treasure still lay near or upon the wide shoal west of the Marquesas Keys.

AFTER WRESTLING with the problem that had defeated Gaspar de Vargas and thwarted Francisco Melián, Mel Fisher came up with a solution: He would build bigger and better mailboxes. He therefore acquired two powerful Mississippi River tugboats with enormous propellers; he put his eldest son, Dirk, in charge of the one named *Northwind*, and appointed son Kim to be captain of the other, called *Southwind*.

When the fine diving weather came in May 1973, *Southwind* and *Virgalona* were working on the site. The divers began to follow an artifact trail southeastward from the galleon anchor and recovered more silver coins, encrusted muskets, swords, and iron cannonballs. They also found stone cannonballs and masses of indigo dyestuff. For weeks a crewman sported a T-shirt he had dyed a fashionable vivid blue with 17th-century indigo.

Though it was hurricane season, the fleet had to sail. Near the Marquesas Keys, one day out of Havana, a storm struck, scattering the neatly organized fleet of 28 ships, and sending *Margarita* and *Atocha* to the bottom within sight of each other.

Built to fight, the 600-ton *Atocha* carried 20 bronze cannons to stave off Dutch raiders. A group of nine such guns recovered by the treasure hunters constitutes one of the most important finds in modern salvage history —most wrecks yield bronze cannons in twos or threes, if at all.

Several of the guns, lying exposed on bedrock, had been worn smooth of identifying marks (**below**). The others, located some 30 feet away in mud, bear foundry numbers that appear on *Atocha*'s arms list. Cannon with quintal-and-pound weight inscription 24Q99L (**far left**), cast in 1616, carries the escutcheon of King Philip III (1598-1621), along with the collar of the Order of the Golden Fleece.

Ammunition for the cannons, split-bar shot (**near left**) could whipsaw through shrouds, rigging, sails, and any man who happened to be in its way. Knobby blob of grapeshot, now encrusted by coral (**lower left**), once may have had a canvas casing fitted with a detonating fuse.

NATIONAL GEOGRAPHIC PHOTOGRAPHERS OTIS IMBODEN (LOWER LEFT) AND GORDON W. GAHAN (NEAR LEFT); AND DON RINCARD

In the last week of May 1973, the trickle of coins coming up from the sands suddenly became a flood. As diver John Brandon recalls: "We found 30 coins one day. The next, 250. On our next workday, Sunday, May 20, we got 1,500." Soon thousands more were found, in a treasure pocket that the divers promptly dubbed the "Bank of Spain."

Soon afterward I sat on the galleon museum deck with Bleth McHaley, Treasure Salvors' public-relations adviser and general factotum, and State Conservator Curtiss Peterson, as we sorted and bagged silver coins. Our wonder grew as we examined the shields and dates—here was a potpourri of 17th-century trade: pieces of four and eight coined at the mints of Potosi, Mexico City, and Lima, during the reigns of three Spanish kings. We straightened in surprise at one coin: It just couldn't be! The rounded eight-real piece bore the initials "N R," meaning Nuevo Reino de Granada, today's Colombia. No coins from that epoch were known from that mint; this one was priceless (page 807).

I sat fascinated by the coins. They were redolent of life and death—the drowning of hopes, fortunes, and lives in the shipwreck, and the decay of empire; yet they spoke also of a once-bustling commerce, living again in lumps of sea-stained silver.

One day Dirk Fisher bobbed up beside *Southwind* holding a circular object (right). It was the pilot's astrolabe, preserved by the deep sand! Later research indicated it may have been made in Lisbon by one Lopo Homem about 1560. It is possibly the most valuable artifact recovered to date.

The next day, between the anchor and the Bank of Spain, Fisher's men found two more gold bars and a 4½-pound gold disk. Molinar, Brandon, "Bouncy John" Lewis, and Steve and Spencer Wickens worked long hours; who knew what might come up next?

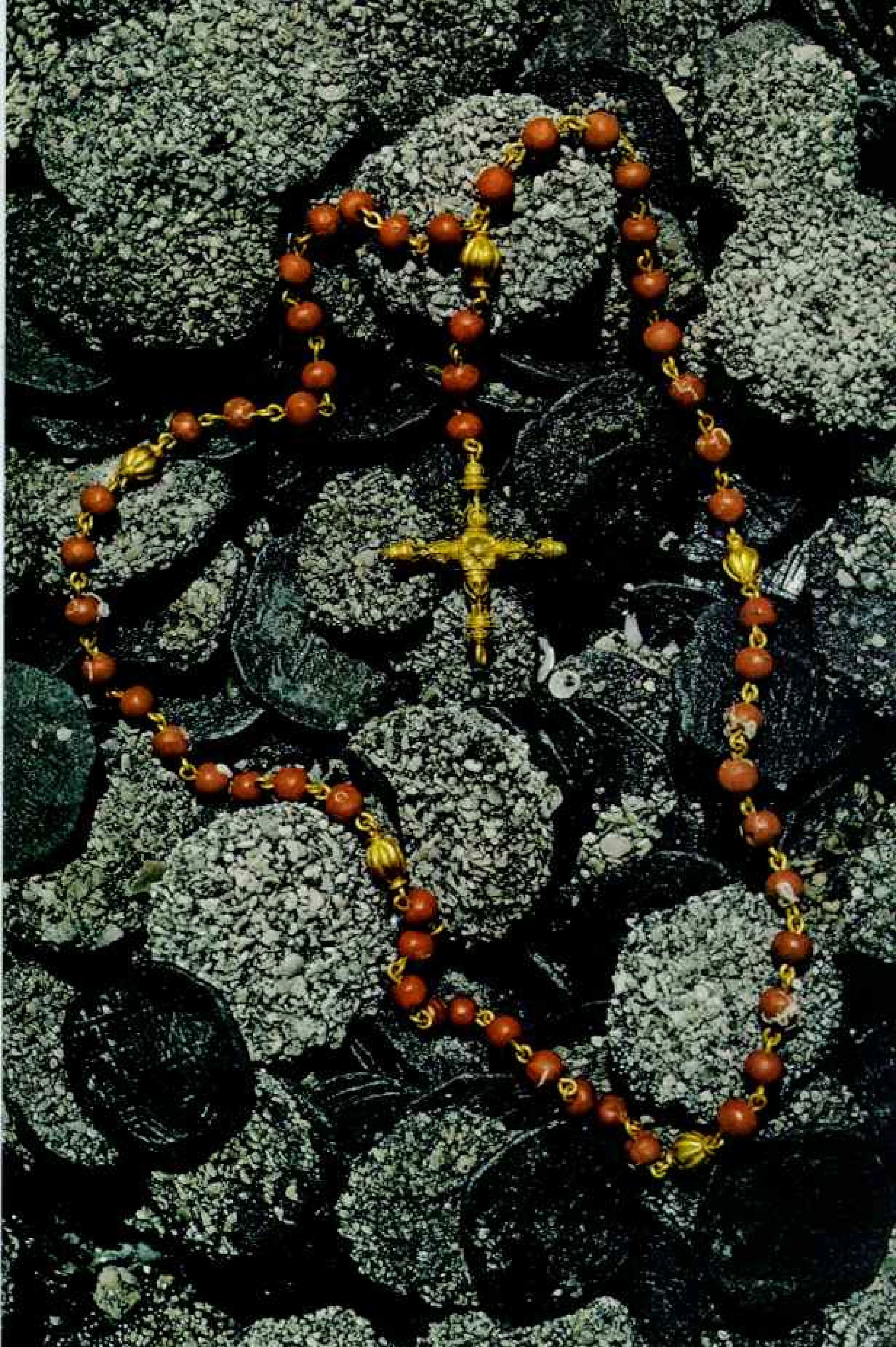
BATES LITTLEHALES (ABOVE) AND DAVID DOUBILET

THE FOURTH OF JULY was no holiday aboard *Southwind*. Despite choppy seas, the divers worked around the edges of the Bank of Spain and brought up a small rosary, exquisitely fashioned of gold and coral (page 806). Bleth McHaley fingered it gently. "I wonder who was clutching these beads when the ship went down?" she said.

Late in the morning, Kane Fisher, Mel's third son, and another diver spied a dark shape on bedrock in a "blow" crater. "It looked," said Kane, "like a loaf of bread." When finally hauled over *Southwind*'s rail, it turned out to be a silver ingot. Eager divers quickly sighted and brought up two more.

Clues to *Atocha*'s demise, bronze dividers and an astrolabe turned up in the same area, indicating where the vessel's sterncastle may have broken up. The dividers (**above**), used to measure point-to-point distances on charts, are essentially the same as navigators use today.

A forerunner of the sextant, the astrolabe was employed to measure the altitude of the sun or stars above the horizon by sighting through pinholes on the raised portions of the alidade, or pointer bar. Reference to tables of declination would have given *Atocha*'s pilot, Martin Jiménez, a rough determination of her latitude. Five dots at the instrument's base may be the maker's mark of Lopo Homem, a Portuguese cartographer.



The treasure hunt had taken a momentous turn. State field agent Bill Spencer, Don Kincaid, and I wiped away dark silver sulfide coating the bars. Initials and Roman numerals appeared. The bars bore tally numbers 569, 794, and 4,584. Each also carried the figures for 2,380, a measure of silver fineness; 2,400 represents total purity.

Here, at last, was the opportunity to test my shipwreck identification theory.

I spent the next four days poring over the microfilm. First I covered the entire *Santa Margarita* manifest, without result. On Monday, July 9, I found bar number 4,584 in the Cartagena lading of *Nuestra Señora de Atocha*. The bar had been shipped in payment of the Crown license fee on black slaves sold in Cartagena. Its weight was given as 125 marks, 3 ounces—a little more than 63½ pounds—with a silver fineness of 2,380.

When *Southwind* triumphantly entered Key West harbor with her treasure cargo, we had a freight scale waiting, preset to 63.6 pounds. When bar 4,584 was set upon the scale, the arm wavered, then settled squarely in the middle. A whoop of joy went up. Mel Fisher had found his ship! Later the two other bars, 569 and 794, also proved to be matches. The long search, it seemed, had been rewarded.

But, as Dr. Livesey said to Long John Silver in *Treasure Island*, speaking of treasure: "Look out for squalls when you find it."

TROUBLE, arising from his financial base, the criticisms and actions of rivals, and the dangers inherent in treasure hunting, was mounting for Mel Fisher. One August day while the *Southwind* was digging, an 11-year-old visitor entered the water forward of the stern. Before anyone could reach him, the youth was mortally injured by a propeller. Although flown by helicopter to Key West, he died as he reached the hospital.

Next, a complaint was filed against Treasure Salvors with the Securities and Exchange Commission, and auditors began to examine the company records. Until the investigation was completed, Mel Fisher could not sell stock or shares of treasure, his principal source of funds. The state, moreover, had not yet divided with Treasure Salvors any of the materials salvaged since 1971. Fuel bills, payrolls, and other expenses mounted.

DAVID LITSCHGI (FACING PAGE) AND GORDON W. SAWYER

Rendered to God, a silver artifact (probably a candlestick) displays the cross (**above**). Coin (**top**), minted in 1621 at Spain's Nuevo Reino de Granada mint in today's Colombia, shows the shield and name of Philip IV. Gold-linked rosary rests upon silver pieces of four and eight, fused with sulfide and bits of shell (**facing page**).

It was evident, however, that the *Atocha* had already yielded substantial riches. By the time the finds were divided 15 months later, the collection in state vaults at Tallahassee included 6,240 silver coins from four Spanish colonial mints, 11 gold coins minted in Seville, 10 gold chains and 2 rings, the 2 gold bars and disk, the astrolabe and 3 navigator's dividers (page 804), 3 pewter plates and 3 silver spoons, a rare silver ewer and an emerald-set golden cup (page 792) brought up by Kim Fisher, and part of a copper ingot found by his brother Dirk.

Weaponry accounted for much of the treasure hoard—34 matchlock muskets and harquebuses with the lead shot they used, pieces of some 44 swords and 15 daggers, 6 stone cannonballs, and 120 cast-iron shot.

Duncan Mathewson, a professional archeologist now serving as a consultant for the company, began to map the site literally from the ocean bottom up, to fix the location and level of each artifact cluster found. This work yielded Mathewson new knowledge of how the ship had broken up in relatively shallow water. From this he evolved a hypothesis of how *Atocha* had scattered and where its main ballast mound should lie.

THE TIDE SEEMED FINALLY to turn for Mel Fisher in 1974. First, Dr. Alberto Pradeau, an expert on Spanish colonial coins, was retained to report to the State of Florida on the *Atocha* coins. He confirmed their numismatic value, and that they supported the 1622 dating of the shipwreck.

Next, the long Securities and Exchange investigation came to an end. Treasure Salvors signed an agreement with the commission to strictly abide by SEC regulations.

It then became apparent that the U. S. Supreme Court would shortly rule on the Florida boundaries. In its 1968 constitution, Florida claimed boundaries beyond the historic three-mile limit; the *Atocha* lies in a complex boundary area in the lower keys. The state and Treasure Salvors nonetheless agreed to divide the 1622 materials.

In Tallahassee on March 3, 1975, Secretary of State Bruce Smathers and History and

GORDON W. GAHAN

Finders keepers? Mel Fisher, third from right, and his wife, Dolores, left, watch as part of the treasure is divided with officials from the State of Florida in March 1975. Later the courts denied both state and federal claims to portions of the bounty, but the possibility of an appeal by the U. S. Government loomed to further cloud the Fishers' golden dreams. The search for *Atocha* has already claimed four victims, including their son Dirk, lower left, and their daughter-in-law Angel, center.

Archives Director Robert Williams presided over distribution of the *Atocha*'s treasures. In its quarter share, the state chose the astrolabe and a judicious sampling of coins and artifacts. The company contracted with Austin Fowles, a skilled conservator, to begin cleaning the rest for its investors.

Shortly after the division, the Supreme Court decreed new Florida boundaries, and it was clear that the *Atocha* site lay outside them. This led to new complexities: Federal authorities intervened to claim jurisdiction when Treasure Salvors filed suit in admiralty court for ownership of the shipwreck.

THE 1975 DIVING SEASON marked the sixth year in the Marquesas for Mel Fisher and his crews. Divers brought up more pieces of eight, three more gold bars, and a pilot's golden whistle (page 793). Then Dirk Fisher, persuaded by Mathewson's theory that *Atocha*'s mother lode lay in deeper water, took *Northwind* beyond the Quicksands.

On July 13 he was swimming alone underwater some distance from the boat, scanning the rocky ocean floor. Suddenly he blinked at an unbelievable sight—a cluster of greenish loglike objects lying exposed on the bottom: five bronze cannons!

He shot to the surface with a joyful yell. "At first we thought he was being attacked by a shark," his wife, Angel, said later. "Then we heard the word 'cannon,' and we all yelled ourselves hoarse."

Later four more bronze guns were found 30 feet from the first group. For three days all other work slowed while Mathewson and Don Kincaid mapped and photographed the cannons. Then *Northwind* brought up two of them and took them back to Key West.

One of the guns no longer bore any recognizable marks. The other displayed the date 1607, the Spanish royal shield, and the symbols 31Q10L—31 quintals and 10 pounds, or 3,110 pounds. That number, and those on all of the other marked cannons, were on *Atocha*'s gun list. This clinched the identification.

In that moment Mel and Dolores Fisher, their children, and all their crew were supremely happy. But the most grievous loss was yet to come.

The next Saturday, July 19, the young Fishers took *Northwind* back out to the Marquesas on their way to the wreck site. They anchored for the night southwest of the atoll. Early Sunday morning, before dawn, the *Northwind* quietly began to take on water, listed, and suddenly capsized.

Eight persons, including Kane Fisher and Don Kincaid, were thrown into the sea, but three—Dirk and Angel Fisher and crewman Rick Gage—were trapped belowdecks and drowned. *Virgalona* rescued the survivors.

Even this blow failed to daunt Mel Fisher. While he grieved for the dead, Mel sent out a crew to mount guard over the bronze cannons his son had found. "It's something Dirk would want us to do," he explained. Then he readied a larger craft, a 180-foot former buoy tender able to stay on the site in fair weather and foul. In early March 1976, excitement rose with the finding of two more silver bars: Perhaps at last Mel and his crews were closing in on the long-lost mother lode of *Nuestra Señora de Atocha*.

Mel Fisher's search has cost him dear. If the value of the things he has found is estimated to be six million dollars, and he has spent a third of that in the seeking, what will the remaining treasure be worth? Clearly this can only be determined when the items are all recovered and sold, but their value will be immense. If they are ever found.

Even then, the salvors cannot be certain how much of what they find will be theirs; though a federal admiralty court ruled on February 3, 1976, that the U. S. Government has no legitimate claim to the treasure, that decision may be appealed.

IN WHAT, THEN, lies the lasting significance of Mel Fisher's quest for the 1622 galleons? Whatever the final outcome, his efforts have helped to forge better tools for man's reach into the seas: improved search, salvage, and shipwreck identification techniques, and advances in shipwreck archeology. And we have gained added insight into Spanish colonial trade.

In the enterprise of the *Atocha*, moreover, Mel Fisher and his associates have been uniquely privileged. By means of the documents that have told us of the ships, and through holding in our hands the precious things brought up from the Marquesas sands, we have seen into the distant past, a climax time of Spain's grandeur. A whole vanished world has lived again. □

ROBERT W. MADDEN (BELOW) AND W. E. GARRETT

Grief and shock mark the face of a highland farmer (**above**). Survivors pick through the rubble that was El Progreso (**right**).

Earthquake in Guatemala

Half a minute seemed an eternity last February as the earth shook, triggering one of the worst disasters ever to hit the Western Hemisphere.

By BART McDOWELL

Photographs by W. E. GARRETT and ROBERT W. MADDEN

ALL NATIONAL GEOGRAPHIC STAFF

ALL THE WARNINGS about Guatemala had been deadly. But the wise men differed in details.

Some highland elders, for example, still believed in an old Maya legend: The world was a cube of earth supported at its corners on the shoulders of four gods, the Vashakmen. Whenever a growing population increased the worldly weight, the Vashakmen would grow tired and shift their burden, ridding the world of people.

In a Maya scripture, the *Popul Vuh*, a villainous deity called Cabracán warned: "I am he who moves the earth [and] will demolish all the world."

Just as gloomy were modern seismologists; their geological maps of Guatemala show a multitude of stripes—prophetic black fault lines running east and west. To these scientists the world is not a god-borne cube but a sphere of hot magma with a crust of floating slabs called tectonic plates. One, the Caribbean plate, forms the ocean floor of the West Indies. It touches and grates against the American plate along the middle of Guatemala (map, page 814).

And also, things had been too quiet. Late in 1975 Don Claudio Urrutia E., director of the Guatemala National Observatory, had complained to his associates about the infrequency of local tremors. "We averaged 500 a year in the 1950's, but since 1960 only about 250 to 300 tremors a year," he said. "Tension is building up."

Artist's Painting Foretells Quake

Perhaps there had been other portents and perceptions. In the Sombol Gallery in the capital, Guatemala City, Doña Ruth Bunge displayed an oil painted by a well-known primitive artist, an Indian named Rafael González G. (page 719). "He had always done realistic village scenes, but this time, strangely, he had pictured an earthquake," said Doña Ruth. "Houses knocked down, people dead and injured, others fleeing. González told me it was all imagination. The wife of the Belgian Ambassador, the Countess de la Barre d'Erquelinnes, saw the painting—and impulsively bought it. That was my last sale on February 3."

But because none of the wise men could

precisely measure the weariness of the gods, or the gnashing tensions of tectonic plates, no one predicted the greatest natural disaster ever recorded in Central America.

It struck at 3:02 a.m. on February 4, when the earth began to rupture some 17 miles south of Lake Izabal: the epicenter of an earthquake ninety times stronger than the one that leveled Managua, Nicaragua, in 1972. Along the valley of the River Motagua, a fault—more than 40 million years old, 150 miles long, and three miles deep—ripped Guatemala in two. Recording 7.5 on the Richter scale, the 30-second shock was felt from Mexico to Costa Rica; the major shock area covered 3,530 square miles. During the next few weeks some 23,000 people were counted dead, perhaps 77,000 others injured, and more than a million homeless.

On the Caribbean shore at Puerto Barrios, a shudder severed the pier; two night watchmen guarding the seaside warehouse were killed, the only fatalities there.

At the ancient Maya site of Tikal one sleepy tourist thought his roommate was stomping around. "I didn't know it was an earthquake until I heard the monkeys and parrots in the jungle. They raised a terrible racket."

On the south side of Lake Atitlán, some people slept peacefully through the night. And on a farm south of Guatemala City, one planter woke up to the sound of his swimming pool "splashing all by itself."

Visible Rift Cleaves the Nation

But between Atitlán and the Caribbean, Guatemala had been grievously wounded. This strike-slip fault, as geologists call it, cut fast and almost clean, east to west, a visible rift, the north side jolting crazily westward. The lightning bolt of a scar cut across railroad tracks, highways, and walls, leaving human construction askew by a measurable five feet.

No one measured that night.

In San Pedro Sacatepéquez, an Indian entrepreneur named Cleto Monroy felt the earth's convulsion and, in the dark, seized two of his children. Somehow he got them out the door before the adobe walls collapsed. "I thought it was only my own house that had fallen," *(Continued on page 818)*

ROBERT W. MADDEN (FACING PAGE) AND W. E. GARRETT

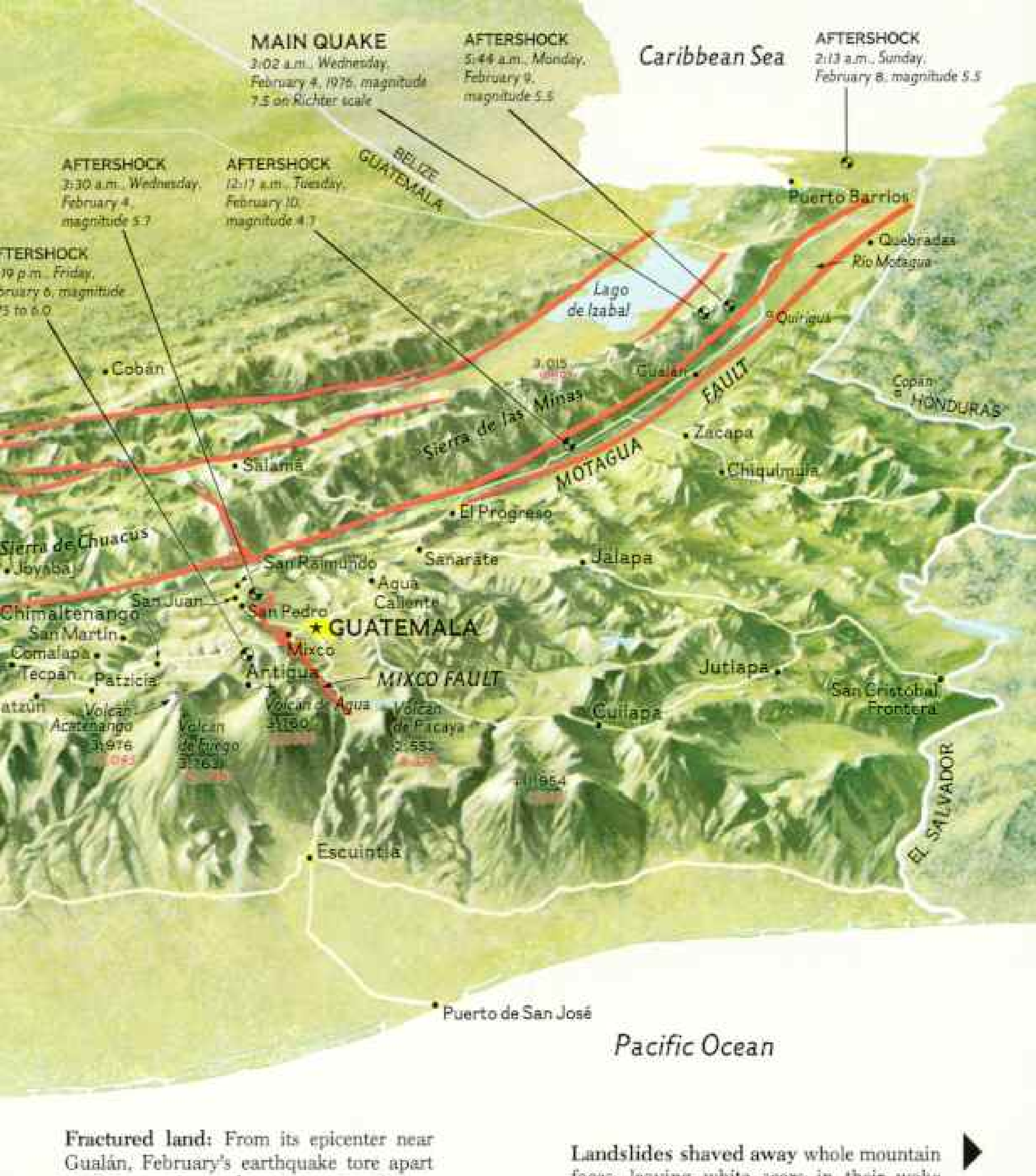
Their lives uprooted, survivors bundle against the chill night on a Guatemala City street (**left**); a candlelight prayer comforts two children (**right**). Of the thousands who took refuge outdoors, many were homeless, others afraid to return to weakened houses.

The February 4 quake jolted Guatemalans from their beds at 3:02 a.m. Thousands died inside collapsing houses. A second major shock occurred two days later.

The estimated toll: 23,000 persons dead; 77,000 injured; more than a million homeless—one of every five in the Central American republic.

AMERICAN PLATE
GUATEMALA
CARIBBEAN PLATE
COCOS PLATE
PACIFIC PLATE
NAZCA PLATE
NORTH
AMERICA
MEXICO
AFTERSHOCK
8:54 p.m., Saturday, March 6, magnitude 4.7
AFTERSHOCK
9:15 p.m., Saturday, March 6, magnitude 5
MEXICO
GUATEMALA
Tikal
Lago Petén Itzá
Flores
Altos Cuchumatanes
Santa Cruz del Quiché
Chichicastenango
Volcan Tacana
13,093
4,050
Volcan Tajumulco
13,220
4,030
Quezaltenango
Sololá
Lago de Atitlan
Retalhuleu
Mazatenango
Champerico
Epicenter plotted from March 1976 data.
Elevations in meters, black, and feet, red.

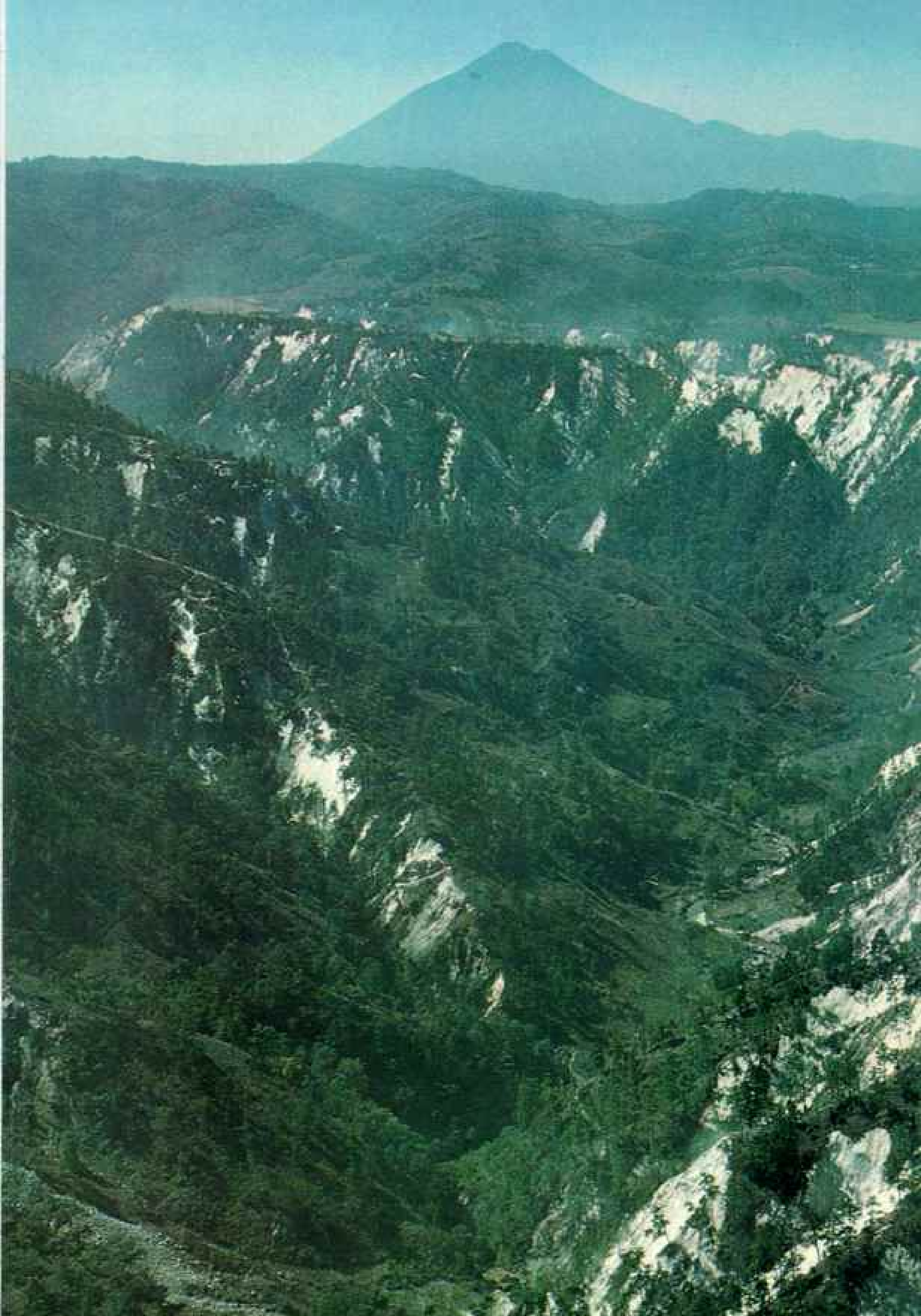
ROBERT H. MADDEN (BELOW) AND ARTWORK BY NATIONAL GEOGRAPHIC STAFF ARTIST WILLIAM H. BOND



Fractured land: From its epicenter near Gualán, February's earthquake tore apart the Motagua Fault (**above**), battering Guatemala's populous central highlands. The country straddles the restless boundary between the American and Caribbean plates —part of earth's grinding crust (**globe, left**). A five-foot lurch of the northern plate unleashed the recent damage. A serious economic jolt came with the collapse of the Agua Caliente bridge (**left**) on the supply route to the Atlantic.

Landslides shaved away whole mountain faces, leaving white scars in their wake and stirring thick clouds of dust in a valley near Chimaltenango (**following pages**). Throughout this hard-hit region, slides buried roads and cut off mountain villages to every conveyance except helicopters. Nationwide, more than 300 villages suffered extensive damage. As the government urged sounder home construction, survivors scoured the rubble for old adobe bricks in the rush to rebuild before the rainy season in May.

ROBERT W. MADDEN



(Continued from page 813) he said later. "When I turned on the lights of my car, I saw that the whole of San Pedro had fallen."

At the capital city's 17th-century church of Cerrito del Carmen, Father Constantino Gastino heard "a sound like an explosion—perhaps an entrance of thieves." Another man compared the sound to that of a train. Photographer Diego Molina found the quake "more like a storm at sea—or hooking a shark."

In the western part of the capital, off Avenida Elena, a bakery fell and smashed adjoining houses, killing seven people. Luis Arturo Rodas Ortiz awoke for only an instant to the noise of crashing furniture and human screams; then the collapsing roof caught him and he was unconscious again.

Window Ledge Is a Lonely Spot

Student Estuardo Nanne climbed out his bedroom window and held fast to the sill as the wall of his neighbor's house crashed down. "At such a moment," he said, "you feel . . . *lonely*."

To combat the risk of fire, electric power in the capital city is automatically disconnected during severe quakes. But darkness proved no handicap for a seller of lottery tickets, Edgar René Quiñones, and his wife: Both are blind. "We had been taught how to take care of ourselves," said Señor Quiñones. "My wife and I leave our clothes close by in a chair, and we had taught our children the same. Darkness was no obstacle."

Don Claudio Urrutia of the Guatemala National Observatory had a scientist's instant list of priorities. He was awakened by his wife. "She is my first seismograph. We had just felt P, but not yet S [for primary and secondary shock waves]. I bent over to get my shoes—and toppled onto the floor with the shock of S. Everything was dark and moving, so I felt the wall to reach the door. There I found that my wife had also fallen, so I picked her up, got her out, and said, 'Don't move.' I went back inside to get a flashlight. And then my pistol. And then my wallet, for if your house falls, you need money. And after that I went to the observatory. You know, other people run outside when an earthquake starts; scientists run *inside*. To get their instruments working again."

Don Claudio's professional priorities were matched by those of Father Constantino Gastino: "I put on my pants and then asked God for His help." In such a spirit Guatemalans began life again. One Indian remarked, "You go to sleep and awake and the world has changed."

In El Progreso, 18-year-old Alfonso Amaya Montes had heard his sister call to him in the first moments of the quake, but now he lay buried alive beneath the rubble of tiles and adobe—all that was left of the family's house. "I could hear cries," he said. "I thought of my father and mother and wondered whether they would be saved. There was dust, dust. But I had just enough air to call. Within an hour a man with white hair managed to dig me out.

"My parents were dead. And the sister who had called me. I lost eleven relatives, and they were all buried without coffins, wrapped only in sheets. We could not have funerals. There were too many dead."

In El Progreso, survivors could not even summon help: All telephone lines were ruptured, and the highway had been blocked by a hundred landslides. At dawn a messenger set out on foot for Zacapa, 37 miles away.

In the capital doctors and nurses moved hospital patients outside onto sidewalks.

"I've never seen so many fractured spines and pelvises," a surgeon reported. "Everyone was in bed when the houses fell."

"I sutured 36 spleens in 24 hours," another surgeon observed.

"We had no beds for the children the first day," a nurse told me. "They had to lie in the street. I worked just on my knees. We had only one blanket apiece for them that first cold night. Some Indian children were brought in from the highlands. They spoke only Cakchiquel, so we couldn't find out their names or home villages."

Faithful Companion Guards His Master

My friend Diego Molina was working feverishly with his camera when he found a man's body in the street. "A dog was guarding the body," said Diego. "When men took the body away, the dog whimpered."

At first no one knew the extent of the national tragedy. Unbidden and spontaneously, members of the Guatemala Air Club and the civil air patrol converged on the airport with their private planes, volunteering to fly and land in spots where the larger Guatemala

Air Force rescue planes were unable to work.

"Our first problem was gasoline," said pilot René Morel. "The gas pumps worked electrically—and the power was still off. But we got three planes up to assess the damage. The first pilot came back, swearing, and said, 'All is finished.' The next man came back and said, 'He was wrong—it's even worse.' "

Obscuring observation were clouds of dust from fallen towns and from the chalky hills that had sloughed away. Tremors and aftershocks continued—1,000 to 1,500, many of them perceptible to the nervous survivors. But gradually pilots were able to piece together the pattern of desolation. There was San Martín Jilotepeque, famous for its brocaded blouses—blocked by landslides, not reachable by road, and almost leveled to the ground (pages 822-23). The people were "dead or bleeding, with only dirt to eat," as one Indian put it. San Martín was typical of other devastated villages in the fault zone: El Progreso, Tecpán, Joyabaj, Patzún, Patzicía.

John C. Bellamy flew the first mission into Patzicía two days after the quake. "I was worried about the people, and whether they might fight over food. Some of the people in the area speak no Spanish. But I landed on a stretch of highway, and the Indians calmly helped me unload the food and medicines. An old man seemed to be in charge, and he asked, 'Are you returning?' I told him yes. 'Then we'll wait to divide the food until you bring more,' he said. 'After two days without

LEE ROMERO, EL SOL DE MEXICO

Overcome with relief, a woman sobs after viewing quake victims in Guatemala City; her missing husband was not among them. Most deaths came as adobe buildings caved in, raining beams and debris on residents. To avert the spread of disease, people resorted to mass burials and cremations, sometimes of unidentified bodies.

food, another half day will not be so hard.'"

"The landings weren't easy," another pilot admitted. "I took out the backseats so the injured people could lie down. When the hospitals filled up, we set up our own ward at the airfield with 37 patients in our hangar."

"There was a lot of heroism," notes William Salas, of CARE. "But the real heroes were those volunteer pilots."

Salas' own CARE professionals must rank along with the pilots. They fed a quarter million people a day with food provided by the U. S. Government. CARE also gave shelter for the homeless and got damaged water systems working again. While aftershocks still rumbled, CARE began bringing in tools for clearing away the rubble.

The Guatemala City airport thundered with traffic as help arrived from abroad—especially from veterans of similar disasters in Central America. Dozens of nations and voluntary agencies sent help.

There was confusion, of course. In the interval just before my own arrival, a severe aftershock—nearly 6 on the Richter scale—had brought the evacuation of the airport building. I met customs, immigration, and health officials in tents on the edge of the runway. In the crowd of arriving passengers, one excited man was objecting to formalities. "Let me go through," he begged. "I must learn whether my children are alive!"

Hundreds were not. Cemeteries were as full as hospital beds. "Each day we find another 2,000 corpses," one official told me.

Driving through the severely damaged neighborhoods, I found sidewalks turned into tent towns; blankets and sheeting provided meager shelter. Women cooked over campfires, using splintered lumber from the rubble as their fuel.

Stricken Family Happy to Be Alive

On Avenida Elena I talked with homeless people like the José Antonio Salazar family—a young bookkeeper, his wife, and three boys, ages 10, 8, and 5. "We have the clothes we are wearing," said the young father, "and those things we dug from the wreckage." He pointed to a mattress and a few pans. "Yet we have our lives. My family is unhurt!"

But not the family of Señor Rodas. "I awoke in the hospital, where they had splinted my leg," Luis Rodas told me. "Broken in two places. They had to discharge me at once, though my chest is still painful. Too many injured." He lay beneath a quilt in a small tent sheltering seven families; his wife tended him.

W. E. GARRETT (ABOVE) AND ROBERT W. MADDEN

Buffeted by crosswinds, a rescue plane crashes into a truck (**right**), while trying to land on a mountain highway near Sanarate. Miraculously no one suffered serious injury. Guatemala's President Kjell Laugerud García (**above**) promises relief to distraught victims in El Progreso. Early government efforts focused on clearing roads and rescuing the injured. Some 135 privately owned aircraft helped move supplies.

"No, we have no medication," said Señora de Rodas. "Not even aspirin. Our neighbors share their food with us. And trucks bring us drinking water during the day. Our family?" Señora de Rodas, a handsome woman, faltered. Fine, dark eyes filled. "Our daughter, Rosa—a girl only 14—she was killed. Rosa was sleeping beside me in the room. Our only daughter." The mother wept, and the father turned toward her, wincing as he moved his painful bandaged chest. He managed to grasp her hand.

Rifle-bearing soldiers stood sentry duty among the ruins. "Neighborhoods have also organized committees for patrol," a Guatemalan Air Force officer told me. "The police and army are spread too thin. Last night where I live, two *maleantes* were shot. Gunfire kept me awake." Maleantes—crooks and outlaws—had begun to loot the rubble, as people seem to do in every catastrophe. I woke often to the sound of rifle fire and the stutter of automatic weapons. And as excavators recovered bodies, they reportedly found persons dead from gunfire.

The radio warned people to beware of false medical men. "They give injections of morphine," said the announcer, "and take your wallet when you sleep."

But for the few acts of malice, we found countless examples of neighborliness and generosity. With National Geographic colleagues Bill Garrett and Bob Madden, I hitchhiked on food trucks and on mercy planes, landing on blocked-off highways.

"Have you had lunch?" a woman asked us in the rubble of Sanarate. She escorted us past her fallen house to the communal campsite behind it; 40 people had found refuge there, along with chickens, dogs, and cats. "You like tortillas? Perhaps an avocado?" Three women were patting *masa*, ground corn, into flat tortillas—an affirmative sound like applause for life and food.

Town Tilted by Earthquake's Force

To reach El Progreso, we hitched rides on four different trucks and bypassed the closed main highway by driving for hours through the shallow water of a riverbed. El Progreso had straddled the fault line. I could see only three buildings reasonably intact (page 811). The rest of the town lay in ruins or stood strangely: walls cracked and crazed, pillars tilting, roofs slumping in a posture of lunacy —a violation of all man's sense of balance.

As we entered the town, one man was screaming in the ruins. "He has just found the

bodies of both his parents," a volunteer explained. The man was still screaming when neighbors took him away.

We spent the night there in a Salvadoran Red Cross tent. Nearby the Panamanians had brought in a hospital. Like everyone in El Progreso, we had a troubled sleep: One aftershock that night registered 5.5 on the Richter scale; it uprooted our tent stakes and our Salvadoran hosts joked of being seasick. But next morning everyone seemed edgy.

We had shared a truck ride with Edgar Montes, coming from the capital to help his few surviving relatives. We ran into him again near the ruin of his family's house. "Do you want to come with me to the cemetery?" he asked. "I want to visit the grave of my parents." Edgar had lost 11 relatives here.

In the Aftermath, More Horror

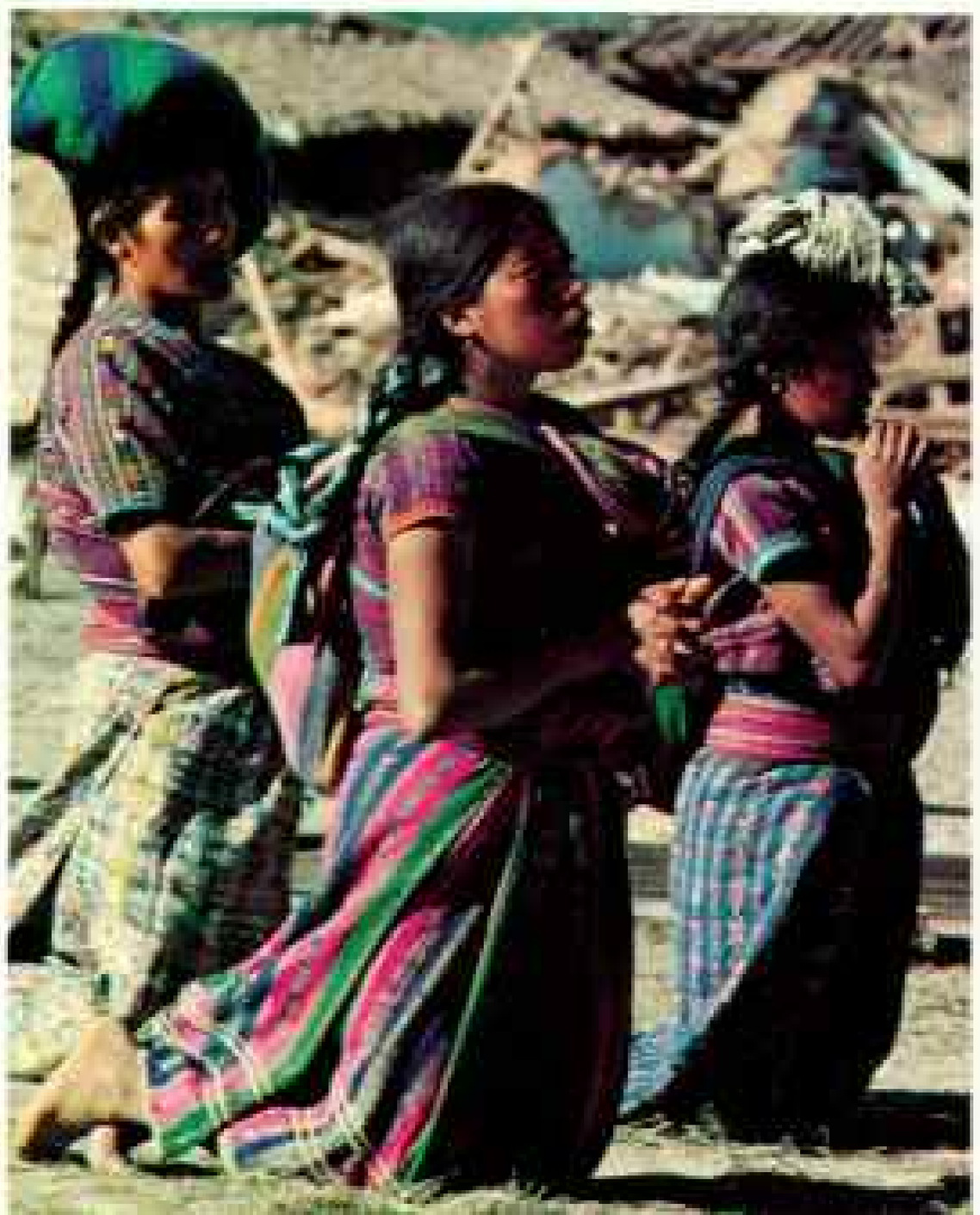
In the cemetery a few headstones had been toppled, but damage was slight. Not like the one in Joyabaj, where coffins had been shaken from their graves. There, a government engineer found the body of his own father who had died three years before. "I have had to bury him twice," he said.

Edgar found the Montes family plot; quiet tears coursed down his face. "I have lived away from El Progreso for 15 years," he said, "but I have come back home every week." As though a son's tears needed explanation.

On our way out of the cemetery, a pall of smoke blew across the road—dense, black smoke, the sort that rises from tallow candles in a church. "They are burning the bodies found last night," Edgar told us. And in a common pit, drenched with alcohol, 15 corpses flamed. I thought of the man the day before, screaming in the ruins. His parents would be here. But not that blackened form on top; the skull was a child's.

Seeking clean air and distance, we climbed a small hill behind the town. Here the desolation of El Progreso was hidden by trees—palms, mangoes, glossy citrus foliage with ripening oranges. In ruined patios and parks scarlet poinsettias and bougainvillea bloomed with manic brilliance.

Near us on the hill were two small children with a thin, very old woman. Her gray hair and clothes were disheveled, and she sat on the earth, clinging fiercely to a bramblebush. The children *(Continued on page 826)*



ROBERT M. MADDEN (LEFT AND ABOVE) AND MARTHA TRACY, M.D.

Litany of disaster unfolds in San Martín Jilotepeque (**above**), cut off for days by landslides that blocked roads. Survivors attend Mass before the ruins of their church. The shrine (**right**), once the glory of the spacious plaza, collapsed with all bells ringing, tolled by the quake itself.

Women pray for mercy (**left**); some Indians believed "God sent us this disaster in punishment for our sins." For the living, scars run deep. Thousands of children are orphaned. Many will always suffer dreams of the living nightmare.

M. SGT. CARL D. MARTIN, U. S. ARMY (FACING PAGE) AND GEORGE PLAFKER, U. S. GEOLOGICAL SURVEY

Homes cascaded down a hill in Guatemala City (**facing page**), their foundations swept away by the violent shift of earth that destroyed 58,000 of the capital's houses. Geologists traced ground torn for some 150 miles, with single cracks as much as 33 feet long and 4 inches wide. Near Quebradas, the fault cleaved a large ceiba tree (**left**). On the rail line to Puerto Barrios, fault movement bent tracks more than three feet (**above**). This wrench indicated horizontal earth slippage, similar to the movement on California's San Andreas Fault system.

were trying to pull her upright, urging her to return to town. She babbled incoherently.

"I knew her before the earthquake," Edgar said. "Her mind must have been injured." But to me she seemed more sensible than those of us who would return to the rubble.

"Do you want to stay in El Progreso?" I asked Edgar's nephew Alfonso. He shrugged.

"I am indifferent for the future."

But Edgar's sister cut in defensively: "No one wants to leave his town!"

Her loyalty was exceptional. The Montes' neighbor Lorenzo Chán would probably move his shop to another settlement. "I must follow my customers," said Don Lorenzo, hobbling on crutches. Three clerks were reclaiming goods from the adobe dust. But the most cogent commentary I heard on the fate of El Progreso came from Don Lorenzo's parrot. From his papaya-tree perch, the parrot trilled his *r*'s and screeched *"¡No lo creo! ¡No lo creo!*—I don't believe it! I don't believe it!"

El Progreso was by no means the worst-hit town. A band of settlements in the Department of Chimaltenango accounted for 13,500 of the nation's 23,000 dead. In San Martín, even the trees had fallen. This damaged area had been a travel-poster part of Guatemala,

Sky is the safest roof in Zacapa, where damage to the hospital forced its evacuation. Bed sheets shelter sleeping patients. Relief arrived swiftly from neighboring countries and the United States.

N. C. GARRETT

famous for its Indian customs, bright costumes, and artful handicrafts.

"I worry about the future of the artisans," said Don Bertoldo Nathusius, a leading exporter of textiles and an art patron. "With their homes destroyed, will they ever be able to return to their own traditions?"

But in the ruined town of Chimaltenango we came across an Indian family that reassured me. In the rubble of their house, survivors had placed a table, and atop it, a full glass of water. "It's for our dead," they explained. "We could not help them in their last moments, but when their spirits return here, we can comfort them." Folklore, at least, survives.

Just outside the town, in a conifer grove beside a pond, I visited a completely staffed, 100-bed U. S. Army field hospital flown from Fort Sill, Oklahoma, and put into operation soon after the quake.

A helicopter arrived as I did, bringing an Indian woman just plucked from the rubble of her village and still in sharp pain. Stretcher bearers brought her to a tent whipped by the gritty wind of the rotors.

"The pain is here?" A Spanish-speaking U. S. physician examined her.

"We've stayed full," said Col. Thomas C. Birk. "More patients than beds, since some stay in incubators." He grinned, pulled back a tent flap, and showed me several newborn Guatemalans. "Not routine for battle conditions, but we came prepared."

Field Hospital Upholds MASH Tradition

"We're similar to the MASH hospital of movie and television fame," he admitted, "but MASH is no longer an official Army designation." Still, I found jaunty, irreverent, hand-lettered signs on the hospital tents: The examining area was "The Dust Bowl"; the oral surgeon's was "Chop Shop: Jaws Repaired While You Wait"; the X-ray tent said "Fox Studios"; plaster was applied to fractures at "Central Casting."

Throughout the highlands those first days, wild rumors rumbled like summer thunder: A new mountain was rising near Sanarate (it was not); the level of the ocean had dropped dramatically at Puerto Barrios (false); Guatemala's volcanoes were erupting (also false); and hungry villagers had mobbed helicopters for food ("No—the Indians were simply unfamiliar with helicopters and the danger of approaching too close," a local pilot told me. "We fired some shots in the air to make them move back to safety").

"And in Zacapa," a fellow truck rider told me, "a mute woman regained her speech."

Dubious, I checked with townfolk.

"Of course, you mean the widow Adriana de Reichstein," a physician in the Zacapa hospital said. "She lives behind the cinema. I once examined her—she was truly unable to speak for almost a year."

So I sought out Doña Adriana (facing page), a kind-faced woman with graying hair. "It was a true miracle," she told me in a strong if quavering voice. "I had even been unable to write during my infirmity. But my daughter and grandchildren were always patient with me. Then, after the noise of the earthquake—when I found that the family was unhurt—I regained my speech."

And what were her first words? "I shouted, 'Great power of God! My children!' "

Doña Adriana showed us her little house, cracked and tilting but still upright, then moved along the walk, greeting her neighbors. "How are you now?" asked one.

"Speaking!" she answered. Triumphantly.

Old Capital Relatively Unscathed

From Chimaltenango I drove toward the old capital, Antigua Guatemala, architectural jewel of the Spanish colonial period and a major tourist attraction.

"We have had perhaps sixty dead here," said young Héctor Gálvez, a student of accounting. "And your countrymen helped run a hospital in a tent borrowed from a circus. But the damage to old buildings? It seems bad only if you have known Antigua well."

Héctor was correct. The old market had fallen in—a loss in local color, but one without fatalities. And ruins of the church of La Recolección had collapsed.

But such is the splendor of Antigua that these losses seemed mere details. The old arch of Santa Catarina still spanned the street, though its clock was stopped at three. A portal was smashed at Santa Clara. The church of La Merced still stood, as did the museums and hotels I saw.

"A few weakened walls fell in the aftershock this morning," Héctor told me. "Nothing serious." To read a plaque on the wall of Our Lady of Carmen, I stood beyond her dangerous reach. Built in 1638, destroyed in 1717, reconstructed in 1728, felled again in 1773, now further damaged, she is a ruin of ruins. But no less evocative for fresh wounds.

The brown, brittle pages of local records give this eyewitness report to the King of Spain by city magistrates describing the tumult on the afternoon of July 29, 1773: "...at the first impact all the buildings... fell to the ground. A ship in the middle of the ocean is not moved, not even in the harshest storm, as we saw our pitiful land tremble ...we rode on a sea of mountains and jungles, sinking in rubble and drowning in the foam of wood and rock. The earth was boiling under our feet as if tired of bearing us... making bells ring, the towers, spires, temples, palaces, houses, and even the humblest huts fall; it would not forgive either one for being high or the other for being low."

That earthquake prompted the Spaniards to move the capital to a new location. Now Antigua had survived with fewer losses than its modern successor.

"We need to reassure the tourists," Guatemalan President Kjell Laugerud García had told me at the airport one day. I could now offer reassurance on one point: Guatemala's historic treasures had survived. But how safe would tourists be?

No Repetition of Quake—for Now

"No tourist lost his life in the disaster," an archeologist told me. "I was staying at the Pan American Hotel downtown in the capital. It's built like a safe. A mirror broke, but breakfast was still served at half past seven."

I also put the question of safety to the seismologists and geologists who were now swarming through the country.

"This Motagua Fault has moved many times in the past—and will in the future," said Dr. George Plafker, of the U. S. Geological Survey. "It moves half an inch or so each year. To produce this earthquake, the fault needed to accumulate elastic strain for at least sixty years. Nothing like it should recur on this fault line within our lifetime."

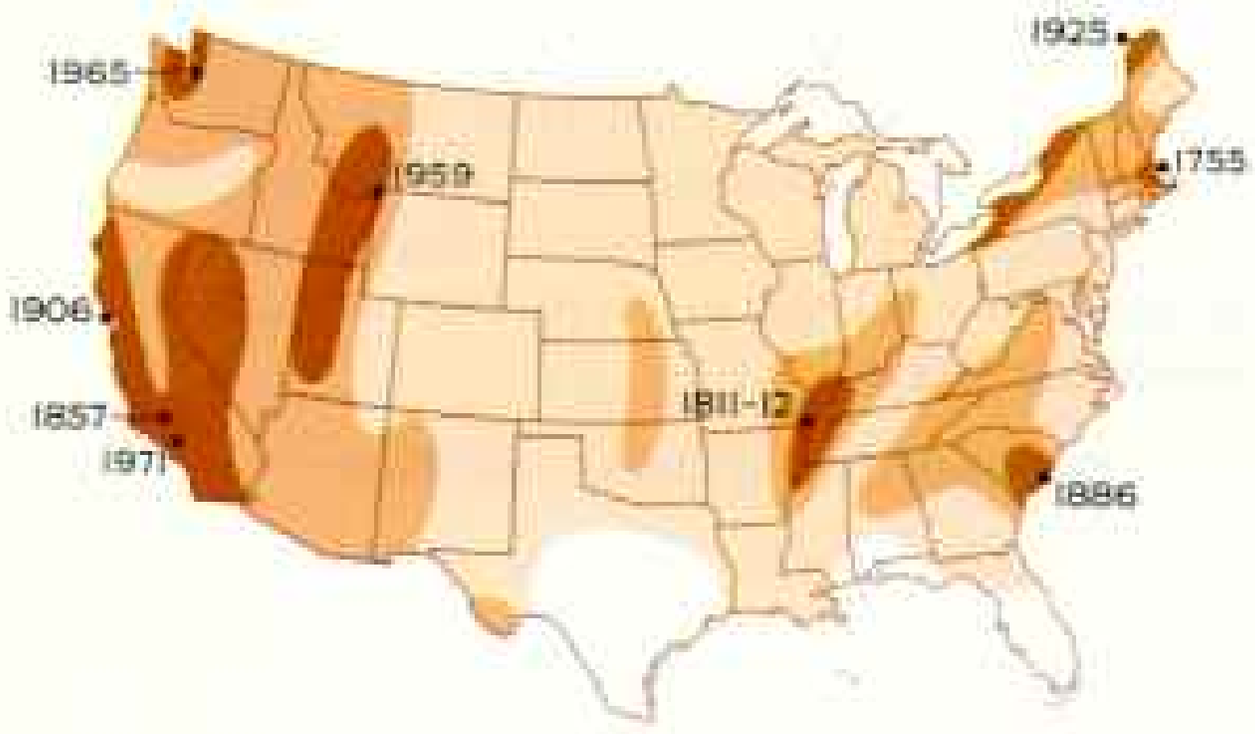
Perhaps the godly Vashakmen would hold their burden steady now. □

"It's the only little house I have." Tears overwhelm Adriana de Reichstein of Zacapa. For the widow the disaster was boon as well as loss. Mute for more than a year, she regained her speech the night of the quake. W. E. GARRETT

Can We Predict Quakes?

By THOMAS Y. CANBY

SENIOR EDITORIAL STAFF



Risk of earthquake damage hangs heaviest over widely scattered regions (**two darkest shadings**) inhabited by a third of the U.S. population. This map reflects the intensity of past shocks, not the frequency; tremors actually strike the West Coast ten times more often than the East Coast. Alaska and Hawaii also feel frequent shocks.

Few locations are immune. Boston and Charleston, South Carolina, are shown to be as threatened as Los Angeles because of rare but devastating quakes.

DATA FROM U.S. COAST AND GEODETIC SURVEY

THE SHOCK WAVES from Guatemala that stunned the world echoed back an oft-asked question: Can we, somehow, peer inside this tormented planet on which we trustingly build our houses and see in advance the onset of earthquakes?

While a Geographic writer-photographer team flew south to cover the disaster in Guatemala (pages 810-29), I set forth to determine just where the United States and other nations stand in the elusive effort to predict earthquakes, nature's most destructive cataclysms. I found the small core of scientists who wage the battle grappling with inadequate data and a multitude of interpretations —the inevitable uncertainties of a complex art in its infancy.

I found, too, that they have achieved some successes. In localized areas small and moderate quakes are being predicted accurately by United States and Soviet scientists. And in quake-prone mainland China a major earthquake was predicted and protective measures taken, averting a catastrophe even greater than that in Guatemala.

Earth's Crust Shifts and Shudders

Guatemala's turbulent seismic history finds explanation in the widely accepted geologic theory known as plate tectonics. The nation rides the boundary of the American and Caribbean plates (see page 814). These and some ten other great crustal slabs pave the planet with an ever-moving mosaic. The plates constantly interact at their boundaries —bumping, grinding, pulling apart, plunging one beneath the other. These jostlings breed most of the world's earthquakes.

Yet violent convulsions can and do occur thousands of miles from plate edges. One of the strongest series of earthquakes ever felt in North America bludgeoned New Madrid, Missouri, in 1811 and 1812. The area was sparsely settled, so few lives were lost.

"Because of today's high population densities in quake-prone areas," I learned from Dr. Frank Press of the Massachusetts Institute of Technology, "an event as strong as the one that struck San Francisco in 1906—8.3 on the Richter scale—could claim tens of thousands of lives, hundreds of thousands of injured, and property damage in the billions of dollars. Such a catastrophe would be unprecedented in this country, and yet most

seismologists expect it to occur sooner or later.

"It is only in recent years," the geophysicist reminded me, "that earthquake prediction parted company with seers and astrologers."

Unlike an advancing storm, which announces itself with changing temperatures and gathering clouds, earthquakes seemingly explode from their subterranean lairs without visible warnings, or precursors. Serious search for warning signals received impetus in 1949, when an earthquake in Tadzhikistan triggered landslides that killed more than 10,000 people. Spurred by the disaster, the Soviet Union dispatched a party of scientists into the remote region in search of symptoms that might warn of future shocks.

Long Study Leads to a Breakthrough

After two decades of dogged study, the Soviet scientists emerged with electrifying discoveries. In the periods before earthquakes struck, they observed that rock deep in the earth revealed measurable changes in electrical resistance, that water in wells absorbed more of a radioactive gas known as radon, that the surface area above the impending quake often changed shape or deformed—rose, sank, twisted horizontally.

Most exciting was their observation that, prior to some quakes, seismic waves traveling deep in the earth showed a distinctive variation in speed. This warning signal could be deciphered on a common seismograph.

The seismic storm warnings discovered by the Soviets, reinforced by the researches of Japanese seismologists, were shared with U. S. scientists at international conferences. The results encouraged all three nations to accelerate their forecasting efforts.

"Today," Dr. Press told me, "most seismologists believe earthquake prediction is an achievable goal." Achievable when? "Much depends on the national commitment," he answered, "the funding for instruments for detecting the precursors, for training skilled manpower. Since our present networks of instruments are sparse, we will also need a lot of luck in trapping earthquakes."

To examine the nation's longest quake trapline, I traveled once again to California.* There the western edge of the American plate rubs against the enormous Pacific plate to create the 700-mile-long web of fractures known as the San Andreas Fault. The fault forms a natural testing ground for the U. S. Geological Survey, the agency charged by the Federal Government with making earthquake forecasting a reality.

With sweeps of a long index finger, seismology chief Peter Ward gestured toward a dot-marked map of California on a wall of the survey's Earthquake Mechanics and Prediction Laboratory at Menlo Park. "Each dot represents an instrument. The northern and central ones are operated by us, those in the south in cooperation with the California Institute of Technology in Pasadena. There are more than 400 seismometers, each sensitive enough to register a rabbit hopping by. Other devices measure deformation of the surface, radon content in wells, and changes in magnetic field" (diagram, next pages).

Between flurries of phone calls from fieldworkers, from headquarters in Washington, from news media interested in rumored quakes, this overworked seismologist manning the front line of forecasting completed his outline. "The whole idea is to look for abnormal signals or earth movements—what we call anomalies. When we spot an anomaly, we may be seeing a quake precursor."

Tremor Foretold in New York State

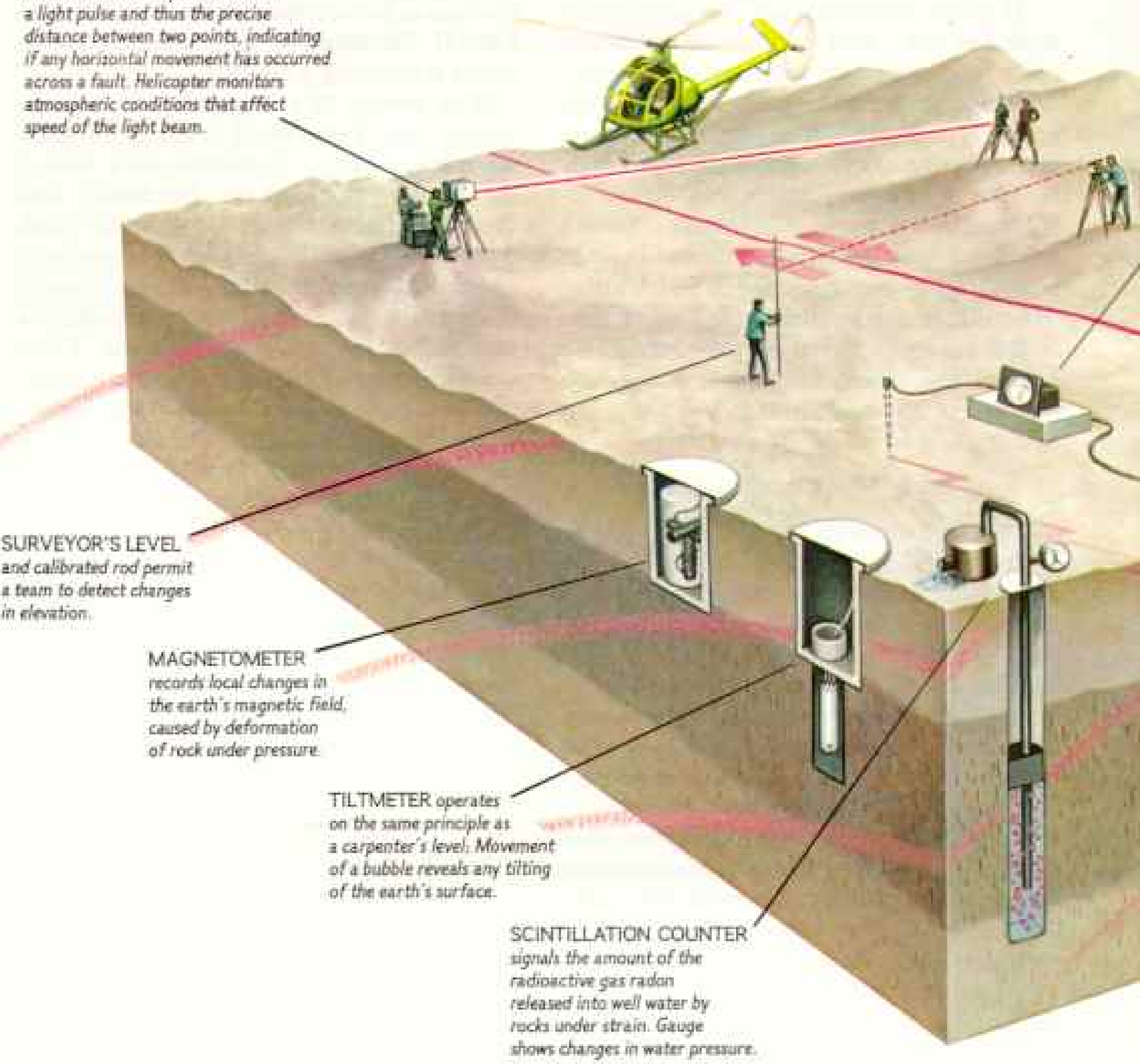
The first valid U. S. earthquake prediction occurred, surprisingly, not in relatively well-instrumented California but in the scenic Adirondack Mountains of New York State. In this region of frequent but small tremors, the Lamont-Doherty Geological Observatory operates its own seismic network.

In 1973 Dr. Yash P. Aggarwal, then a graduate student at Lamont-Doherty, discovered changes in the speed of seismic waves from seismometers placed around Blue Mountain Lake. He calculated that a 2.5-to-3-magnitude tremor would occur in two to four days.

"At dinner one of those nights, I thought I felt the slight rumbling typical of our subtle local quakes. When I checked the instruments, there *had* been an earthquake, its magnitude 2.6. I was jubilant!"

Most scientists agree that Yash Aggarwal met the three rigid requirements of an earthquake prediction: It must specify the place the quake will occur, the time it will strike, and its magnitude.

*The author described "California's San Andreas Fault" in the January 1973 NATIONAL GEOGRAPHIC.



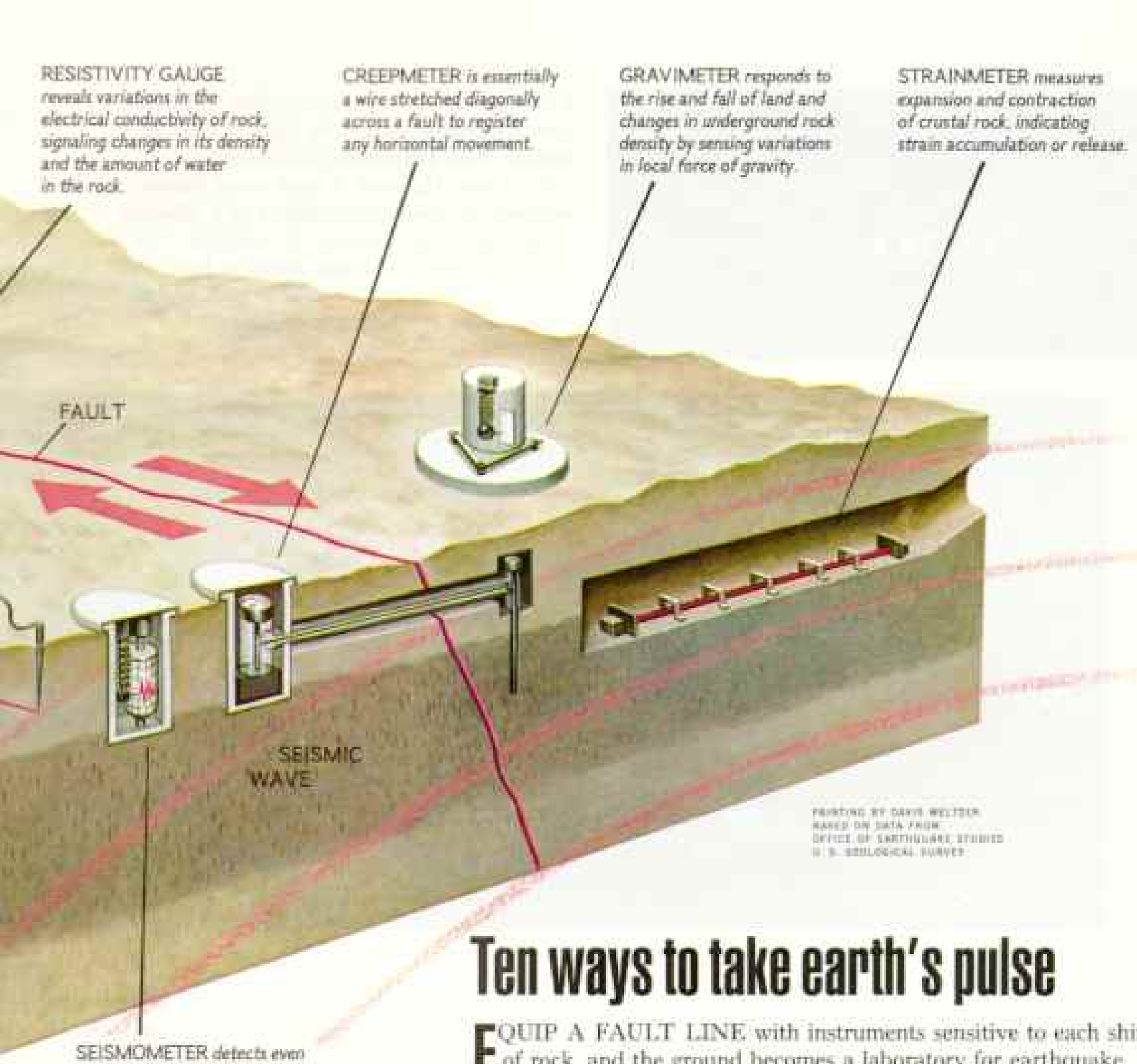
The second U. S. quake to be predicted, by Caltech geophysicist Dr. James H. Whitcomb, unfolded in early 1974 at the right place and time, but with the wrong magnitude. In a third try not long afterward, Menlo Park scientists monitoring the survey's network of instruments south of Hollister informally predicted a magnitude-5.2 shock that occurred on schedule but slightly off in location.

By the time of my visit, I found that the Menlo Park team had observed precursors before two magnitude-4 quakes and had made one forecast that failed. The batting average for the area's more frequent magnitude-3 tremors was running .600. "In 25 cases our instruments had earlier seen anomalies," said geophysicist Dr. Malcolm Johnston, "but ten similar observations were not followed by quakes. Obviously this is not good enough, but it is progress. Interestingly," he added, "although we registered anomalies that were not followed by quakes, before every quake we detected a precursor. Nothing slipped through our network."

How to Predict the Big Ones?

What about major earthquakes, the colossal hammerings that rend the earth for hundreds of miles and send mountains crashing down? Forecasting these, I learned, poses problems of proportionate magnitude.

"When we speak of a major earthquake," I



Ten ways to take earth's pulse

EQUIP A FAULT LINE with instruments sensitive to each shift of rock, and the ground becomes a laboratory for earthquake prediction. Thus scientists attempt to forecast the time, place, and magnitude of the next shock, sparking the prospect that routine prediction of earthquakes may be a reality a decade hence.

learned in the office of Stanford University geophysicist Dr. Amos Nur, "we are working with a global event. It shakes the entire planet. To fathom these, we must go beneath the surface symptoms and explain the inner workings of the earth in terms of physical processes, just as Newton's laws explained the external motions of the planets."

It was Dr. Nur, I knew, who first related the Soviet discovery of wave-speed changes to the behavior of rocks deep underground. He attributed the change to water entering rock during a phenomenon known as dilatancy—when rock under extreme pressure suddenly opens with myriad tiny cracks and expands. With passing time, scientists have found that dilatancy explains other precursors—variations in the electrical resistivity of rock, the uplifting of land under strain, the increase of radon in well water.

At Caltech's prestigious Seismological Laboratory in Pasadena, I talked with its director, Dr. Don L. Anderson, another geophysicist striving to comprehend the anatomy of the living earth. "It might surprise you," he told me, "that we're getting some promising insights by way of the outer universe.

"In an arrangement with NASA, we use two radio-telescope receivers—one at Goldstone in the Mojave Desert and one here in Pasadena—to record radio emissions from quasars as far as a billion light-years away.

Earth never rests in fault-ridden California, where geologists probe for clues to coming quakes. At a University of Washington project near Hollister, a laser beam flashes between an observatory (**left**) and a reflector three miles away (**below**). A multiple exposure shows the beam aimed at five targets. Inside a nearby mine tunnel (**right**), a University of California strainmeter transmits to computers in Berkeley.

By precisely comparing the arrival times of an emission, we can detect earth movements between the two stations with enough accuracy to discover precursors of large quakes."

One such warning may lie uncomfortably close at hand. Reviewing past elevation surveys, USGS geologist Robert O. Castle discovered that a vast area of southern California stretching from the Pacific to the Mojave Desert has uplifted ten inches in the past 15 years. Known as the "bubble," the area centers on a stretch of the San Andreas Fault that has been quiet since a titanic 1857 earthquake rent the surface for 200 miles.

Does the bubble portend another giant tremor? Noting that uplift can occur without a quake, the USGS has assigned a task force to keep watch with additional instruments.

On one aspect of quake prediction, I found few scientists in disagreement: Exciting events are occurring in quake-plagued China.

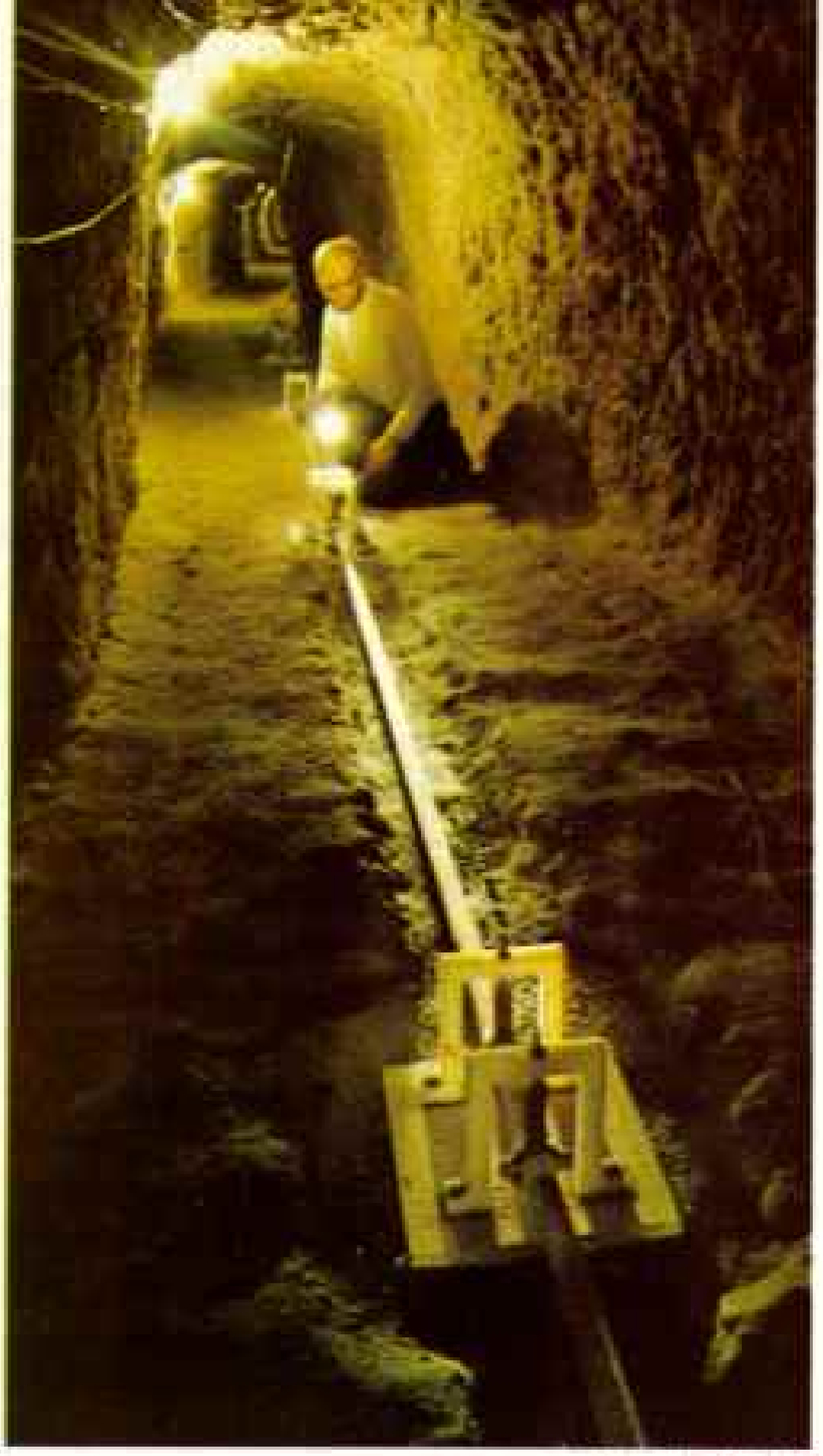
Perhaps the greatest natural disaster known occurred in Shensi Province in 1556, when an earthquake snuffed out 820,000 lives. The Chinese have compiled a 3,000-year catalog of their earthquakes—a unique document that some scientists believe can reveal whether quakes occur in identifiable patterns.

Invited to China in 1974, a group of U.S. experts led by Frank Press was astonished to discover a trained corps of 10,000 earthquake professionals, aided by many times that number of amateurs. Dr. C. Barry Raleigh of the Geological Survey and Dr. Lynn R. Sykes of Lamont-Doherty heard of three successful predictions based in part on abnormal animal behavior: rats leaving buildings, snakes crawling from their holes in large numbers, fowl refusing to go to roost.

Scientists Avert a Major Tragedy

Now, out of China has come a dramatic story of man thwarting a major earthquake.

As early as 1970, Chinese seismologists identified a region in southern Manchuria as one of seismic threat. Swarming over the area, they closed in on a danger zone surrounding the town of Haich'eng.



ALL BY CHARLES O'RYAN

By 1974 their instruments showed ever increasing anomalies. Reports of ominous precursors poured in from amateurs—commune wells muddying and bubbling, livestock and dogs behaving strangely, radon counts up.

A 4.8 foreshock rumbled, and one area sounded a false alarm. For two nights families obediently slept outside in the Manchurian winter. In February 1975 seismologists issued a frantic official warning that a major quake would strike within two days.

"Without delay," states a Chinese report, "the broad masses of people were notified to build temporary living huts . . . to move the old and the weak . . . while in some communes . . . open-air movies were shown" to entice the "masses to leave their houses."

On February 4, 5½ hours after the warning, an earthquake of magnitude 7.3 hammered Haich'eng. Nearly every house was flattened. Yet many communes suffered no casualties, and nowhere were they heavy.

"The Chinese success," states Dr. Robert M. Hamilton, Chief of the USGS Office of Earthquake Studies, "signals that the age of earthquake prediction may be upon us."

What of those intriguing animal precursors? "Before our Chinese experience," acknowledges Dr. Press, "we were skeptical. Now we've got to reconsider."

In my talks with earthquake scientists, I often sensed a special worry. How will people react to earthquake forecasts? Could disruption caused by a prediction be worse than the quake itself? What of a false alarm?

Dr. Ralph H. Turner of UCLA, who headed a National Academy of Sciences study, does not deny such problems could occur. But the report strongly favors prediction.

"We're not talking about total evacuation of cities," he stresses. "If people are protected from fire and collapsing structures, if water levels in dams can be lowered, very few lives need be lost, even in a strong quake."

Routine Forecasting May Be Near

How soon, I asked as I traveled, will earthquake prediction become routine?

Most scientists I spoke with hinge their estimates on the level of forecast funding. Of the USGS's $11,000,000 earthquake budget, less than half goes into prediction. Part goes into research to reduce human and property loss in quakes. Another interest is in earthquake control—devising ways to induce rocks under strain to slide past each other harmlessly instead of locking until a quake builds.

One of the more optimistic estimates I heard came from a leader of the historic Soviet expedition into Tadzhikistan. Dr. I. L. Nersesov was at Menlo Park as part of an ongoing exchange between U.S. and Soviet seismologists. Drawing on his pipe, the sturdy seismic pioneer pondered. "If all goes well," he finally ventured, "we may have success in five to ten years."

Don Anderson believes ten years is the earliest to hope for, even with favorable funding. Barry Raleigh generally agrees, as does Caltech geophysicist Dr. Clarence R. Allen.

Some, like Frank Press and Malcolm Johnston, feel the time is still too early for estimates. Most, I think, would agree with USGS scientist Dr. Jerry P. Eaton. "We will never come up with a single device that signals Green when we are safe and flashes Red when danger threatens. But I believe we will succeed in saving lives and property." □

Kyoto and Nara: Keepers of Japan's Past

By CHARLES McCARRY

Photographs by
GEORGE F. MOBLEY
NATIONAL GEOGRAPHIC PHOTOGRAPHER

Rivers of fire flood the great hill at Nara during "dead-grass-burning event." The January 15th spectacle had a practical origin centuries ago—to exterminate vermin and prepare for the regrowth of foliage. In Nara and in nearby Kyoto, Japanese nurture artistic and religious traditions threatened elsewhere by the headlong rush to industrialize.

THE SILENCE WAS PERFECT. The sun was just rising, and mist lay on the mountains that stand above the venerable city of Kyoto as I approached the Zen Buddhist temple called Daisen-in. Then my shoes crunched on the gravel walk, and I realized that I was hearing my own footsteps for the first time since I had arrived, many days before, in cacophonous modern Japan.

I paused beneath the temple gate to savor this peaceful moment. Far away a bell sounded. Then, as if some clear liquid were being poured into a crystal goblet, the dawn filled with the sound of temple bells. From the whole circle of the horizon they gave voice, joining to the new day the many manifestations of Buddha and the myriad Shinto gods.

The scent of morning and the sound of bells joined me to the glorious Kyoto of long ago, imperial capital for almost eleven centuries, and the smithy in which religion, art, and politics had been forged by the hammerblows of history into the unique culture of Japan.

I had come here hoping to enter that past, insofar as such a thing is possible for a foreigner and a man of modern times. Already I had caught many glimpses of its wonders. Daisen-in, one of 38 buildings in Kyoto designated as "national treasures," was among them. Another, less easy to grasp, was the mysticism of the Japanese. I had long had an interest in Zen Buddhism, that stern but vague system of meditation that demands the pupil study himself, master himself, and find his own place in the spiritual universe by his own efforts.

Visible treasures abound in Kyoto—211 buildings and artifacts out of Japan's 1,021 national treasures. Many others can be found in Nara, just 23 miles to the south. There, in A.D. 710, the Japanese, who had lived until that time in scattered settlements, built their first true city. In Nara, for seven shining decades before the foundation of Kyoto, Japanese artists, scholars, and statesmen began to develop a civilization that survives in many of its essentials to the present day.

What I wanted was to set my imaginary time machine slow astern, and to go back to that long seedtime. "No problem," said my doughty interpreter, Kunio Kadowaki. He knew where to find the guides for my imaginary journey—and what a remarkable group they turned out to be! Poets and priests, artists

and artisans, they have chosen to live and work in the deeps of their nation's cultural history. Brilliantly talented, they devote themselves not to creating new forms of art, but to re-creating traditional styles and even individual masterpieces.

Art Embodies National Spirit

A potter and sculptor of splendid gift named Toen Murata explained the reason why in these words: "If the impulse to equal the old masters ever dies among the new generations of our artists, then Japan will lose part of her spirit." It was this new work, the treasure of the future, that I had come to see.

I saw it in all its brilliance in the weeks I spent in Kyoto and Nara. It was a gentle experience, in which I was reminded that what is not said, what is not seen, is often the truest part of a work of art. In the end I felt I had entered into one of those classical Japanese tales in which character after character is encountered, speaks, and vanishes. Nothing extraordinary happens in such stories, but when they are over, all is explained.

On this particular morning I had risen while the moon was still up and had traveled in its glow across the vast city (236 square miles—more than half the size of Los Angeles) in order to hear the chief priest of Daisen-in, Soen Ozeki, recite his morning sutras. Like many meaningful things in Japan, Daisen-in, a jewel of Zen architecture, lies within something else—in this case, a larger temple called Daitoku-ji.

Priest Ozeki led me over the pine floors, polished to silken brightness by four centuries and more of bare feet. The room where he intended to pray lay beside one of the temple's principal gardens, examples of the "dry landscape" style developed by Zen priests. This stark arrangement of black rocks and white

sand may seem little like a garden to the Westerner who associates that term with growing things, but in the stone the Zen adept sees qualities of the human spirit.

Dressed in a robe of black silk, Soen Ozeki knelt by a vase filled with freshly cut lilies and hollyhocks and chanted the ancient sutras in a high, sure voice. Afterward, in a quiet inner room of Daisen-in, we talked about the vibrant sense of tradition that runs like music through Japanese life. In today's Kyoto as in the old imperial capital, father and child are the links that hold past and future together. "All this is natural," Soen Ozeki assured me, "for in Japan we have always known that the nation is nothing but the family, developed on a much grander scale. And an awareness of history is how we keep our ancestors with us always, in spirit."

Mistaken Identity Sparks Friendship

Past and present in Kyoto are like loving sisters who are always in one another's thoughts, and often in one another's houses. These visitations can warm the heart, as when I arrived a few minutes early at the home of the great tea master, Soukan Horinouchi, and found him giving a lesson in the 500-year-old tea ceremony to a group of ladies. Mr. Horinouchi, a brushstroke of a man, slender and elegant in black kimono, asked if I would care to watch the lesson.

The Japanese women, all in kimonos, knelt and drank the bittersweet green tea, turning the bowl and admiring its beauty in the choreographed ritual that the tea ceremony prescribes. All this is a serious business, for the ceremony has its roots in Zen Buddhism, and it holds great spiritual meaning. Yet I noticed that one of the ladies kept throwing mischievous glances at me as I sat, cross-legged, absorbed in the scene.

As soon as the ceremony ended, this lady—a tiny wren of a person, bespectacled and surely no less than 80 years old—scampered across the tatami mats on her knees, thrust out her hand, shook mine, smiled infectiously and cried, in English, "God save the King!"

My new friend explained that she had spent some years in London during the reign of Queen Elizabeth's father, when her husband was in the Japanese Embassy there. "I love your English nursery rhymes, and still sing them to my great-grandchildren," the

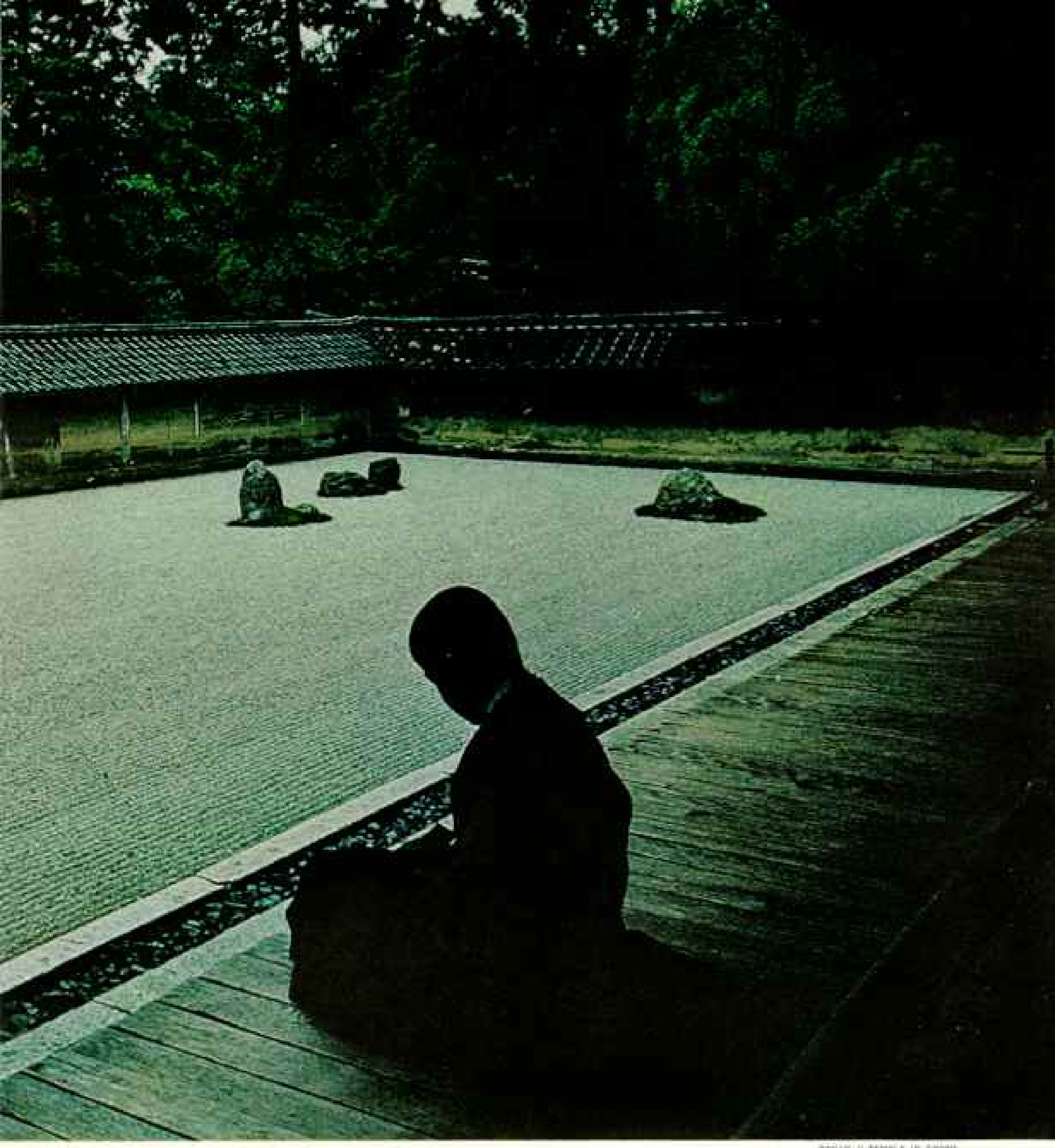
Living bridges span the ages: Kyoto's painters, sculptors, and actors perpetuate arts that stand at the core of Japanese identity. Decorating a bowl (**above**), an artist creates an iris, evoking the warm days of summer. Painstakingly handcrafted to become an heirloom, a ten-inch doll costing $80 (**facing page**) represents a lion dancer of Kabuki theater. An actor wearing wooden wrinkles (**below**) follows a 700-year-old tradition of lighthearted pantomime.

Serenity opens the door to self at a "dry landscape" garden where Zen Buddhists seek enlightenment. Here 15 islandlike rocks are so arranged in a sea of raked sand that some always remain hidden from any vantage point, suggesting life's mysteries. Thus the 500-year-old garden speaks—but only to those who are willing to listen.

lady said, and burst into a chorus of "Pop Goes the Weasel."

I hadn't the heart to tell her that I was never a subject of George VI, and it was only the exercise of great self-control that kept me from kissing her on both cheeks. It would have been a most incongruous act, after the solemnity of the tea ceremony.

Even before tea was introduced from China in the eighth century, Japan had absorbed much from the neighboring giant—an empire



RYOAN-JI TEMPLE IN KYOTO

that was attempting to rule itself not by force but by wisdom. Japan was shaken out of the sleep of primitive life by China's cultural and political energy. It was in the middle of the sixth century, when Buddhism crossed the sea from the mainland, that Japanese society began to develop in a systematic way.

Buddhism did not replace Shinto, the ancestral religion which holds that everything in nature is somehow alive. This lovely belief is woven into the earliest consciousness of the Japanese nation. Buddha soon sat down among Shinto's gods in peace and harmony.

Of all the countless temples and Buddhas that have sprung up since the sixth century, none is more symbolic of the smooth join between Japanese past and present than the colossal bronze figure in Nara known to Japanese as the Daibutsu, and to wondering foreigners as the Great Buddha (page 843).

I have seen three men standing casually in the outstretched palm of this 53-foot,

eighth-century masterwork. The statue consumed 437 tons of bronze as well as 286 pounds of pure gold from a mine discovered just in time to gild this great figure.

At Todai-ji, Nara's famous temple, administrator Ryuei Moriya explained to me that the Great Buddha had not always been so lucky. "The Daibutsu's head was shaken off in an earthquake in 855, and his head and right hand melted when the great hall in which he sits—one of the largest wooden buildings in the world—burned down in 1180. The head was lost again in another fire in 1567."

Eighth-century Nara, with its broad avenues and its many temples and palaces, was magnificent beyond anything that had gone before in Japan. Life had turned overwhelmingly Chinese: architecture, court etiquette and dress, the very language in which everything from imperial edicts to sutras to love poems was written. Perhaps 10,000 persons of the 100,000 in Nara and the five million in Japan as a whole were involved in this beehive of learning and assimilation, but they changed the nature of their society forever.

Japan: Evolution, Not Revolution

And, in the process, they changed what they borrowed, making the material into something new and special and quintessentially Japanese. Professor Masaaki Ueda of Kyoto University has made a lifelong study of this curious phenomenon, and he explains it this way: "When we import something, we age it, and if it is found to be good, it is consumed. In old wine containers we put new sake. We Japanese have no revolutions, but we have very enthusiastic evolutions!"

Early in 793, Emperor Kammu commanded that a new capital be built, on the model of the Chinese capital at Ch'ang-an. Larger and more magnificent than Nara, Kyoto was at first named Heian-kyo, "capital of peace and tranquillity." The city prospered; by the ninth century it held perhaps 100,000 people and 20,000 houses.

The fascination with Chinese arts and sciences persisted. Scholars and statesmen continued to write in Chinese characters, even though a Japanese phonetic system was devised, according to legend, by a Buddhist named Kobo Daishi (774-835). To write in Japanese was, in a scornful phrase of the tenth century, to write as a woman writes. But a woman of the court called Lady Murasaki Shikibu published, in the early 11th century, *The Tale of Genji*, Japan's first great novel.

Nature's Beauty Creates a Poetic People

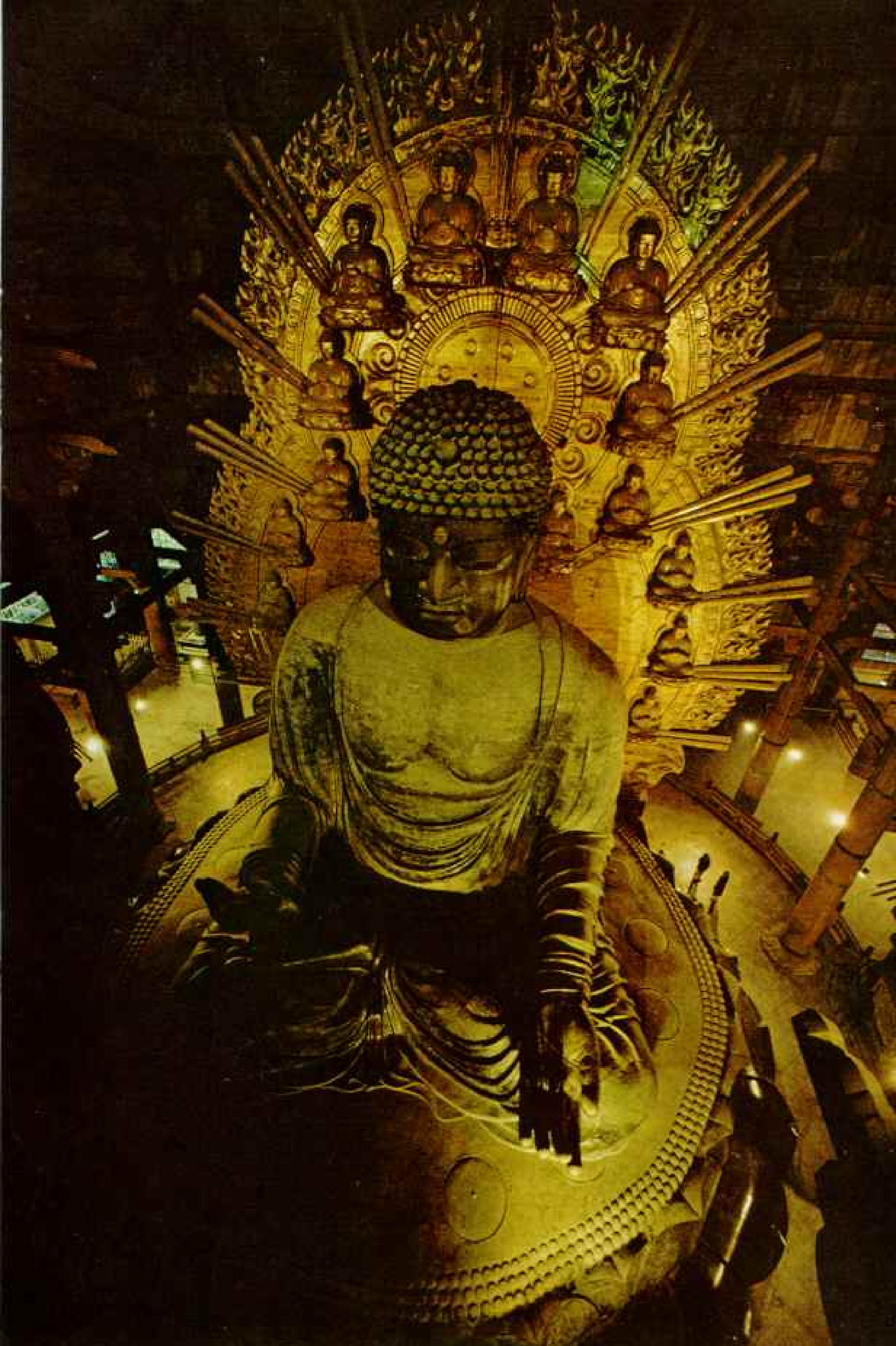
The poet Kaido Maruyama and I agreed that it would have been a fine thing to have known the author of *The Tale of Genji*. We talked of literature all through an afternoon at Mr. Maruyama's house on one of Kyoto's old streets lined with brown wooden houses and brimming with life. As we enjoyed a delicious snack of raw fish and sake, the screech of metal and the sound of automobile horns penetrated the walls of the poet's house. "Lady Murasaki's writing was subdued, delicate," my host observed. "In her time and for hundreds of years, the full beauty of nature was touched and expressed by the Japanese aristocracy. No longer, alas, are things so simple. But poetry survives."

Mr. Maruyama invited me to join him a few days later at a temple called Jinko-in to meet some of his students. I may have expected to encounter languid youths in soulful communion with the oaks and pines and splashing waters inside the walls of this temple where a 19th-century poet named Rengetsu lies in her grave. But when I arrived, I found a group of kindly ladies seated on the floor of a room, industriously writing verses.

Their leader, Mrs. Misao Kuroda, explained that since they graduated from high school together before World War II her friends had been meeting twice monthly to study the haiku, a 17-syllable poem in three lines. They studied under Mr. Maruyama—and before him, his father, also a well-known poet. Their subject this day was Rengetsu.

"Rengetsu was very beautiful, and she became tired of the ceaseless attempts of men to seduce her," Mrs. Kuroda told me. "So she

Lodestar for a budding nation, the 53-foot-high bronze Buddha at Todai-ji, a temple in Nara, rose in the eighth century, 200 years after Buddhism arrived from China by way of Korea. Emperor Shomu promoted the faith as a state religion, helping to set a growing Japan on the path to achievement.



left the world and came here to Jinko-in. In the peace of this place she wrote poems about the beauty of nature and the sadness of life." Poems by Rengetsu, written in calligraphy as fine as the bones of a thrush, were framed on the walls of the temple.

When Mr. Maruyama arrived, he read aloud some of his pupils' haiku—they had been mixed together, unsigned, on a wooden tray, and the best had been chosen by vote before he arrived. My host had learned that I sometimes publish haiku in English, and I was urged to write something about Rengetsu, and about the temple, which has a fine stand of oak trees. I wrote this:

What oaks remember,
princes were cut down to lose:
Rengetsu's beauty.

Those Japanese who believe that art is the child of time often remark that there is no longer enough time to shape artists as they should be shaped. In former days one began a career as a child; today the beginning is usually delayed until age 15, because of Japan's compulsory-education laws. Geishas, for example, who used to start their training at the age of 6, now begin in their teens.

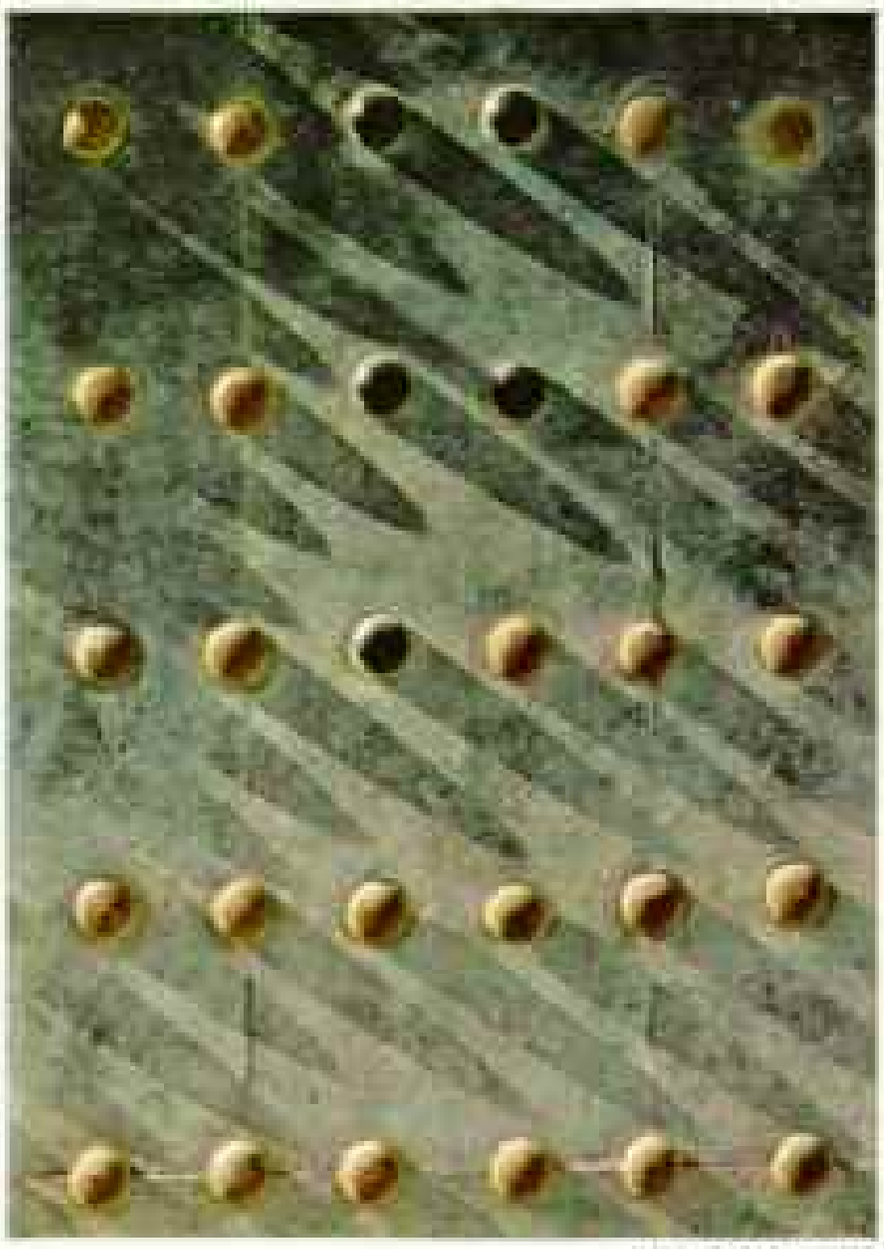
As I watched the geishas of Kyoto's entertainment districts, wearing silken kimonos in glorious pale colors, dancing with parasol and fan with wonderful grace, it seemed to me that their ancestors could hardly have been more pleasing to the eye. But a somewhat grumpy gentleman in the theater seat behind me did not agree. "That's not a proper gesture for *Summer Firefly*!" he would exclaim aloud. "They call that a well-danced *Origami*? Ha! But what more can you expect? These girls begin too late ever to learn how to do things properly!"

The theatrical arts of old Japan, particularly the stately No drama, still have power over audiences. Since No plays are narrated in an archaic Japanese that has about as much relationship to the modern tongue as the language of Chaucer has to 20th-century English, this is no mean feat.

My wife, Nancy, and I went one night with a crowd to see, outdoors in the courtyard of

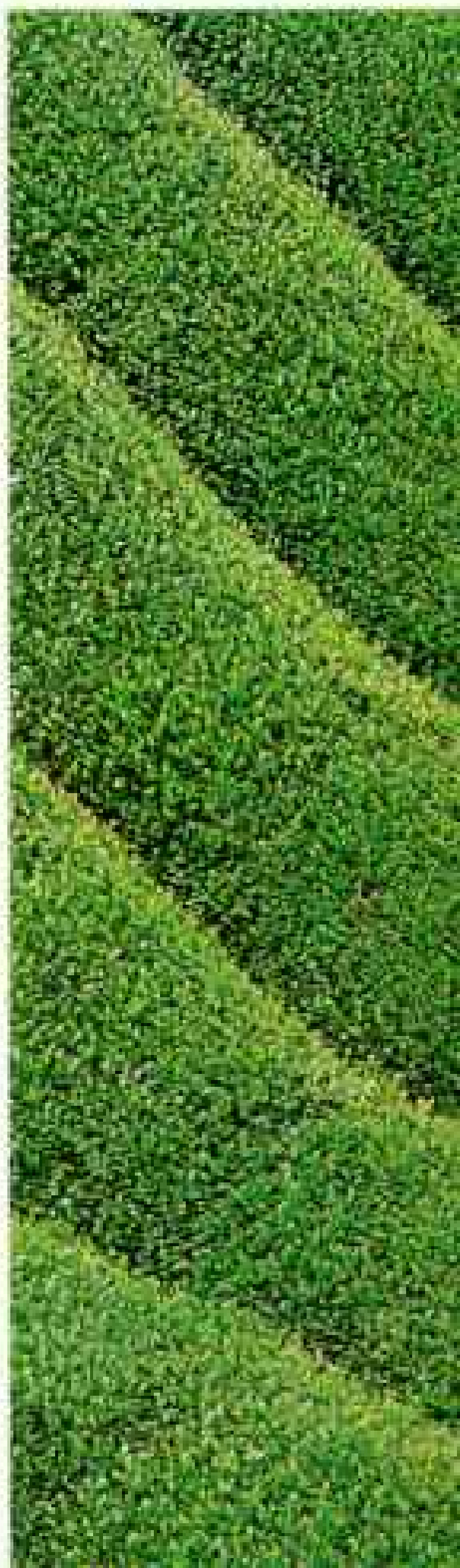
When beauty reaches great subtlety, say the Japanese—as in maple leaves breaching a bamboo fence or rusty rivets in a wooden door—they call the effect "*shibui*," meaning restrained elegance.

FENCE AT TEA GARDEN OF RYOAN-JI TEMPLE, KYOTO



NIJO CASTLE, KYOTO

Waves of green lapping the slope of a tea farm (**right**) exemplify the Japanese ideal of beauty. Zen Buddhist masters teach that a seeker can find the eternal in the simplest finite detail.



Kyoto's Heian Shrine, a torchlit performance featuring the celebrated No actor Hirotaro Katayama. There was a pale-yellow spring moon and Venus was bright. Pots of flame burned at the corners of the stage, and the roofs of the shrine rose out of the firelight into the moonlight.

Both Nancy and I forgot language and race and place as the hypnotic cadences of the antique speech and the notes of the flute merged with drums and the rhythmic clack of wood blocks being struck together to create an arc of feeling between audience and players. Even we foreigners could feel that we had entered into that fragment of emotion that is all a living generation can know of the generations that went before.

Music Demands Vigor as Well as Artistry

One who lives matter-of-factly in that electric region is the great samisen player Yahichi Takezawa. Unlike the modern geishas, he did not begin too late. He began playing when he was a child, for it was the tradition that samisen players should begin their training on June 6 of their sixth year.

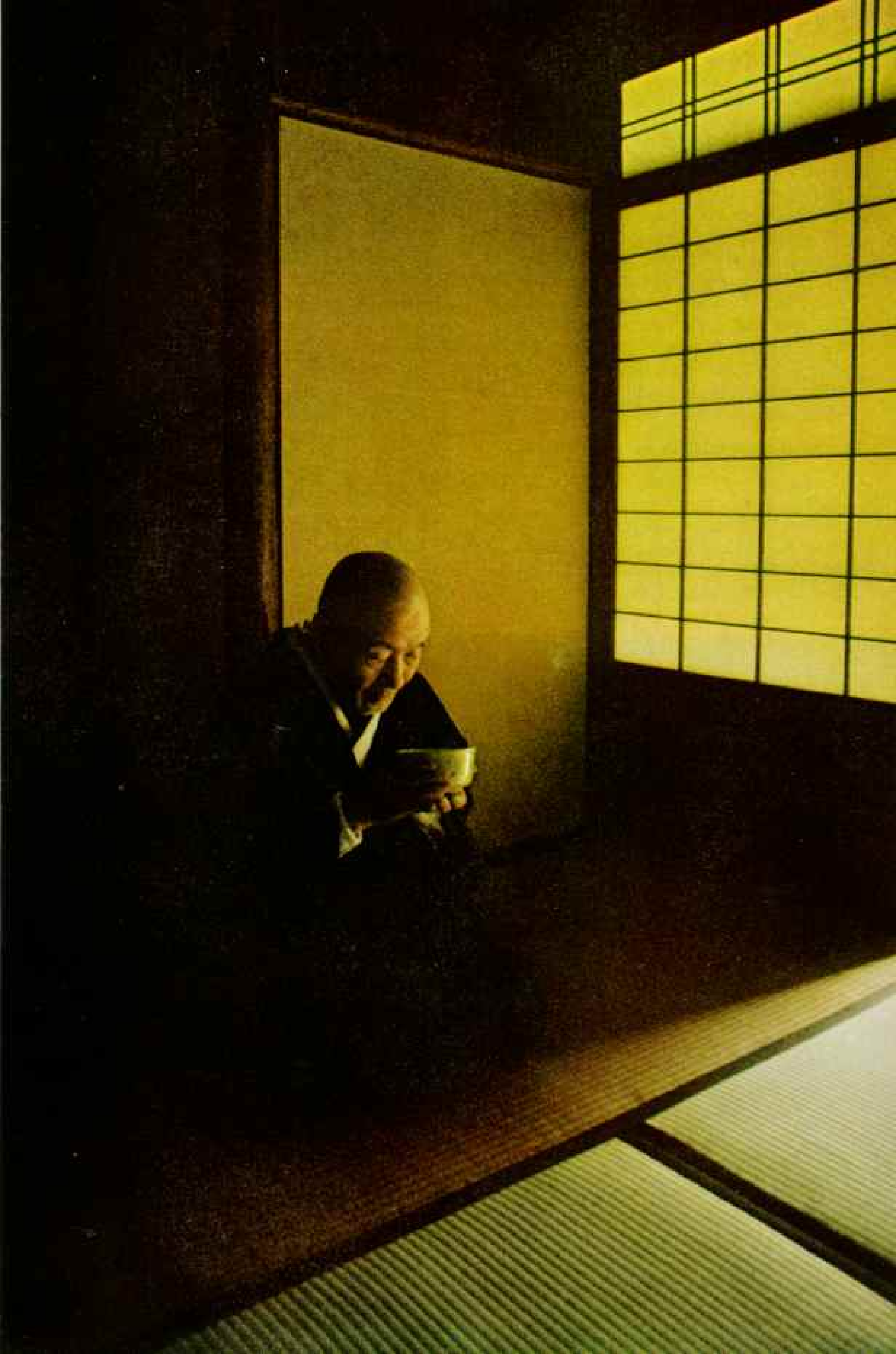
Now he is 65, though he appears 20 years younger, and he has been named a human national treasure by his government.* Will he retire? "I want to play until the day I die," he told me. "In that way I will learn something on my last day, as I have on every other day I have played the samisen."

We were seated at a low table, with a door open to the May sunshine. "The samisen ought to be played on sunny days only," Mr. Takezawa told me. "Rain affects the tension of the instrument, so that it does not sound so pure, so honest."

The neck of the samisen is rather longer than that of a banjo, and the soundboard, covered with taut catskin on the face and dogskin on the back, is rather smaller. Its three silk strings are plucked with a large ivory pick; Mr. Takezawa wears out a pick, an inch thick, in ten days, a samisen in two months. His fingers rub away the wood of the neck. When he plays, he wears a sumo

*William Graves wrote of "Human Treasures of Japan" in the September 1972 NATIONAL GEOGRAPHIC.

PICKING THE YEAR'S FIRST TEA CROP IN NARA



wrestler's girdle, so that the performance will not come only from the mind.

"Constant effort until one dies, that is the philosophy by which a musician must live," Mr. Takezawa said.

Another fine musician drew an apt but startling connection between her instrument and another Japanese art—that of war. Mrs. Toshiko Fukumori is a koto teacher, and as I thanked her for playing an exquisite song for me upon her 13-string instrument, she smiled. "The music is alive," she told me. "As the samurai must seize the moment to strike with the sword, so must the koto player pounce upon each note—one moment too late, and the musician is defeated."

This fierce simile greatly amused Dr. Reimon Yuki, president of a leading Kyoto women's school and an enthusiastic practitioner of kendo, the two-handed Japanese style of fencing with wooden staves. The Japanese have been fencing for sport at least since the reign of Emperor Kammu, who 1,200 years ago, legend tells, enjoyed watching exhibitions of swordsmanship in his palace at Kyoto.

Dr. Yuki began practicing kendo seven years after his birth in 1902; at 74 he is as sinewy as one of his samurai ancestors, and he attributes his fitness largely to kendo. Dr. Yuki cautioned me against the mistaken idea that kendo, or any martial art, conditions the body to the exclusion of the mind; indeed, the spiritual lessons are the very purpose of the sport. As a youth, Dr. Yuki explained, he often tried too hard to excel; now he realizes that one cannot every time achieve the best one is capable of doing. But when the best does come forth, mind and body join to produce something like perfection.

What was the most important lesson kendo had taught him? Dr. Yuki gave me an answer that I shall not soon forget. "Defeat," he said, "shows one that victory is possible."

Dolls Become Treasures, Not Toys

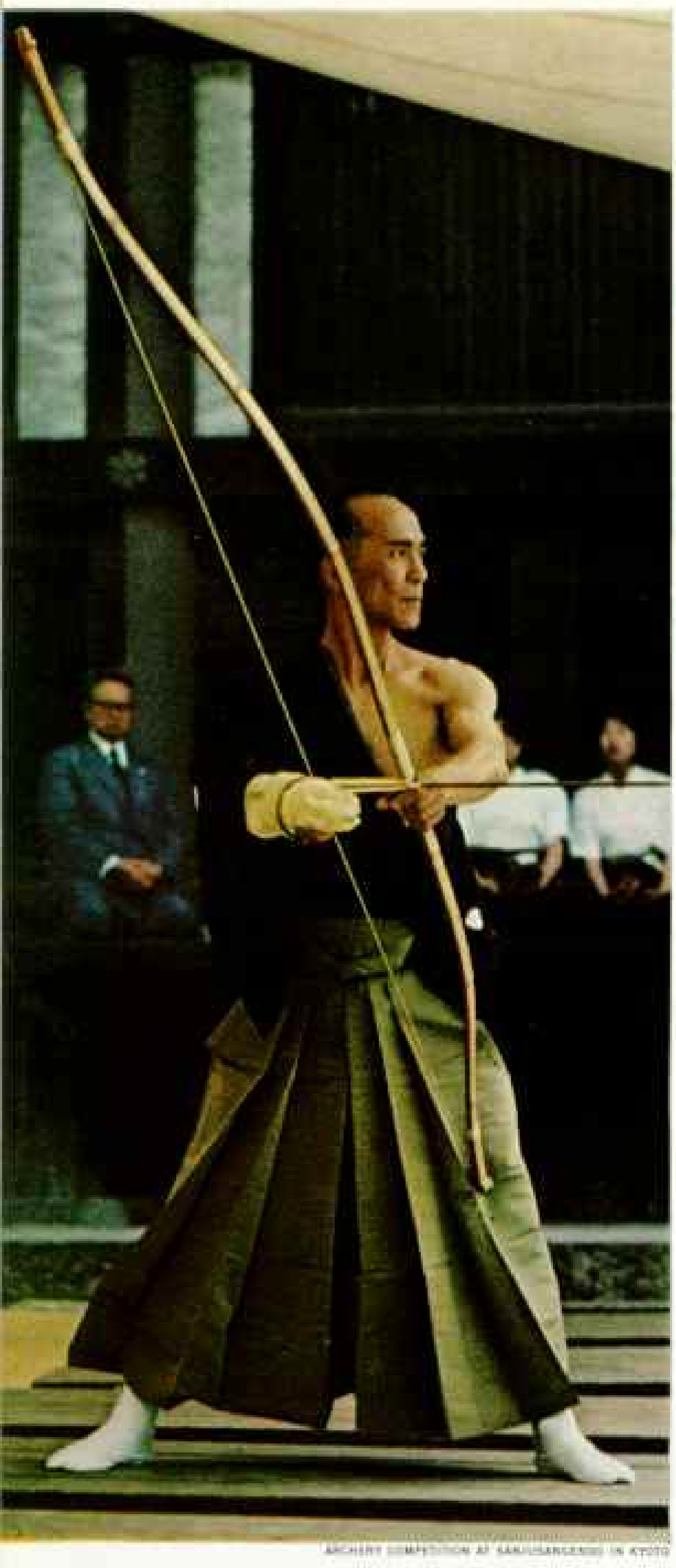
I spent happy hours in the wonderfully cluttered workshop of Shintaro Nakajima, who makes armor for dolls. He and his son, Nobuyuki, together with two assistants, sometimes work from dawn till midnight filling orders for dolls—miniature, life-size, and all dimensions in between.

The day I arrived, they were finishing a suit of armor, reproduced in scholarly detail from surviving examples of the accoutrements of the Heian Period (794-1185). In May, traditional month for displaying and presenting dolls, some lucky 7-year-old boy would have a fine present.

Chances are, however, that the youngster would not be allowed to play with the armor. One of the Nakajimas' creations can cost anywhere from $350 to $30,000 retail. "Some rich people order dolls that take between six months and a year to make," Mr. Nakajima told me. "They want them as family treasures." The Japanese often buy precious

"**Most wonderful medicine . . .** the secret of long life." Thus the Zen monk Eisai extolled the virtues of tea, a Chinese beverage that he helped popularize. Japanese priests later developed the tea ceremony as a form of meditation.

A measure of powdered green tea is put into a bowl (**right**), and hot water is added. Soshu Mori, chief priest at the 200-year-old teahouse at a temple named Gyokurin-in, savors the texture and warmth of his bowl (**left**), having finished the elixir in three slow swallows.



ARCHERY COMPETITION AT SANJUSANGENDO IN KYOTO

"Battle dress was my pillow, arms my profession," declared a 12th-century Japanese hero-warrior who may well have carried a seven-foot bow such as this one. Now men practice archery as both a mental and physical discipline. Yoshihiro Shishime demonstrates the art.

goods with the idea of putting them in storage; it is not only a form of saving but also a means of building up a treasury of heirlooms that add to a family's traditions as well as to its wealth.

Each doll is an authentic representation of a historical figure and costume. Authoritative texts are consulted, but not relied upon entirely; so Mr. Nakajima travels periodically to an island in the Inland Sea where there is an armor museum. There he studies, photographs, and tries to deduce forgotten methods of fabrication. "I have to look inside the armor," he explained. "The hidden part is always the interesting part."

Artist Restores Glory of Old

To command beauty, hidden perhaps for centuries, to reappear in all its original colors is the magical occupation of another hardworking Kyoto artist. On a sun-shot morning after a rain I walked with him to the Karamon, the great gate of Nijo Castle—a headquarters of Japan's military rulers from 1603 till their downfall in 1868. My companion, Ryoichi Kawamo, a restorer of antique works of art, showed me one side of the gate, corroded by time and weather, interesting but unremarkable.

Then he showed me the other side, restored by him and his assistants. What had been an indistinct pattern of fretwork sprang to my eye. Snow-white cranes sailed over vivid flowers; a whole lost world had been brought back to vibrant life. "That's what it looked like when it was made; that's what the artist intended," said Mr. Kawamo. Working from old records and bits of old paint, scraped from the gates and examined in a spectroscope, he had been able to reproduce exactly the colors of the original work.

"Also long experience," he said with terse modesty. "I can look and pretty well tell what would have been used. The man who did it and I are alive in different times, but we are the same kind of men, and our methods don't change."

According to culinary artist Koji Sugimori, an artist's methods *should* change. Mr. Sugimori operates the Funaoka Sushi Shop in a northern neighborhood of Kyoto, and though he can produce *sushi* exactly as it has been produced in Kyoto for centuries, he would prefer to make something else.

Sushi is an acquired taste. Say "raw fish" to an American, or indeed almost any non-Japanese, and you will be rewarded with a grimace. But let the same person place a morsel of absolutely fresh, uncooked salmon roe, bluefin tuna, or abalone in his mouth; let him chew with an open mind, swallow with nonchalance. You will have made a convert. Sushi (raw fish with rice or seaweed, made up in bite-sized morsels) or sashimi (raw fish alone, dipped in soy sauce laced with the virile green horseradish of the country) are among the world's great delicacies.

As with many things Japanese, sushi long ago had its nature and its limits defined. Some people will tell you there is only one way to make it, that only certain things make sushi. Not so, says Koji Sugimori. He prefers to swim against the tide, to be creative, to experiment with new tastes. He is building up a clientele of iconoclasts.

Painter of Bowls Seeks Visual Harmony

I have no doubt that there have been men like 74-year-old Kakko Hisamatsu tucked away in the dark ateliers of the city ever since the art of pottery, one of the glories of Japan, was introduced centuries ago. I found him with his two assistants in a loft in the potters' quarter of Kyoto. They were applying a glaze made from powdered stone to raw clay jugs. On Mr. Hisamatsu's low table was a thicket of paintbrushes, a maze of paintpots. He showed me an urn his father had made for the export market between the World Wars; vermilion and gilt, it looked very much like the vase in which my mother keeps the dried petals of the roses she has been given since before her marriage in 1909.

Mr. Hisamatsu showed me some of his own work—shallow teabowls for summer, deeper ones for winter, vases, urns. For each piece, he receives 2,000 yen (about $7) or less from a wholesaler, and sometimes sees them in shops priced at 45,000 yen. "Some famous designers get as much as 100,000 yen for a single teabowl," he remarked. "I'm not sure what the difference is."

As a youth, Mr. Hisamatsu dreamed of becoming a painter. "The temptation to go to Tokyo and paint was great, but I had all the reasons a Japanese always has to remain where I was, so I remained," he said.

With a shy smile he produced a notebook containing the drawings he does for pleasure. He riffled the pages with his old hand, and birds, flowers, landscapes, the faces of Japan leaped to life, like memories passing through the mind before sleep. "One has to keep one's eye in harmony," the artist said. "I go often to the temples to look at the flowers, to remember their colors exactly."

The traveler in Japan will often hear that word—"harmony," or *wa* in Japanese. It is inscribed on temple gates, and on Japanese minds; it is, many Japanese have told me, at the very center of their idea of life.

As nearly as I can understand it, harmony has to do with the proportions of things, and with their fitness. One sees it in the architecture of the temples, but also in the perfect proportions of the gray-thatch trapezoidal roofs of country houses in the folds of verdant hills. Rengetsu acted harmoniously when she fled from her seducers; Mr. Hisamatsu too saw harmony in accepting his lot in life.

A very famous artist, the woodworker Tatsuaki Kuroda, held harmony in his large hands, like those of a great pianist. It was an unbelievably fragile wooden tea container with a lid so perfect that it could not be recognized as a lid until it was removed. "I have waited four years for this wood to dry before working it," he told me. "Now it will take five years to apply coat after coat of lacquer and to dry it properly. In all, pieces like this can take 10 or 15 years. I am over 70, and with all my other work I have had time to make only six or seven of these, and I may have time for only one more." Then he smiled broadly. "But what is that?" he asked. "The cedar tree from which I took this wood required a thousand years to grow!"

Floor Mats: Key to Proportions

That is harmony. So is the casual way in which the potter Toen Murata, showing me his clean, simple works, revealed something I had never known: that proportions in a classic Japanese house, from bowls to flowers to the pattern in a kimono, should be in harmony with the tatami mat. These soft floor coverings of woven rushes are, in Kyoto, precisely 94.5 centimeters by 189 centimeters. In Tokyo, the mat will be 84 centimeters by 174 centimeters. A Japanese will say of a house, it is a so-many tatami-mat house, to fix its proportions. "In a Western house my things

wouldn't be right," Mr. Murata said. "Even in a Tokyo room my works could be incongruous. I didn't create them to live in any dimensions but those of Kyoto!"

"I have seldom been far from Kyoto," said Mokusen Amano, an artist who paints on silk with the Yuzen dyeing technique, producing the famous fabrics of the city. His paintings are made into kimonos, one of a kind, and they are worth a queen's ransom. He spilled on a table a brilliant cascade of silks—blue, pink, color of jonquil—on which he had painted intricate patterns of bamboo, pine, and apricot, good-luck symbols of Japan.

"The beauties of Kyoto are my materials, and they are inexhaustible," he said. "I *know* Kyoto—the exact moment when the apricot trees blossom, every inch of earth, every noise and scent!"

No traditional artist in Kyoto forgets that art continues to flourish because people want it and will pay for it. I asked potter Toen Murata how long it took him to learn his craft. "About 55 years!" he replied.

Another Yuzen dyer, Shigemi Shinka, showing me the designs he had done for a kimono, explaining the masterly way in which his father, Yoshihiro, can mix dyes to achieve the precise hue wanted, spoke the central truth about his craft, and all others. "In the end, it is the creativeness of the hand," he told me. "The craftsman must have eye and heart in harmony. The wholesaler and retailer can worry about money, but without craft there would be no wealth for anyone."

Even the arts of pleasure require years of training and self-discipline. Powdered and lacquered, three students (**above**) await their graduation from a Kyoto geisha school, where they studied conversation, dance, and traditional music. For her family's enjoyment, a 9-year-old girl (**facing page**) practices on the koto, an instrument imported from China 1,300 years ago.

Temple Bells Span Time and Space

On my last day in Kyoto I went to the Iwazawa Bell Foundry to watch the making of a new temple bell. Outside, in the spring rain, stood a long row of bronze bells, like a procession of monks with shoulders hunched against the downpour. Within, a boy stood on a precarious perch above the forge, throwing bundles of copper wire into the leaping green flames. A small shrine had been set up for the occasion, and the priest from the temple that had ordered the bell watched, with some of his flock, in heat that parched the nostrils and stung the eyes.

Tin was added, and the color of the flames changed. At last the molten bronze was ready for pouring into the mold. The priest added to the glowing metal a handful of copper strips on which the names and the wishes of the faithful had been inscribed. He added some incense from a *koboku* tree.

In my pocket I have carried, for many years, a coin that was given to me on my first voyage to Japan. It seemed that it was time to give it back. I dropped it into the melting pot, saw it swallowed, watched the iridescent stream of bronze flow into the mold —and went home to my own country, where in memory I often hear the harmonious tolling of Kyoto's temple bells. □

Kyoto Says Happy New Year

A PICTURE PORTFOLIO BY GEORGE F. MOBLEY NATIONAL GEOGRAPHIC PHOTOGRAPHER

LIKE A CRESTING WAVE, celebrants engulf Kyoto's Chion-in, vying politely for a better view in the temple's crowded grounds. Then, BONG-G-G! The great bell sounds at midnight, signaling the New Year. Again and again the hammer strikes, as Buddhist priests pull back and release the suspended log, counting off 108 human frailties.

Afterward, a boy and his father visit the flame at Yasaka Shrine. Wide-eyed with wonder, the child catches a spark with his rope (**below**). He will carry it home carefully to light his mother's cooking fire and the candle of the household shrine, ritual precautions to ward off illness.

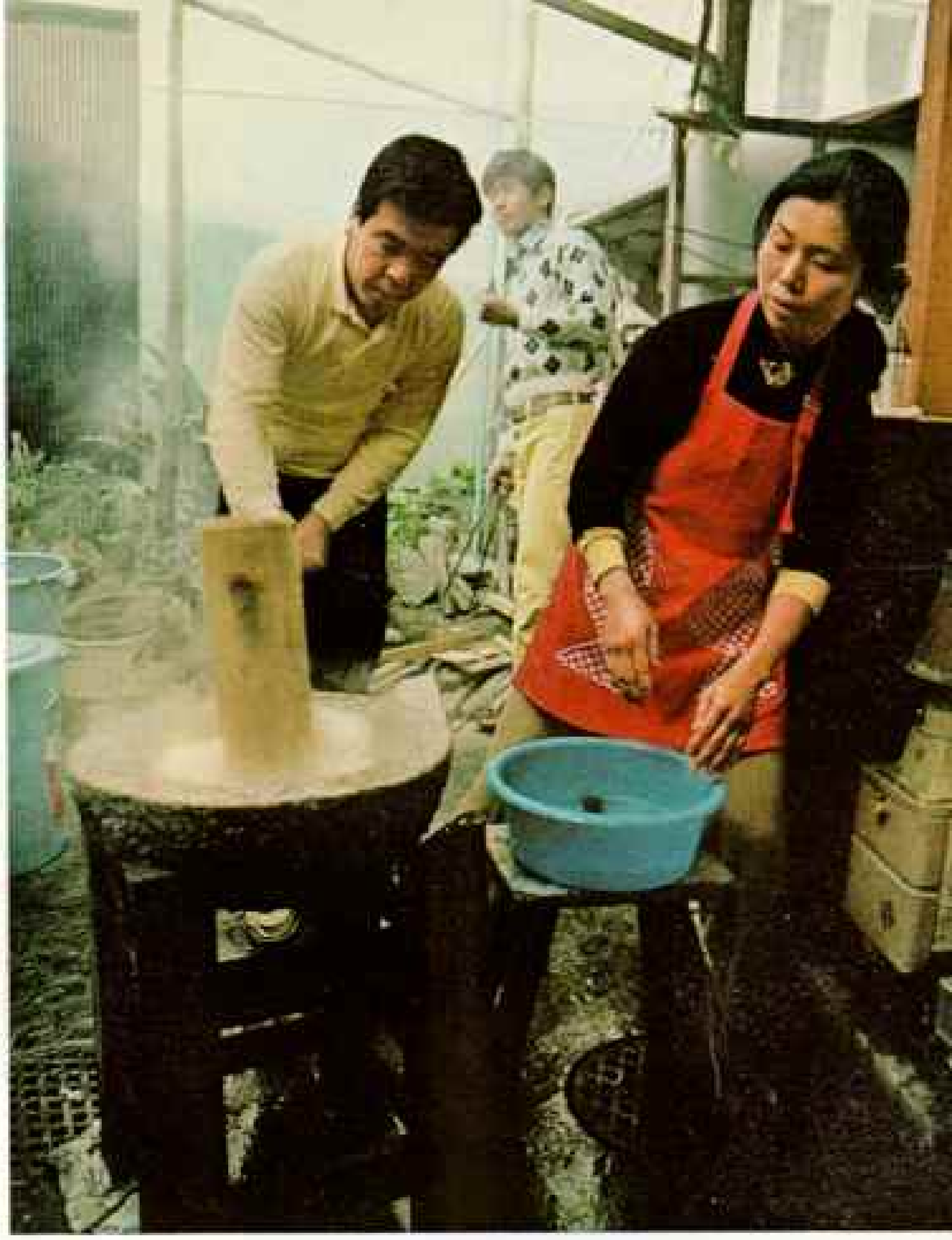
All over Japan the bells toll on this night of nights, which falls, as in the West, on December 31. But Japanese New Year spills far beyond this hour and the traditional three-day holiday. Ask Japanese why, and they will tell you, "New Year is the key to unlock the whole year!" And so for weeks they clean house, purchase new clothes for the children, exchange gifts with family and friends, and pay off personal debts. Every action lives up to the Japanese word for New Year, *oshogatsu*—the "right month."


事務用品
結納用品
自谷
TEL
西下
100g
90円
若

WHICH TO CHOOSE? Sliced lotus root, black beans, radishes? These shoppers select vegetables to be cooked ahead so their holiday will be leisurely. Their pocketbooks jingle, thanks to year-end bonuses granted to all employees.

Contributing his muscles to family custom, a man pounds steamed rice which the woman of the house will shape into small round cakes called *mochi*, an essential New Year dish (**right**).

With all the excitement Westerners associate with Christmas, a Japanese family greets the first of January. Children don new kimonos and share in the sake toasts. At table they find porgy and prawns (**lower right**), delicious omens of happiness. To one child's delight, her meal ends with non-traditional ice cream (**below**).



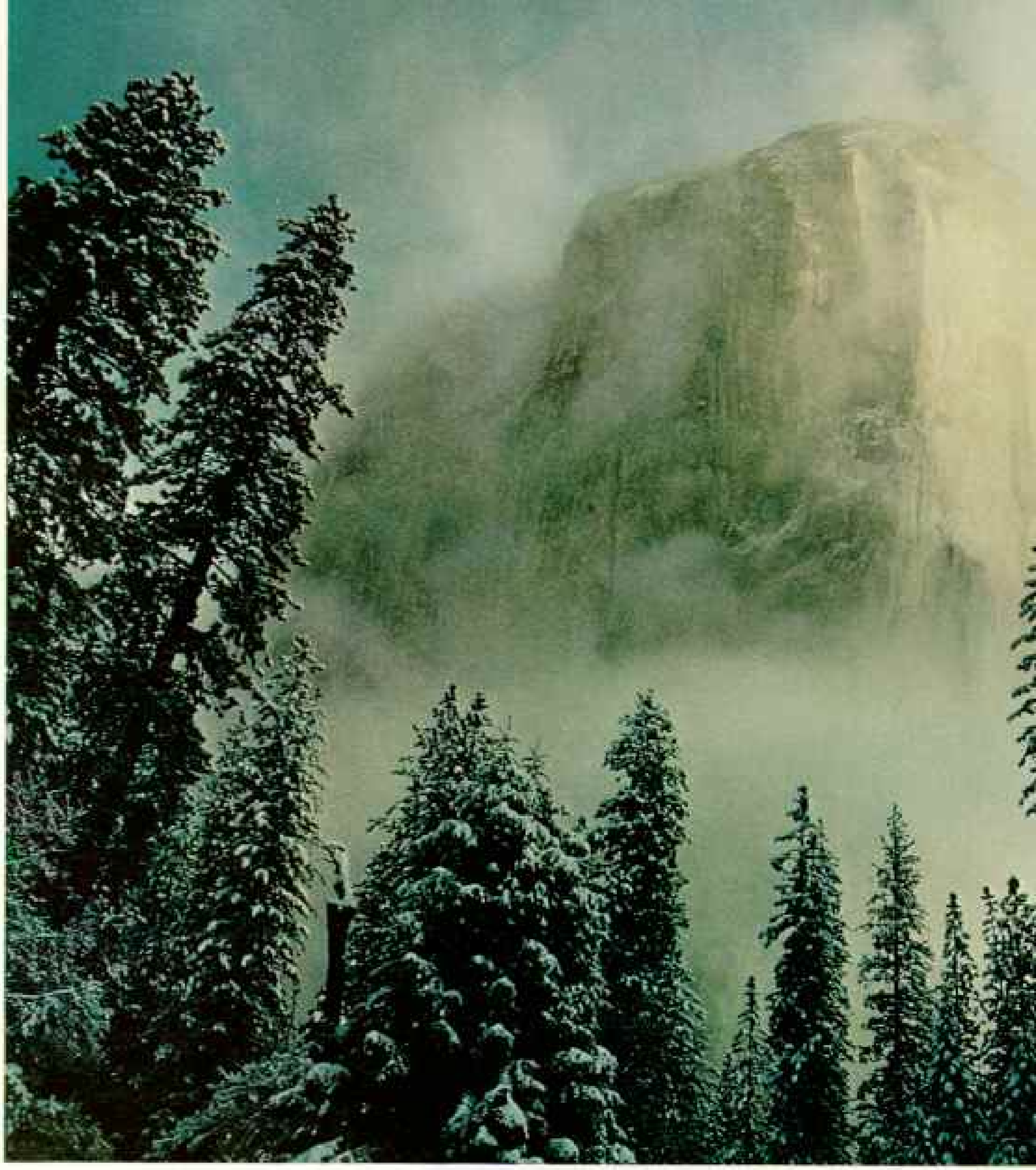
HURRY, THE GODS WAIT! Priests rush offerings of rice cakes to the altar hall of a Shinto shrine. There neat labels identify each donor family for all to see (**below**). Shinto, the native Japanese religion, teaches that the gods descend from heaven during festivals to reside in the cakes and in objects of worship such as a mirror or a sword. In the tolerant mix of theologies that is typical of Japan, many Buddhist families visit Shinto centers as well, such as the famous Heian Shrine (**right**). For good luck, celebrants buy fortunes scratched on white paper and tie them, like blossoms, to bare-branched trees.

The shrine rose as a reproduction of the first imperial palace of Kyoto in 1895, commemorating the 1,100th anniversary of the city's founding. Five months ago it caught fire, the fate of many wooden shrines through the centuries. But as always, Kyoto will restore its beloved treasure.

Kyoto's workaday world

FINE KIMONOS and kotos go back on their shelves; out come overalls and smocks. Commuter trains screech past mills that hum once more. New Year is over, and Kyoto settles back to business.

But normal does not mean neglect of duty. Throughout the year Japanese will pause at the hundreds of palaces, shrines, and temples such as To-ji, with its five-story pagoda (**left**). There they will nourish a sense of their own identity as a people. In Kyoto, yesterday does not die, and the future always beckons with the calendar's brightest star—*next* New Year. □



NEW GEOGRAPHIC BOOKS

Four Views of Our Nation

AS WE CELEBRATE the Bicentennial, National Geographic pays special tribute with four new, all-American books for 1976-77, each lavishly illustrated to reveal a different, exciting aspect of these United States.

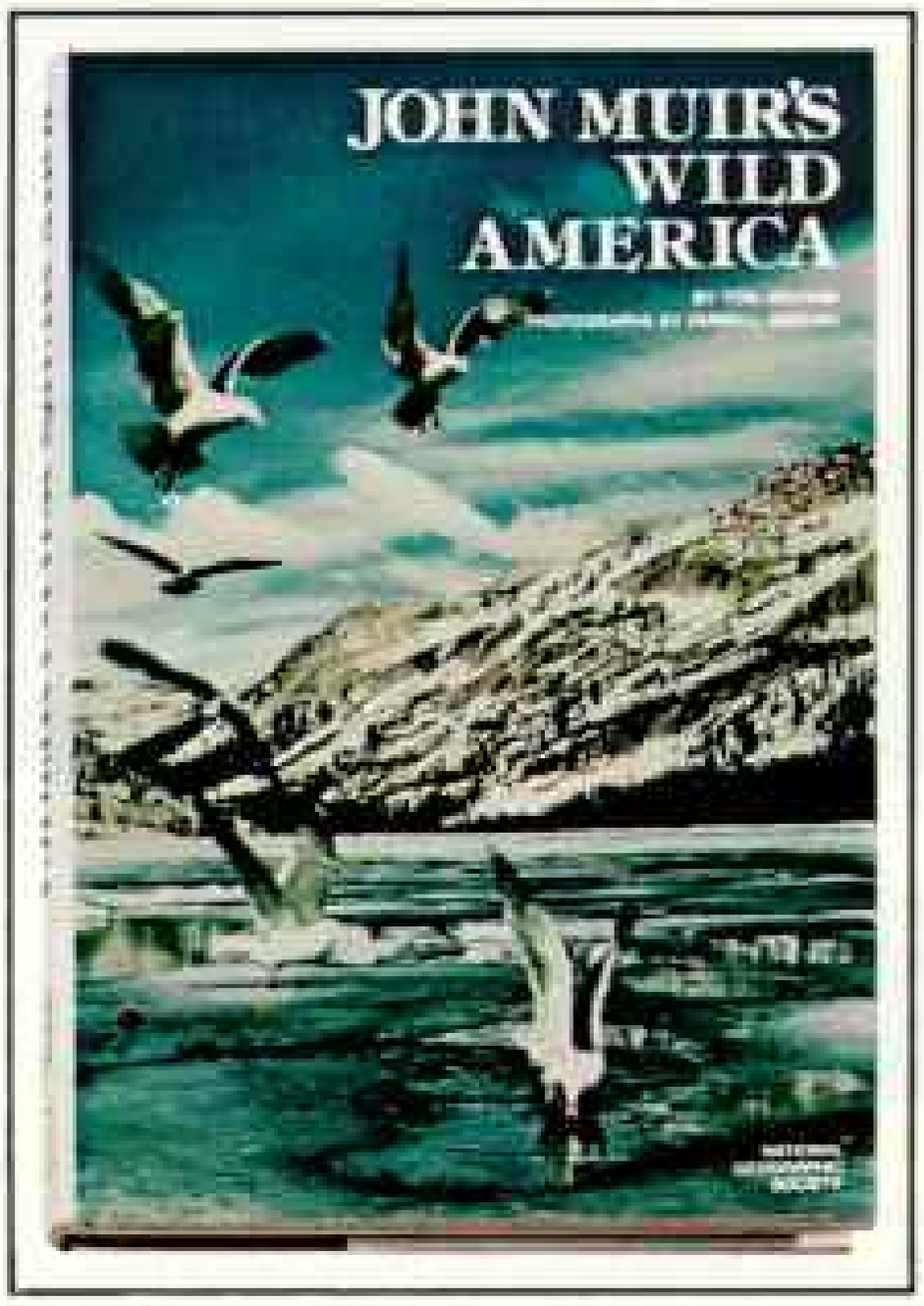
The first, *John Muir's Wild America*, sees our land through the eyes of one of our greatest wilderness travelers—19th-century adventurer, naturalist, and writer John Muir. A rugged sort was John o' Mountains, tough enough to ride a hurtling avalanche half a mile down a canyonside—and revel in the experience. Yet he was gentle, believing the

GALEN ROWELL

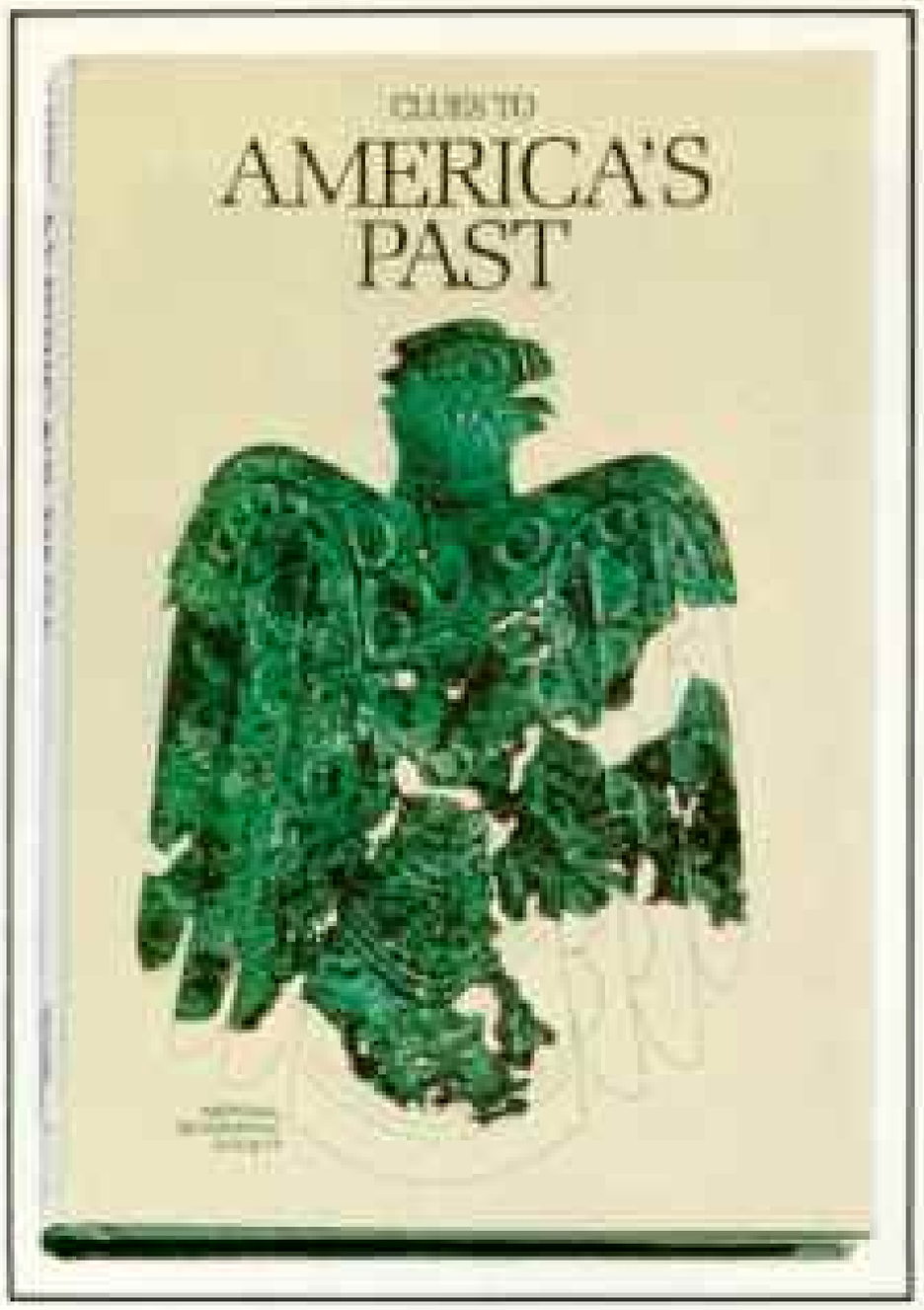
unfiverse "would . . . be incomplete without the smallest transmicroscopic creature. . . ." He knew Wisconsin's woods, Kentucky's caves, and Georgia's swamps; he lived amid the incomparable majesty of California's Yosemite and roamed from the colorful Grand Canyon to snow-capped Mount Rainier, from the wild Oregon coast to the barren ice sculptures of Alaska's Glacier Bay.

A founder of the Sierra Club, Muir crusaded for a system of national parks and national forests, sparked a nationwide awareness of the value of wilderness, helped save the sequoias, and popularized the science of

H. TOM HALL



From towering Yosemite cliffs to living Alaskan glaciers, John o' Mountains bestrides the wilderness he helped preserve, all in this stunning new book, the first of four Special Publications for 1976-77.



ecology. And now this remarkable man walks the pages of a remarkable book—a book that chronicles the inspiring legacy he left us all—America's varied wild lands.

Clues to America's Past, the second book of this series, investigates the intriguing discoveries and methods of archeologists as they re-create ancient American cultures—and helps puncture some long-accepted myths about our own.

Probing archives and museums, detectives of history disprove fallacies long accepted as fact. Consider, for example, the first Thanksgiving: tradition decrees it a devout occasion marked by prayer and solemnity. *Clues to America's Past* shows why that memorable gathering of Indians and Pilgrims is now assessed as primarily a harvest festival of games, sports, and other "recreations," including copious sampling of the brewer's art.

PAINTING BY LOUIS S. GLANZMAN

Archeological detective story, the second book of the series turns the stones of the past to uncover lifeways in America from prehistoric times to the Civil War. Paleo-Indians of 14,000 B.C. share an elk they have killed. Chipped stone tools date from the same period.

Using up-to-the-minute techniques and employing such Space Age machines as nuclear reactors and computers, archeologists also painstakingly piece together our pre-Columbian past from confused masses of shattered pottery and bone fragments. They bring back to life the mysterious culture of Cahokia, in southern Illinois, site of one of North America's largest prehistoric cities.

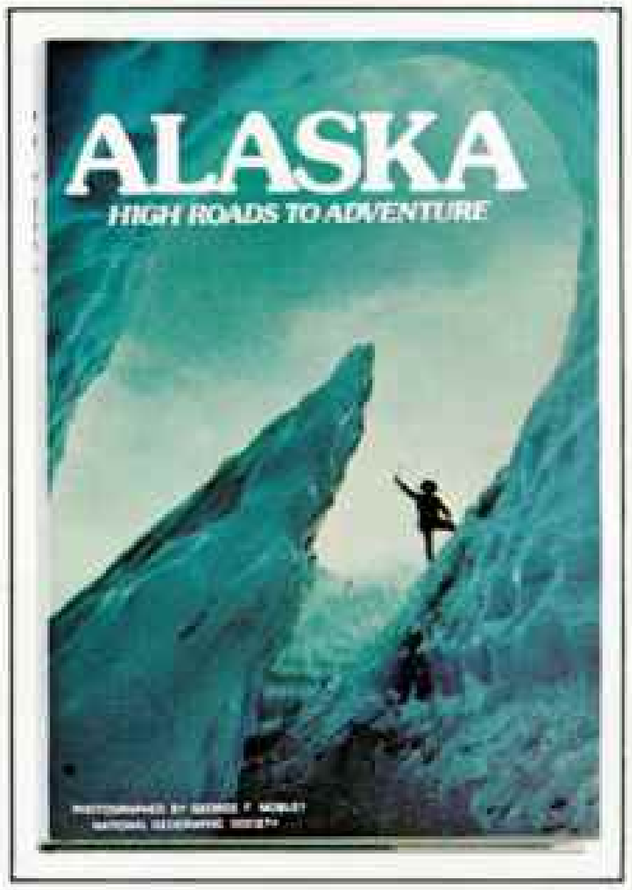
The third book—*Alaska: High Roads to Adventure*—follows the 1,500-mile Alaska Highway through America's frontier, the 49th state. There, Chilkoot Pass still challenges

JIM BRANDENBURG

WILLIS SEITZINGER

hikers. The Klondike trail echoes with exploits of prospectors past and present. Bush pilots and homesteaders, businessmen and hermits, Eskimos, Aleuts, and Indians all stake their futures on the Alaska of today.

Alaska's natural wealth continues to amaze even residents. Salmon race upstream in spectacular annual runs; moose and other game provide a ready food source, and the broad Matanuska Valley holds another—agriculture, now a big business in what was once jeered at as "Seward's Icebox." On Kodiak Island, king crab remains king. Mount



Alaska the magnificent parades its animal wonders and scenic glories in this third new Special Publication. As pipeline builders pierce the ecologically fragile northland, the conscience of a nation poses the question: Can we have both oil and wilderness?

NATIONAL GEOGRAPHIC PHOTOGRAPHER STEVE RAYMER

McKinley, highest peak in North America, lures hundreds of daring climbers every year. Beyond the jagged Brooks Range, the vast North Slope affords a gigantic field of endeavor where the desire for wilderness preservation and 20th-century needs for oil meet head to head. You will quickly become absorbed in this splendidly photographed book, as diverse and adventurous as its subject.

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Then down the line comes *Railroads: The Great American Adventure,* a nostalgia-filled volume about the invention perhaps more responsible than any other for America's early growth and success. From the belching, steam-driven "teakettle on wheels" to the massive diesel-electric locomotive, this is the story of the iron horse.

Determined Indians and formidable mountain ranges challenge railroad work gangs as they strive to span the continent with iron. Lusty songs and legends retell the spine-

BOTH BY JAMES A. SUGAR

tingling stories of "Old 97" and Casey Jones. Train robbers—the James brothers, the Dalton gang, Butch Cassidy and the Sundance Kid—plague the Western lines.

The roar of express passenger trains, among them the gleaming *Twentieth Century Limited,* proclaims the golden age of the railroads. Pictures and text evoke the haunting whistle that once spurred schoolboys to daydream—and hoboes to hop aboard.

National Geographic's Special Publications delight a varied readership. Of 40 books prepared over the past ten years, more than twelve million copies have been distributed —an impressive record when one considers that sales of only 150,000 will rank a book among the nation's ten best-sellers.

To reserve your copies of the latest of these fine publications, fill out the postpaid form at left. You will receive promptly *John Muir's Wild America;* the others will follow at three-month intervals. There is absolutely no obligation; examine each book at your leisure, *then* decide whether you wish to keep it for your personal library. □

All aboard for excitement! The fourth Special Publication for 1976-77 brings to track-rattling life the drama and romance of American railroading. If you've ever thrilled to the fadeaway wail of a train whistle at night, you'll not want to miss *Railroads: The Great American Adventure.*

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But only one that can take you all around the world.

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See your travel agent.

Report from a devastated land

WHEN DISASTER STRUCK GUATEMALA in February, a three-man National Geographic team rushed to the shattered republic to bring back this month's dramatic report. Senior Assistant Editor W. E. Garrett, photographing Guatemala City's ruined Church of Cerrito del Carmen (**below**), had "never seen such total destruction" in a globe-spanning career that has included coverage of the 1964 Alaskan earthquake and the war in Viet Nam. Yet amid the ruin, Assistant Editor Bart McDowell (**right**) encountered "enormous kindness" as he toured the nation with his sleeping bag and tape recorder. "For three days I never had to pay for food or a place to sleep—people just offered." Squeezing into a helicopter, photographer Robert W. Madden (**below, right**) hitches a ride to a village isolated by landslides. He was touched by the "resolute courage" Guatemalans exhibited as they confronted their torn lives and homes. In months to come, your friends can share other timely NATIONAL GEOGRAPHIC reports; use the form below to nominate them for membership.

ROBERT W. MADDEN (LOWER LEFT) AND W. E. GARRETT, BOTH NATIONAL GEOGRAPHIC STAFF

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ILLUSTRATION REDUCED. OVERALL SIZE OF FRAMED ENGRAVING 34½ x 30⅝ INCHES.

The American Bald Eagle

Albert Earl Gilbert's first work in the series of four colored hand-engravings.
Each engraving signed and dated by the artist.

A CENTURY AND A HALF AGO, John James Audubon began creating his renowned "Birds of America" engravings – a landmark art collection by any measure.

Now, in honor of the 150th Anniversary of that historic event, the National Audubon Society will issue its first collection of *hand-engravings* in the Audubon tradition: *The Sesquicentennial Collection of American Bird Engravings.*

The collection will consist of hand-engravings portraying four of America's most impressive birds. The American Bald Eagle. The Screech Owl. The Cardinal. The Blue Jay.

To create these fine engravings, the National Audubon Society has commissioned Albert Earl Gilbert – one of the few living artists whose works are considered worthy to stand beside those of John James Audubon himself.

Fine engravings in the Audubon tradition

In creating the works for this collection, Albert Earl Gilbert will follow the method used by John James Audubon to produce his famed engravings 150 years ago.

Working directly from life, in the woods and fields of America, Gilbert has conceived and created his designs – portraying each bird in authentic and exacting detail.

Then the master engraver personally selected by the artist – Yves Beaujard – will take Mr. Gilbert's original art and painstakingly *hand-engrave* the master plate. And after the first engraving is taken from this plate, Albert Earl Gilbert will add lifelike colors to complete the work. Master craftsmen will then apply these colors – one by one – to each subsequent engraving.

This method of engraving – considered by Audubon himself to be the *only* correct way to create a fine bird engraving – is almost a lost art. Indeed, very few hand-engravings of any kind are created today because of the time, skill and care that must be devoted to them.

Yet the result is well worth the effort. For each engraving is a work of stunning beauty. A work whose strong, forceful lines, visual depth and vivid lifelike color can be compared only to the priceless "Birds of America" engravings completed by Audubon and *his* engraver a century and a half ago.

Individually hand-signed and custom-framed

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Hand-signing is often a key factor in determining the future value of an engraving. For major works that bear the artist's personal signature are highly sought after by collectors as time goes on.

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Each engraving will be issued in *a single, strictly limited edition.* After the edition is completed, the master plates used to create the engravings will be destroyed. *And none of these hand-engravings will ever be issued again.*

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Subscribers will receive their engravings at the rate of approximately one every three months – and will also receive a year's complimentary Family Membership in the National Audubon Society upon completing the series. The issue price for each framed engraving is $120, payable in three monthly installments.

Subscription deadline: June 30, 1976

To subscribe for *The National Audubon Society Sesquicentennial Collection of American Bird Engravings,* simply fill out and mail the application at right. But remember that your order *must be postmarked by June 30, 1976,* to be accepted.

Subscription Deadline: June 30, 1976

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The Screech Owl

The Cardinal

The Blue Jay

The artist: Albert Earl Gilbert

The engraver: Yves Beaujard

Albert Earl Gilbert has devoted his entire career to portraying wildlife. Today he is considered by art critics and naturalists alike to be one of the world's most brilliant wildlife artists. His works are exhibited in The American Museum of Natural History, The Field Museum and The Illinois State Museum, and are included in the permanent collections of the National Audubon Society and The National Wildlife Federation. In addition, his work has appeared in the Encyclopedia Brittanica, the World Book Encyclopedia and *The Audubon Handbook of American Birds*. Writing about Albert Earl Gilbert's work, Dr. Douglas Lancaster, Director of Cornell University's Laboratory of Ornithology, said: "Gilbert's rare craftsmanship, his attention to detail and to accuracy of bird form and posture, coupled with his scholarly interest and broad knowledge of birds, have established him as one of the world's leading bird artists."

Yves Beaujard is one of a vanishing kind of handcraftsmen—the master engraver. Beaujard received his art training at the famed College Estienne in Paris, the only school of its kind in the world. Shortly after graduating, Beaujard was awarded a commission by the Government of France to create a series of official postal stamps. Because of his outstanding work, he was then recommended for a position with the United States Banknote Company, where he created engravings for important currency issues. Beaujard joined The Franklin Mint in 1972 as a master engraver, and has since been responsible for some of the mint's major works of art. Among them are the White House Historical Association Presidential Plates, for which he has received the highest acclaim from art critics and collectors alike.

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Yet, through nearly seven years of bitter struggle a rag-tag army of often ill-clothed, half-starved, and half-frozen, patriots kept alive the dream of Independence. When at last the day of deliverance came at Yorktown, it was more than a victory for musketry and arms. It was the triumph of the burning determination of a People to freely shape their own destiny.

The unprecedented philatelic event dedicated to The Spirit of '76.

It is therefore fitting that on the eve of the 200th Anniversary of the Declaration of Independence, the United States Postal Service will issue a unique and superbly detailed set of *four* sheets of Official United States postage stamps recapturing *The Revolution's Most Memorable Events*. It is the *first* such set of sheets *ever issued* in our Nation's two hundred years. As such it is certain to command the special notice of collectors everywhere; and especially of Americans now rededicating themselves to the spirit which led our Nation to greatness.

The Revolution's Most Memorable Events will portray the four episodes which will always be revered as symbols of courage and determination:

The Declaration of Independence, 1776, for which patriots pledged their lives, their fortunes, and their sacred honor.

The Crossing of the Delaware, 1776, the effort so daring and so unexpected that it brought dazzling victory at Trenton and saved the army at a time when the British thought it was crumbling.

Winter at Valley Forge, 1777-1778, through which the ragged, poorly-equipped army of citizen-soldiers was held together in the face of starvation and wretched weather by the spirit of liberty.

And, *The Surrender at Yorktown, 1781*, the final British disaster and great patriot triumph which at last proved to Great Britain that her American Colonies were to be free and independent states.

The spirit and substance of these epic events will be captured by the individual sheets of postage stamps reproducing world-renowned masterpieces by the great artists John Trumbull, William Trego, Emanuel Leutze, and Eastman Johnson. Each sheet will be of an unprecedented format created expressly for this series. Individual stamps, five within each sheet, will depict details from each heroic painting. Together they will help form the entire masterpiece in all its brilliance.

Available to you: the First Editions.

Our Nation's leading citizens and distinguished philatelists from every corner of the world will gather in Philadelphia on May 29, 1976, to inaugurate *The Revolution's Most Memorable Events*. At special ceremonies on the opening day of the historic ten-day International Philatelic Exposition, Interphil '76, *first* editions will be *officially*-certified by the coveted, one-day-only, *First Day of Issue* postmark of the city where America was born. These Official First Editions will be but a *small fraction* of the total number of sheets eventually available to the general public *after* that day at other post offices.

For this historic occasion, the Philadelphia '76 Commission has appointed the world-renowned Fleetwood Company to issue the first edition of *The Revolution's Most Memorable Events* in *one complete* collection of four matched First Day of Issue Panels. The first one hundred collections have been reserved by the Commission for special presentations during the Bicentennial year. And, because of the National importance of this issue, the Commission has also authorized Fleetwood to offer identical collections to America's citizens.

A truly impressive and historic series.

This is the only collection of First Day of Issue Panels *ever* dedicated to so monumental a theme. As befits such a series, it will be extraordinary in every respect. Superbly detailed and nobly composed, each panel is inspired by an historic work of art: "The Reading of the Declaration of Independence" and the "Surrender of Cornwallis at Yorktown" by the frieze encircling the Rotunda of the United States Capitol, painted in fresco by Brumidi. "The Hessian Surrender at Trenton," — made possible by the Crossing of the Delaware — by John Trumbull's masterpiece in the Yale University Art Gallery. And "Washington at Valley Forge, 1778" by Brumidi's lunette in the National Capitol.

A deluxe presentation portfolio will protect and display the collection.

Citizens who take advantage of this opportunity to acquire the Official Collection of *The Revolution's Most Memorable Events* will also receive, without additional cost, a handsomely bound presentation portfolio. To enhance the historical and educational value of the collection, an authoritative reference guide will be included to describe each of the masterpieces represented in the collection, and to detail the lasting significance of each event.

A single, officially limited, edition.

The Revolution's Most Memorable Events will be issued *only once*— on the precise First Day of Issue, *only* at Philadelphia, and *only* as a complete collection. Thus, the *first edition* will be forever held to the exact number *officially*-postmarked on May 29, 1976. The official issue price for the complete collection is $35, and not more than three sets may be reserved by any one collector.

A collection of timeless significance.

The Official Collection of *The Revolution's Most Memorable Events* deserves a cherished place in your home. It will constantly revitalize the memory of the sacrifices which were made to secure our liberties, and rekindle the "Spirit of '76" for you, your children, and their children for generations to come.

Prompt action well-advised.

This is the *only* time that *The Revolution's Most Memorable Events* can ever be issued. To become one of the select group of Americans who will be able to acquire this inspiring collection, your reservation must be mailed promptly. Requests will be honored, subject to availability, in the exact sequence received. All applications should be sent directly to The Fleetwood Company, 1 Unicover Center, Cheyenne, Wyoming 82008.

RESERVATION APPLICATION
THE OFFICIAL COLLECTION OF

The Revolution's Most Memorable Events

Limit: Three collections per subscriber.

ME

Fleetwood
Cheyenne, Wyoming 82008

Please accept my reservation for _____ Complete Collection(s) of *The Revolution's Most Memorable Events*. The collection will consist of four Official First Day of Issue Panels to be sent to me approximately eight weeks after the Official First Day of Issue date, May 29, 1976. The official issue price is $35 for each collection, which I desire to pay as follows:

☐ I enclose my remittance of $ _____ ($35 per collection) as payment in full.

☐ I prefer to have the full amount of $35 for each collection I am reserving charged to my credit card account below:

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Credit Card Number _____

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Signature _____
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Mrs.
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the Spirit of '76
now and in the future.

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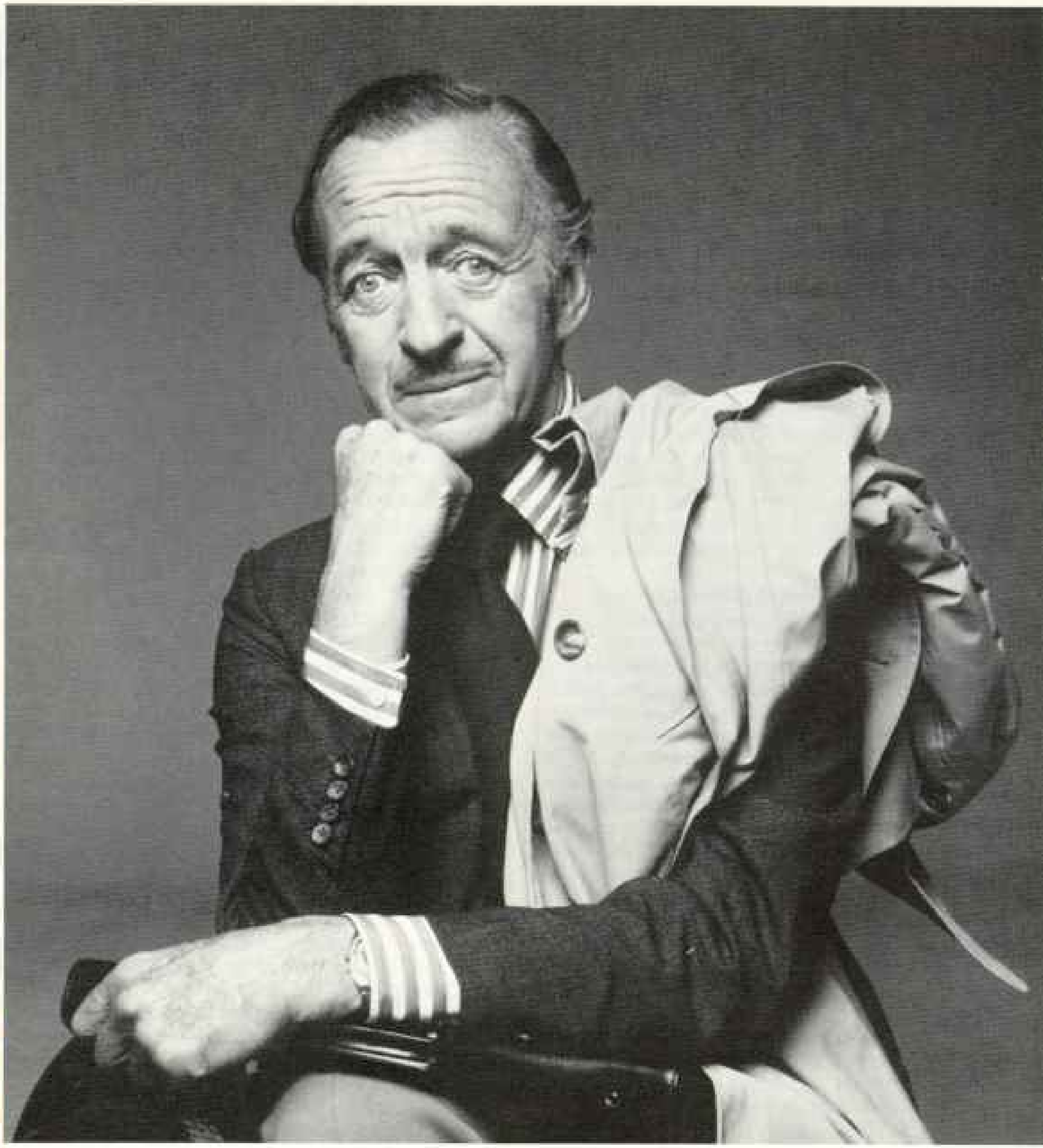
Each of the four Official sheets of United States stamps is of a format never before used for America's stamps. Individual stamps, five within each sheet, depict details of each painting. Precisely oriented in the sheet, they help form the entire masterpiece, correct to minutest detail. Shown above seventy-five per cent of size.

NATIONAL GEOGRAPHIC



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45,000 ON-THE-SPOT REFUND LOCATIONS.

Massive, concrete arteries: do they nourish the city core? Or drown it? In pollution, congestion, noise, waste! Which? Each is partly true.

An urban freeway does encourage extra traffic. Concentrates it. Attracting commuters away from other transit systems. And freeways impose other costs, too. Building them can dislocate families, change neighborhoods, promote urban sprawl, concentrate noise and pollution, deface skylines. "Freeways," many say, "make a bad problem worse!"

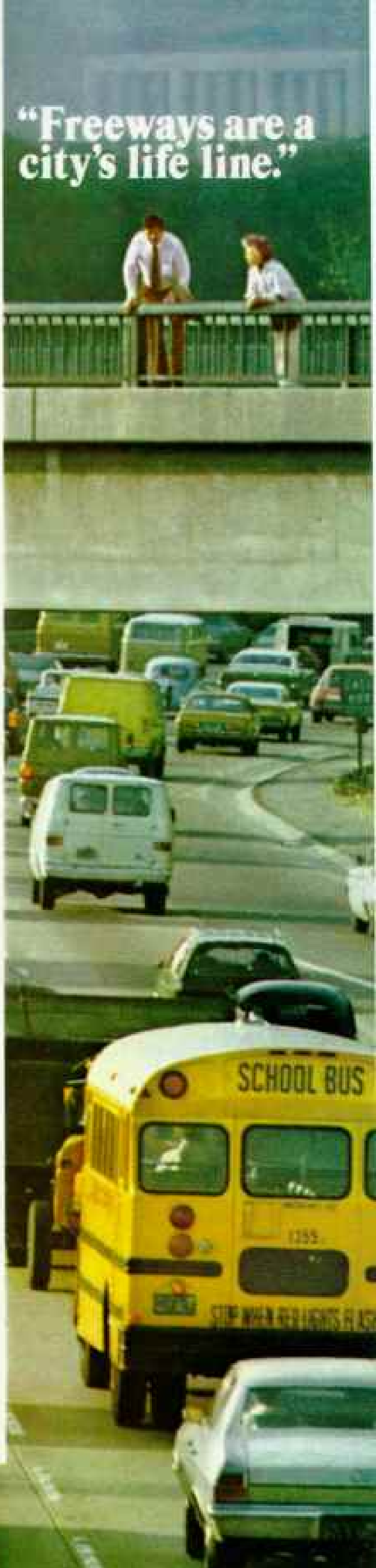
On the other hand, urban freeways facilitate fast, safe, comfortable movement around town—door to door—for service vehicles, emergency vehicles, delivery trucks, taxis, and automobiles. And buses. They promote more use of inner-city facilities: theaters, cathedrals, museums, art galleries, concert halls, stores, stadiums. And freeways let urban dwellers reach suburban jobs —conveniently, quickly—and outlying zoos, parks, golf courses. Freeway proponents say the benefits outweigh the drawbacks.

Which way should we go?

First, let's recognize that no one mode will solve all a city's needs. We can't ignore public transportation for those who need it: the old, young, handicapped, poor. The auto-less. Those who prefer it. In some places mass transit means subways or elevated trains—in most, it means buses running on city streets and freeways.

We must provide those freeways for buses and for truckers, commuters, service people, business travelers, shoppers, tourists—just as we must have pipelines and air transport, railroads and waterways. Each mode must be given proper consideration if we are to have a well balanced, total transportation system.

Caterpillar machines are used to build and maintain transportation facilities of all kinds, from roads to airports. We believe a first-class transportation system needs all modes.



There are no simple solutions. Only intelligent choices.

CATERPILLAR

Bran may be the richest source of food fiber in the American diet.

Food fiber's importance to our nutrition is rapidly gaining recognition. But we've known for years that Kellogg's fiber-rich cereals help the digestive system regulate itself.

Sources of fiber.

Generally speaking, food fiber is found in fruits, vegetables, and whole grains. But many Americans don't eat these foods in quantity anymore.

So while there are many American foods with some fiber content, there are few that are fiber-rich. Kellogg's® All-Bran® and Bran Buds® are an exception, for bran is one of nature's richest sources of food fiber.

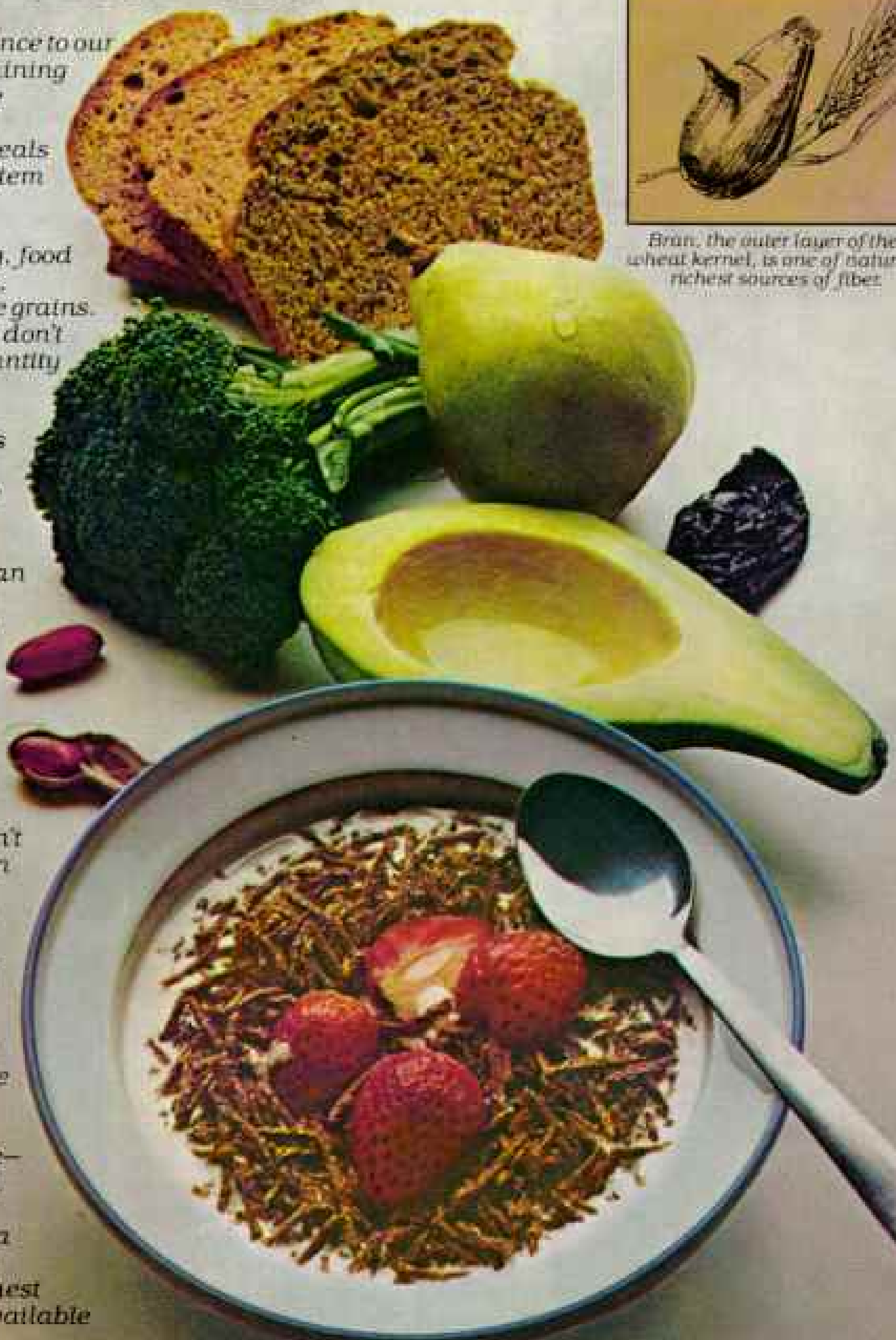
How much fiber is enough?

The clinical evidence isn't in. But what we do know so far suggests that many Americans aren't getting enough fiber in their normal diet.

If you're concerned about food fiber and your health, consider adding Kellogg's fiber-rich cereals to your diet. They have an honest wheat taste that stays crunchy in milk.

So take your choice—All-Bran, in shredded form, or Bran Buds, morsels of bran with a slightly sweeter taste. They're one of the richest sources of food fiber available to Americans.

Bran, the outer layer of the wheat kernel, is one of nature's richest sources of fiber.



All-Bran and Bran Buds.
The high-fiber cereals from
Kellogg's®

Remember when you were in such a hurry to grow older?

At the time, thirteen seemed like a silly age. It was so. . .*young*.

And since growing up was taking so long, you decided to hurry nature along, and become Very Mature instantly.

As it turned out, the years didn't need any hurrying at all. The girl above trying to look like a Woman is *now* a Woman—and probably wondering, like yourself, how she got there so fast.

You can't postpone the future.

If all that time can fly by so fast, imagine how quickly the *next* several years will pass.

That's why we'd like to urge you to get ready for them.

And that's where Metropolitan Life can help.

We don't just insure your life. We help insure your future.

Let's say you're planning to send your children to college someday. If you take out your own Metropolitan policy, that can help pay for it.

Or maybe you've chosen a career instead, and you have an eye on a business of your own someday. Your Metropolitan insurance can help make that possible, too.

And, of course, men aren't the only people who retire. Women do, too. Your Metropolitan insurance can help make a secure retirement possible, too.

In fact, two out of every three dollars we pay out in benefits go to *living* policyholders to help pay for their future.

She who hesitates pays higher premiums.

At Metropolitan Life, we insure over forty million people. We've been helping people prepare for the future for 107 years. But while much has changed over that time, one fact about personal life insurance is always the same:

The sooner you begin, the less it costs every year.

See your Metropolitan representative. Soon. Because the future gets closer every minute.

Metropolitan

Where the future is now

PAINT ISN'T ALL IT'S CRACKED UP TO BE.

Consider these guaranteed alternatives...

Whether the exterior of your home is old paint, stain or new wood, the finish you put on should do two things: Look beautiful and stay that way. That's why, before you settle for ordinary housepaint, we'd like to show you some guaranteed ways to do the job better.

Olympic Overcoat®: Put it over paint.

If old paint's your problem, the answer is Olympic Overcoat—the acrylic latex coating that goes on easily, covers almost any surface in a single coat and dries quickly to a beautiful flat finish that lasts and lasts.

Olympic guarantees you'll like Overcoat better than anything you've ever used. Try it. If you're not convinced, return your first gallon and any un-opened cans to your dealer for a full refund.

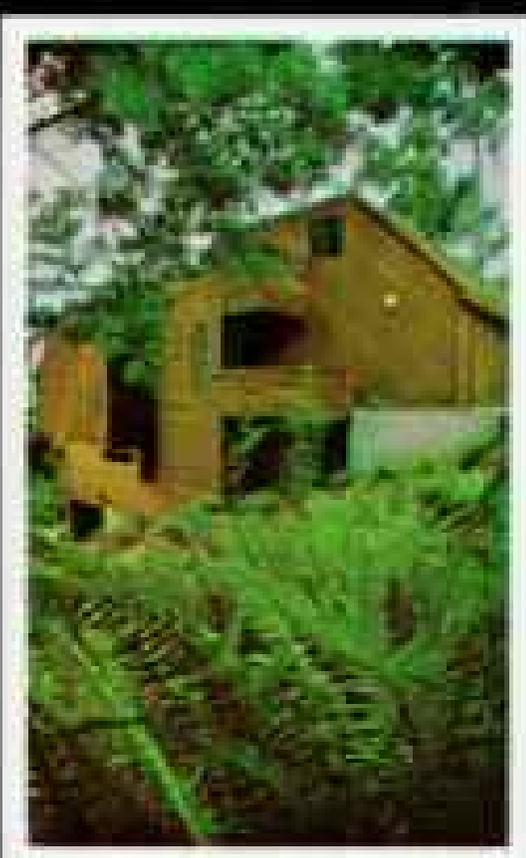
Solid Color Stain: For the mellow look.

Olympic Solid Color Stain combines mellow, rich color with lasting protection. Rich in pigment, it hides beautifully—usually with a single coat. But, rather than forming a thick film it penetrates; lets wood breathe. We guarantee to refund your money or provide replacement gallons at our option if Olympic Stain ever cracks, peels or blisters (except when caused by a breakdown of the previous paint film). Our guarantee does not cover labor costs.

Acrylic Latex Stain: For easy water clean-up.

You can get the same mellow beauty, the same remarkable guarantee—plus fast-drying and easy water clean-up with Olympic Acrylic Latex Solid Color Stain. Look for the blue can.

Semi-Transparent Stain: For the ultimate beauty of wood.



Olympic Semi-Transparent Stain does the most beautiful thing you can do for new wood: It highlights the grain and texture, enhancing wood's appearance with soft color that weathers graciously. Rough or smooth siding, decks, fences, outdoor furniture—you name it—if it's wood, nothing you can use adds the same subtle beauty and lasting protection you get with Olympic Semi-Transparent Stain. It, too, is backed by the Olympic Stain guarantee.

For straight answers to any questions you have about finishing your home, see your Olympic dealer. Look for them in the Yellow Pages.

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So, if we want your business, we have to be a better airline.

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Bahamas. The country of 700 islands.

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We know that only the female bites.

We know that if fed on blood, she can lay over 200 eggs in a single mid-afternoon.

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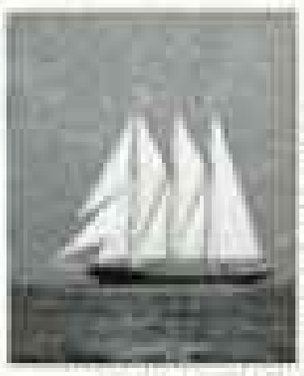

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Hunters bag them for trophies. Guardians, hired to protect guano birds on Peru's offshore islands, wantonly slaughter condors on the mainland. One village ceremony also takes a grisly toll. A captive bird is swung from arched poles, and Cashapampa's fist-swinging horsemen pummel it to death. A man bites its tongue out, then others tear the creature apart for talismans. The rite, now meaningless, apparently began with the Spanish, who symbolized destruction of the Inca's pagan culture by killing condors. Their cousins, the few surviving California condors, cling to dwindling mountain retreats. Readers keep tabs on these and other endangered species by regularly turning to the pages of NATIONAL GEOGRAPHIC.

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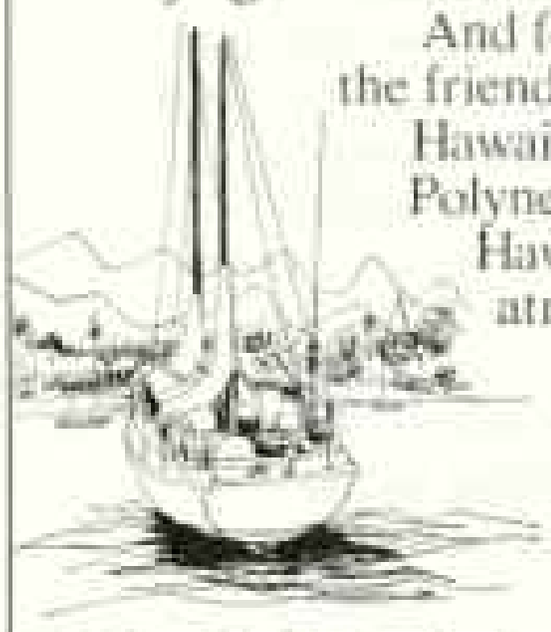

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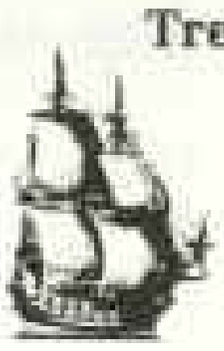

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