TRAVELER'S MAP OF SPAIN AND PORTUGAL

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THIS JULY on New Zealand's East Coast I had occasion to follow the footsteps of the family that produced the Maori article in this issue. Inevitably, wherever I travel, I hear about GEOGRAPHIC people who've worked there in the past.

Last year in a small town in Syria I was told, "We've had your people here before, you know—May 19, 1931!" Usually the gap isn't so long, but almost without exception the memory is favorable.

That's no accident. Our writers and photographers are advised always to "leave the nest as clean as you found it" for the next one to come along. In the case of John Eastcott and his wife, Yva Momatiuk, traveling with their 2½-year-old daughter, Tara, through the land of the Ngati Porou people, they left it better than they found it.

Reports considered inaccurate, insensitive, or even demeaning had soured these Maoris on visiting writers and photographers. In short, our team wasn't really welcome. Even when they had received grudging cooperation, they needed specific permission for all photography—and it wasn't always forthcoming, at least at first.

When I arrived with Dr. Tamati Reedy, Secretary of Maori Affairs, and the proofs of Yva's text and John's picture layout, the welcome was reserved but warm. To know the Maoris at all is to know that not everyone would ever be happy with all that is said or shown. But those I met remembered John and Yva as good people and found their work fair.

More important, their daughter left her own lasting contribution. At a funeral for a respected Maori teacher who had died in a car accident, I met Kate Walker, a member of the National Advisory Committee on Maori Education. "I was one who gave them a bad time at first. But they did us a great favor by bringing Tara," Kate said.

John, a New Zealander, and Yva, being from Poland, had taught Tara to speak both English and Polish. "By the time they left," Kate continued, "she was also speaking some Maori. Before they came, a lot of our people said we couldn't expect children to learn two languages. Tara changed that." And for Maori leaders like Kate and Tamati Reedy—dedicated to preserving Maori culture—she became an inadvertent ally.

Wilbur E. Garrett

EDITOR

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COVER: *Trying to escape pollen's miseries, two croquet players don the Hincherton Hayfever Helmet. Photograph by Martha Cooper.*

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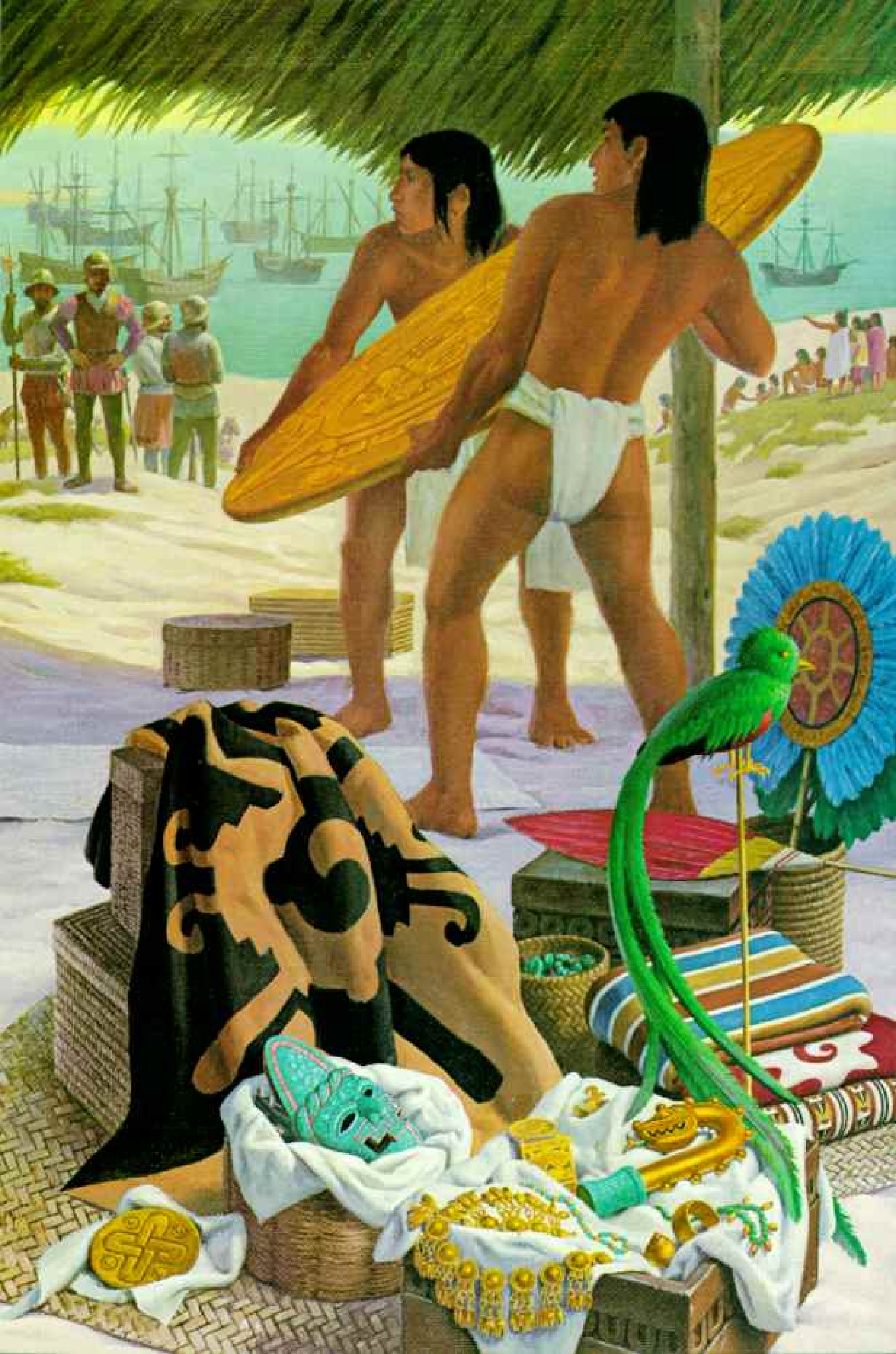
FOLLOWING CORTÉS:
Path to Conquest

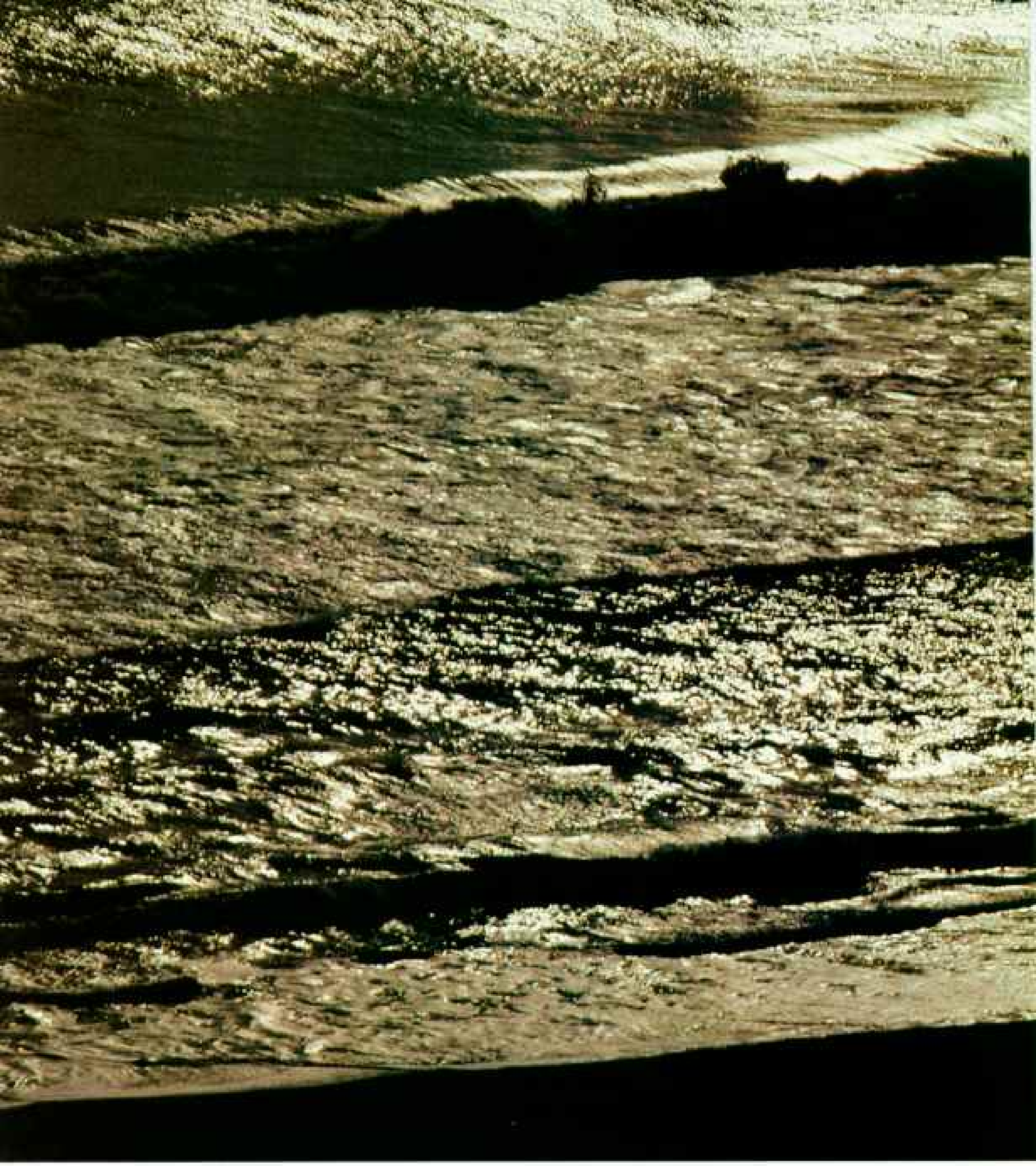
WHAT AUDACITY HE POSSESSED, this upstart Spaniard. With a craving for wealth but limited military experience, he landed on the coast of Mexico with some 550 men, 16 horses, 14 cannon, and a handful of dogs. He was daring, politically skillful, at times ruthless, always imaginative. Yet how could even Hernán Cortés have imagined he would soon gain control of one of the most powerful empires in the world?

HOSPITAL DE JESUS NAZARENO

It was Good Friday, 1519, when Cortés stepped ashore on a beach near present-day Veracruz (right). He was soon greeted by ambassadors of the great Moctezuma II, lord of the mighty Aztecs, who presented him with astonishing gifts. There were gold necklaces and ornaments, a turquoise mask, pieces of featherwork, richly colored textiles and, most impressive, disks of hammered gold and silver the size of cartwheels. As stunning as they were, they were but a hint of marvels yet to come as Cortés led his men inland to the Aztec capital. They would soon discover cities larger than any in Spain, volcanoes reaching into the clouds, armies so vast they stretched out of sight, and bloody rituals of human sacrifice. Their journey of conquest, intrigue, valor, and uncommon luck would change forever the face of Mexico.

By S. JEFFREY K. WILKERSON
Photographs by GUILLERMO ALDANA E.
Paintings by NED SEIDLER
NATIONAL GEOGRAPHIC ARTIST
and ROSALIE SEIDLER





"CORTÉS? Yes, a man called Cortés crossed that mountain." The old Indian spoke across the campfire, then fell silent. At the limit of the flickering light our horses stamped their hooves. There was a chill in the air, for we were camped at almost 9,000 feet in the Sierra Madre Oriental of Mexico.

I waited for the old man to speak again. He did not. Long ago I learned that Indian elders are seldom loquacious. Finally I asked, "What did he do here?"

"I do not know. When I was a child, the grandfathers told me that he came many years ago."

Silence again. After a respectful delay a younger man volunteered, "He went to meet Moctezuma, who ruled these lands."

It was in August 1519 that Hernán Cortés led his company of about 400 Spaniards,

plus several hundred Indian warriors and bearers, past Chololoyan, the village of my taciturn informants. He was marching to Tenochtitlan, now buried beneath sprawling Mexico City, to meet Moctezuma II—and ultimately to overthrow the proud empire of the Aztecs,* then called the Mexica

*Bart McDowell told the story of the people of Mexico's last great pre-Hispanic empire in the December 1980 NATIONAL GEOGRAPHIC.

IN PURSUIT OF CORTÉS, the author and his party set out from the Gulf of Mexico for the Aztec capital, now Mexico City, along the same route taken by the Spaniard four and a half centuries earlier. Cortés sent one ship back to Spain with treasures for the king. The other ships he had destroyed to prevent his men from turning back. Thus he stranded them in a strange land.

(meh-SHEE-kah). That journey of 83 days and more than 400 miles, a landmark feat of perseverance and arms, opened the way to a cultural amalgamation that produced modern Mexico, part Indian, part Hispanic. The sinuous route took Cortés from the humid littoral of the Gulf of Mexico across three series of mountains—from zero elevation up to more than 12,000 feet.

. . . the heroic actions and deeds that we accomplished when we won New Spain and its provinces in the company of the valorous and daring Captain Hernando Cortés . . . I myself saw. . . . I have no other wealth to leave my children and descendants except this my true and remarkable story.

BERNAL DÍAZ DEL CASTILLO

WHEN, 462 YEARS LATER, I set out on horseback to retrace Cortés's journey, I wanted to follow the same long-obscured trails and paths whenever possible. I relied heavily on Cortés's own account, as well as that of the gifted chronicler Bernal Díaz, whose *True History of the Conquest of New Spain* was completed 53 years after the event. I also sought out documents preserved in Mexico City and in Spain's Archive of the Indies in Seville, and stories handed down by the "grandfathers" to the people who live along the way—such as the spare oral history I heard in Chololoyan.

Hernán Cortés was about 34 years old when he undertook his extraordinary journey. His birthplace was the town of Medellín in the Spanish region of Extremadura, where poor land and bitter harvests had spawned a tradition of seeking one's fortune bearing arms. Extremadura also produced Francisco Pizarro, conqueror of Peru, Vasco Núñez de Balboa, discoverer of the Pacific Ocean, and Cortés's lieutenant, Pedro de Alvarado, who later conquered Guatemala.

Willing to take great risks, Cortés also

THE ROUTE OF CORTÉS

As retraced by S. Jeffrey K. Wilkerson

HIDDEN BY TIME, *stones from Mexico's first European settlement lie before the author (**below**, at left) and his assistant Genaro Domínguez. Cortés founded Villa Rica de la Vera Cruz to circumvent legal restrictions on his mission. As leader of an expedition for the governor of Cuba, Cortés was not authorized to colonize new territory. But as the representative of a duly organized Spanish town, he could claim new lands directly for the crown.*

Cortés's 400-mile trek across Mexico, from the tropical coast through the snowy passes of the Sierra Madre Oriental, took him 83 days. The author's party took 53. Though they fought no battles such as Cortés fought, they faced fighting bulls and suspicious farmers with shotguns. They endured torrential downpours, parching deserts, and freezing rains. And they survived the teeming traffic of Mexico City to reach the heart of the Aztec capital.

ENRAGED *by human sacrifices, Spanish soldiers hurl down idols at the main temple in Cempoala, to the horror of a Totonac priest (***right,** *foreground). The city's leader, called the Fat Cacique by the Spaniards, stands in the grip of two conquistadores. Today schoolchildren climb the steps of the same temple (***above***).*

Despite the Spaniards' actions, a successful alliance was formed with the Totonac people. Cortés won their allegiance by boldly ordering some visiting Aztec tax collectors imprisoned. To avoid being blamed for the act by Moctezuma, however, he also secretly arranged for two of them to escape.

proved himself an exceptional diplomat, winning allies among Indian peoples who despised their Aztec overlords. Fervently religious, he prohibited human sacrifice and erected crosses in temples built for the grisly rituals. Yet he could be ruthless; fearing attack in the city of Cholula, he slaughtered 3,000 warriors.

Finally, Cortés could steer through the complex legalisms to which 16th-century Spain was greatly attached. Such maneuvering led him to found the first European town in what is now Mexico, Villa Rica de la Vera Cruz—"rich town of the True Cross"—where I began to retrace his route.

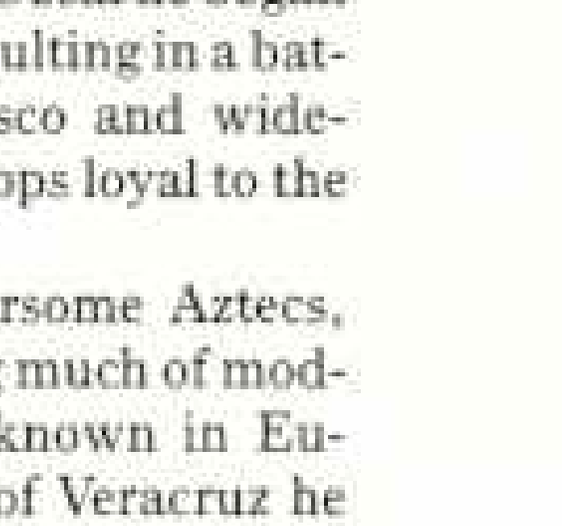
This was not at today's bustling port of Veracruz. The original site, near a beach of dark sand 45 miles to the north, was not definitely established until the early 1950s. Even today no marker honors it.

Cortés had no authority to establish Villa Rica, much less to journey to the great Aztec capital. He had been sent by the governor of newly conquered Cuba, also called Fernandina, to reconnoiter the mainland coast. He was to take no risks. But in his zeal he began to exceed his instructions, resulting in a battle with the Maya in Tabasco and widespread discontent among troops loyal to the Cuban governor.

He learned about the fearsome Aztecs, whose empire, encompassing much of modern Mexico, was totally unknown in Europe. Near the present port of Veracruz he received emissaries from Moctezuma, who believed that Cortés might be Quetzalcoatl. Prophecy held that this legendary god-ruler would one day return from the east.

Cortés galloped horses on the beach and sent stone cannonballs crashing into the forest beyond to impress the Indians. Awed, Aztec artists quickly made paintings of the Spaniards and their weapons for runners to take to Moctezuma.

It was the Spaniards' turn to be astonished when Indians returned and unloaded lavish



gifts including two large disks of hammered gold and silver, more than 20 golden animal figurines, lengths of decorated cotton cloth, and feathered ornaments.

Eventually the emissaries abandoned the Spaniards in hopes that they would leave. Soon some Totonacs, discontented subjects of the Aztecs, appeared and led them to Cempoala, their capital.

. . . they had their dwellings well white-washed and shining . . . and it seemed to one of the horsemen that the white shone as silver, and he returned galloping to say to Cortés how they had walls of silver.

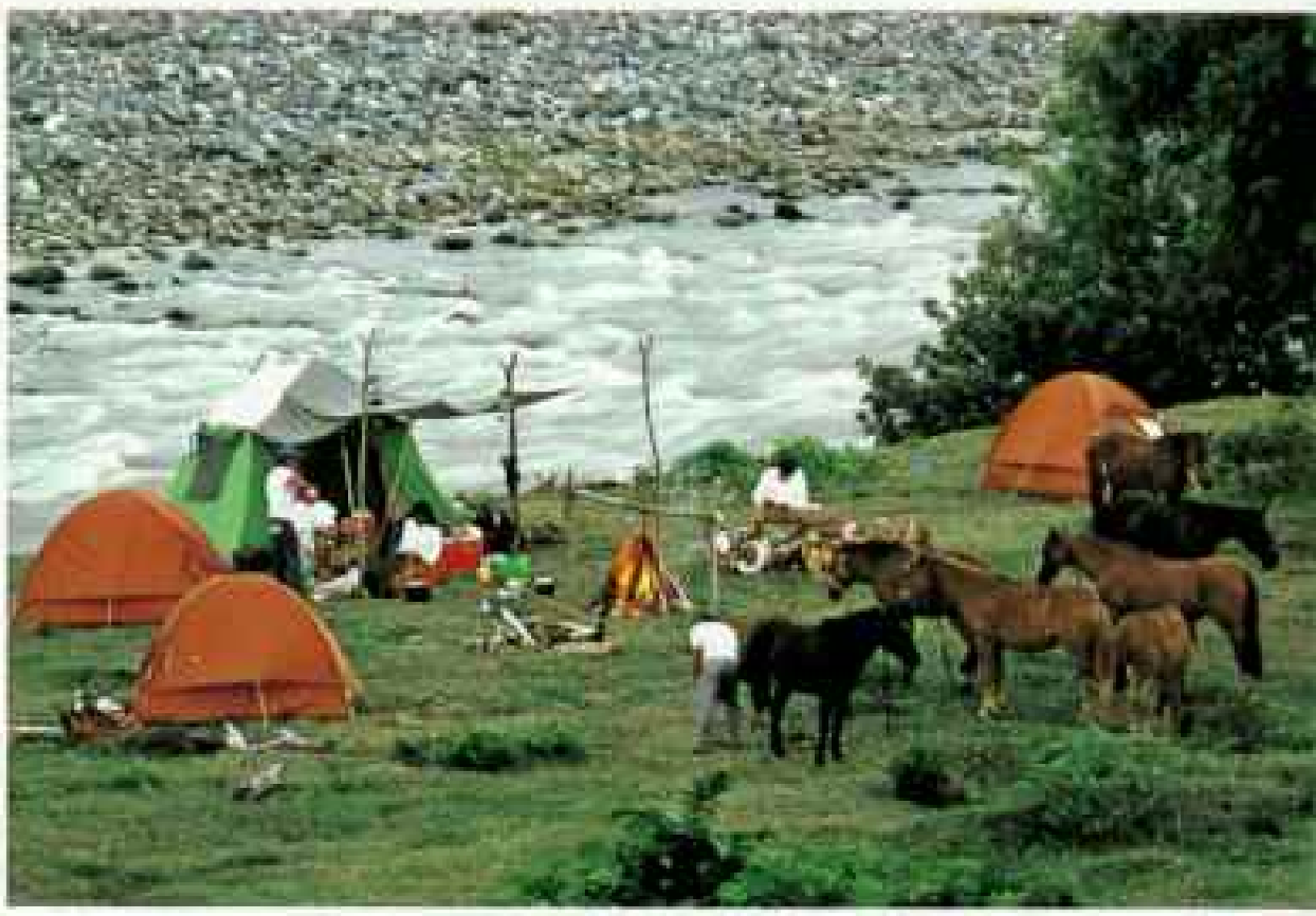
THE WALLS of this gleaming city, set among irrigated gardens, were plaster, but Cempoala nevertheless whetted the Spanish appetite for conquest. With 80,000 or more people, it was larger than any city in Spain. Exclaimed Bernal Díaz: "We gave thanks to God for the discovery of such a country."

The people offered the famished strangers fruit and maize cakes. And they poured out their grievances against Moctezuma. His tribute collectors impoverished them and took their sons and daughters as slaves or for sacrifice.

I believe the great decision to march inland was made at friendly Cempoala. But how could Cortés go—legally—beyond his narrow instructions from the governor of Cuba? By founding a town, complete with fort and officials. In effect he resigned his commission from the governor and took up another, as captain general of Villa Rica de la Vera Cruz.

Subterfuge? In Spanish eyes this was a questionable but legal maneuver. A ship was sent with an explanation to Charles V, sweetened by Moctezuma's extraordinary gifts. Cortés then quelled lingering opposition by hanging two of his men, flogging others, and destroying his entire fleet.

"Believing, therefore, that if the ships remained there would be a rebellion . . . whereby all that in the name of God and Your Highness has been accomplished in the land would be prevented," he advised his distant monarch in Europe, "I devised a plan, according to which I declared the ships unfit to sail and ran them aground."



Incredible audacity! Now Cortés himself dared not return to Cuba. He surely would have been executed for exceeding his authority, the fate of many conquistadores.

Cortés left about 150 men at Villa Rica. He took with him most of his soldiers, the sailors from the wrecked ships, 400 Totonac warriors and bearers, and a few Indian servants from Cuba. He had 15 horses and 14 cannon. Some men carried the unwieldy harquebus, a not very reliable early firearm;

LIKE WALKING UP THE DOWN ESCALATOR, *the author's party struggles with poor footing on a steep trail between Xico and Ixhuacán de los Reyes* ***(left)****. Heavy rains have long since washed away most of the flagstones laid down centuries ago. At a campsite beside the Antigua River* ***(above)*** *vampire bats bloodied the ears of one of the horses during the night.*

CROUCHING *on massive stone haunches, a centuries-old, rudely carved jaguar known today as the San Miguel stone* (**above**) *looks toward the summit of Orizaba* (**left**), *at 18,855 feet the third highest peak in North America. Jaguar images represented powerful deities in most pre-Hispanic Indian cultures. In the Orizaba region, the few examples found have features of a fearsome monster. Candles are still burned today beside the stone, and food or floral offerings appear during uncertain times. The fact that the eight-foot-long statue points directly toward Orizaba illustrates the sacredness of the volcano.*

others were armed with crossbows, lances, swords, and perhaps pikes.

Villa Rica survived only a few years before being supplanted by ports that could accommodate larger vessels. Only a few stones remain today, amid a patchwork of cornfields plowed by oxen with measured pace.

Here I was joined by three colleagues who would go with me on the journey: Victoria Velasco, who helped me research the route; Genaro Domínguez, who would care for our equipment; and Julio Lagunes, who would tend the horses and mules. Our first animals were kindly provided by Don Agustín Acosta Lagunes, Veracruz's governor.

Photographer Guillermo Aldana E. joined us from Mexico City. At the last minute the expedition received a volunteer, my Totonac friend José García Santés. Cortés had started his journey with Totonac guides, and so too would we.

It was the height of the rainy season. The temperature exceeded 100°F on the day we started for Cempoala. Here Cortés began his journey to seek Moctezuma's capital, reaching it, battle weary, 83 days later. Our expedition would take 53 days—and encounter different dangers.

At times we followed pavement fringed by sugarcane and mango trees. People

stared with curiosity at our little procession: six persons on horseback, and two mules and two horses as pack animals. Trucks roared by a foot away. Yet most villages we passed did not own a single car 20 years ago.

In the afternoon we reached the place now called Zempoala and set up camp amid ruins of Totonac temples. Here Cortés's army had been quartered in a single building. No longer a great city, Zempoala is just a large town. Its population was decimated in the 16th century by by-products of the conquest—epidemics of smallpox and other diseases to which the Indians had no natural resistance.

. . . there came forth twenty principal Indians . . . and they brought bouquets of sweet-smelling roses of the land, . . . and they said that their lord awaited us in his lodgings, and because he was a very fat and heavy man he could not come to receive us.

REMARKABLE LUCK enabled the Spaniards to communicate with the obese chieftain, known to history as the Fat Cacique. On the Yucatán coast Cortés had rescued a shipwrecked Spaniard, Gerónimo de Aguilar, who had lived for eight years as a slave of the Maya. And as a peace offering after a battle in Tabasco, the Maya had given Cortés slaves, including a young woman whose native language was Nahuatl, the Aztec tongue. Her Indian name seems to have been Malinalli; the Spaniards baptized her Marina.

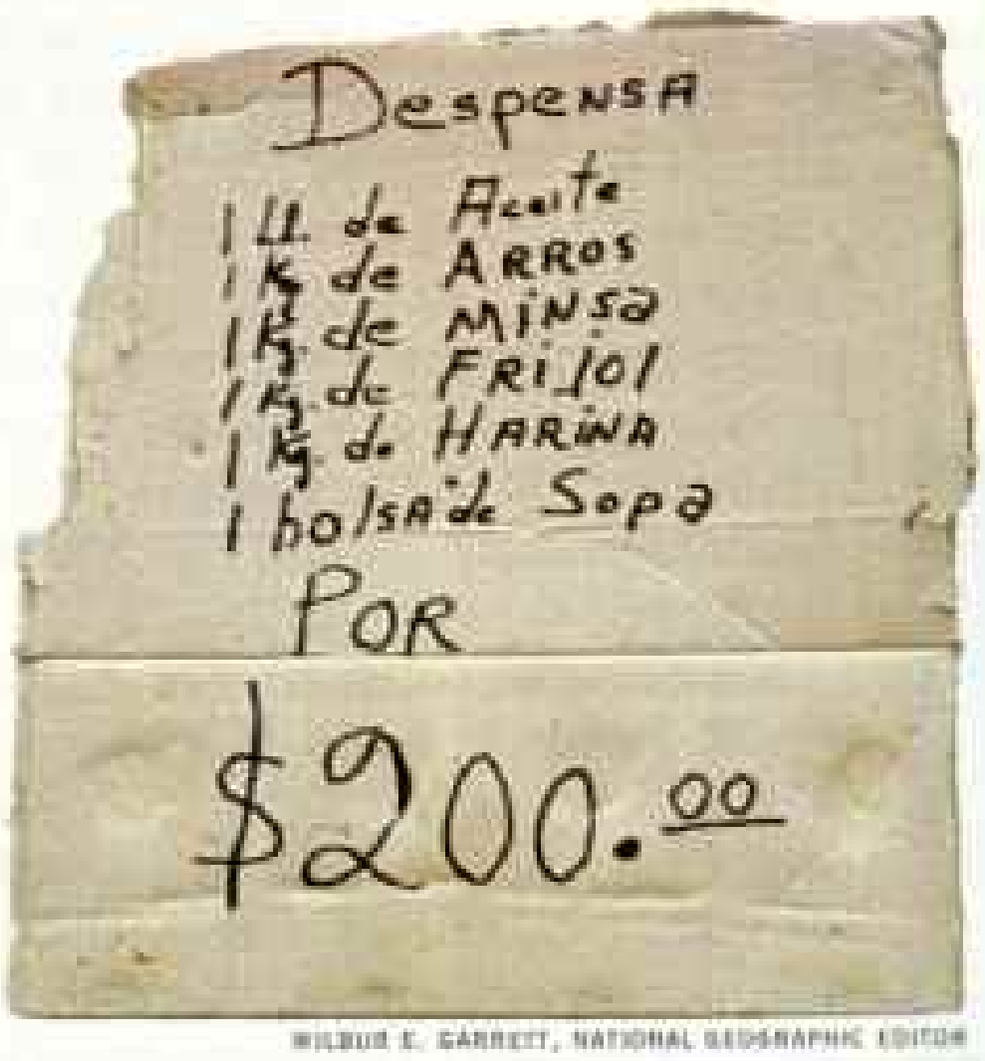
Cortés spoke Spanish to Aguilar, who spoke Maya to Doña Marina, who spoke Nahuatl to the Fat Cacique. The response came back in reverse order. Doña Marina served the captain general so effectively that the Indians identified Cortés with her. Both became known by the reverential form Malintzin, later corrupted to Malinche, which is now Doña Marina's name in Mexico.

In Cempoala, Cortés risked losing his new allies. Like many Indians the Totonacs sacrificed humans to their gods. Díaz recorded how they had already found "altars of their idols covered with blood and the hearts before the idols and also . . . the flint knives with which they opened their chests to take out the hearts." Horrified, the Spaniards watched victims taken before the idols in the main temple. Finally, their religious zeal exploded. Soldiers sent the idols crashing down the steps (pages 426-7). Furious, Totonac warriors prepared to fight.

The Spaniards faced them down, seizing the Fat Cacique and six priests as hostages. Cortés "spoke eloquently to the Indians through our interpreters," Bernal Díaz said.

A SHY ONLOOKER *gazes at passersby on the Camino Real near Ixhuacán de los Reyes. In a region of heavy rains, farmers hang beans from the roof and tack skins to the wall to dry.*

*BASIC TO LIFE since the Aztecs, corn is unloaded (**right**) at a government storage depot in the highlands. A sign (**below**), posted in a store run by the National Company for Popular Subsistence (CONASUPO), offers a week's supply of oil, rice, corn flour, beans, wheat flour, and soup for two people for the equivalent of $1.20. Corn tortillas, such as these cooking (**bottom**), became a staple for the Cortés expedition.*



WILBUR E. GARRETT, NATIONAL GEOGRAPHIC EDITOR

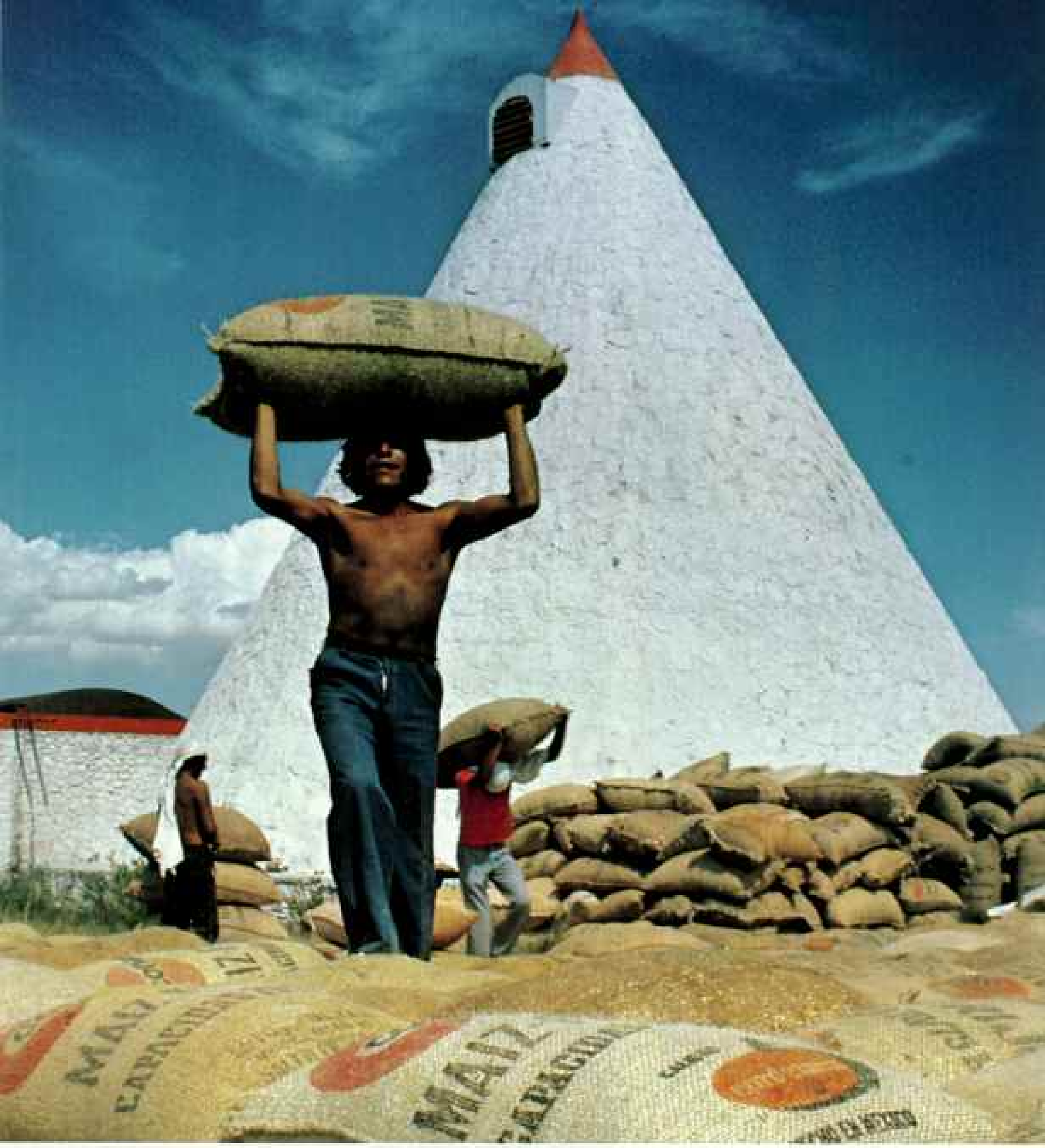
"... we would treat them as brothers and give them all possible help against Moctezuma." A cross was erected in the temple.

I sat on the steps of that temple and chatted with several high-school students. They talked about the nuclear generating plant being built 20 miles away—in fact, very near Villa Rica. Zempoala had become a boomtown of construction workers, their high wages the gold of a different conquest.

"The future will surely be different," a girl said, adding proudly, "but Zempoala will always be here."

We rode out of Zempoala to a ford on the Actopan River. Cortés, joined by hundreds of Totonac bearers and warriors, may have crossed here. We tried, and failed.

Julio and I nudged our horses into the muddy river swollen by downpours. Suddenly we were saddle deep, pushed 50 yards



downstream over stones that rolled with the racing current. Crossing with the pack animals would have been suicidal.

We detoured ten miles to an old suspension bridge. It surged a foot or so as heavy trucks rumbled across—none stopping to let our skittish horses pass. In desperation we raced the animals across between trucks.

Cortés had forded the Actopan at low water. But where did he go from there? Bernal Díaz wrote that from Cempoala "the first day's march took us to a town called Xalapa." Today Xalapa (sha-LA-pa) is the capital of Veracruz state; in 1519 it was a mere village. Did Cortés's band march 75 miles in a single day, just to get to a small village? I think not. Díaz wrote his account five decades after the conquest; by then Xalapa was an important city on the new coast road.

My research suggests that the Spaniards

SURVIVORS *of violent days, Don Pascual Limón and his wife, Doña Irma* (**above**)*, own a former hacienda on the dusty plateau west of the Sierra Madre Oriental. Larger haciendas in the region were destroyed or occupied by landless peasants during and after the Mexican Revolution, beginning in 1910. The former hacienda of Totalco* (**right**)*, once owned by the Limón family, bears the scars of that upheaval on the high stone walls enclosing it. About 24,000 acres of Totalco's land now belongs to a cooperative farm. A corral that once held more than 400 mules today contains baseball and soccer fields.*

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followed a more southerly route and came at the first day's end to the town of Oceloapan (oh-say-lo-AH-pan). We went that way.

Snow-mantled Pico de Orizaba, at 18,855 feet North America's third highest peak, shone in the Sierra Madre far ahead of us. We followed paths upward across a dry, forlorn stretch of rock and thorn forest. Thorns slashed our water bags; with earthen jars, Cortés was better equipped.

Delayed several hours by the detour, we did not make Oceloapan by nightfall. But, being only 15 miles from Cempoala, Oceloapan could have been reached in a day of marching, fitting Bernal Díaz's chronology.

A large stone edifice, the temple of the wind god, remains at Oceloapan. Like pilgrims, we paused to pay respect before setting up camp on a green swath in a pasture. Bats and birds swirled in the evening light.

Vicki reminded us after dinner: "Cattle have a near mania for soap. Be sure not to leave your soap outside your tent." Someone forgot. Next morning three wide-eyed beasts were sudsing at the mouth.

We also found Vicki's horse fretting, its ears bloodied by vampire bats. Treated with bacon grease on the bites, and extra fodder, it soon regained its strength.

Now we followed the Antigua River's narrow canyon, slowly gaining altitude in often wild country. We skirted a field of chilies. A pole in the field bore a metal cross with strips of red cloth attached. Many Indians place such devices to protect their crops from eclipses and spirits that might cause blossoms to fall or plants to wither. Trying to escape rain, we spent a night in the decrepit great house of an abandoned sugar hacienda—but had to put up our tents inside because the roof leaked.

We had traveled 80 miles since Villa Rica and had climbed to 3,000 feet in the outriders of the Sierra Madre. I still wondered about Bernal Díaz's mention of Xalapa, now almost due north of us. Did Cortés turn here? We tested old trails. He could have reached Xalapa this way, I concluded, but it meant an unlikely 20-mile detour 1,100 feet up over intervening ridges and a descent to nearly the same spot.

In his own description of the conquest Cortés provided strong evidence that he continued generally west instead of detouring. "On the fourth day," he wrote, "I entered a province by the name of Sienchimalen." In our travels we had reached approximately the border between the territory of Zempoala and the next Indian province, whose name is rendered today as Xicochimalco (she-co-chi-MAL-co). It is extremely unlikely that Cortés could have gone to Xalapa and still reached the new province on the fourth day.

HAVING SEEN US safely to the historical limits of Totonac lands, José reluctantly left us here to return to his village and cornfields.

With the truncated cones of old volcanoes ahead of us like road markers, we rode on to Coatepec. Masked Indian dancers celebrating the Day of San Gerónimo whirled in front of a church whose entrance was wreathed with flowers and greenery. Their wooden masks, reflecting the popular image of the conquerors, were embellished with exaggerated European features: long noses, great mustaches, and thick, dark beards.

We continued on a mossy pathway, still known as the Camino Real—"royal road"—paved with cobbles in colonial days over an older Indian road. Townsmen told me the road was Cortés's route.

Shade trees for coffee plants, covered with bromeliads, arched overhead. The ambience was compelling, even magical, conjuring a spell of long ago. Time settles easily among the Indians of the isolated region that was ancient Xicochimalco, like the soft rays of sunshine filtering through the vegetation. Antiquity has everyday reality here; imagination is not needed.

Oldsters still speak Mexicano, a surviving dialect of Nahuatl. But for fear of ridicule many do not admit they speak it. Buying provisions, I asked a woman in Mexicano if she spoke the language. "No," she said perfunctorily, but her broad smile told all.

We camped near the town of Xico. In the patio of the church at the end of the main street I saw a huge carved stone, obviously once part of a pre-Columbian idol. On one side were wax drippings. When I passed again a little later, a candle burned on top. The only people nearby were several women sweeping out the church. Could one of them

have placed the offering on the ancient stone? I asked the priest about the stone; he gave it no importance. Still. . . .

Some students of Cortés's journey have identified the present Xico as the capital of the old Indian province. Cortés, however, described a much more formidable citadel—of "great strength and built in a position immensely strong by nature."

The description fits a remote site called Old Xico, known today to few persons outside the sheltering mountains. The conqueror had no easy time getting there. Nor did we. From Xico we followed a twisting, climbing path. Near a bend Guillermo reined in his horse, cupped an ear, and exclaimed "Thunder!" But the sky was blue.

Then straining mules careened into view, dragging long planks that bumped noisily on the rocks of the trail. The woodcutters' eyes settled on a soldier escorting us. Nervously one asked, "Are you forestry police?"

When we said we were not, they bade us a terse "adiós" and bolted down the slope. Illegal woodcutting is an enduring problem in the highlands.

Three thousand feet above Xico and 110 miles into our journey, we stood at the entrance to a small hidden valley with a few houses scattered among the cornfields. Along one side rose the steep mountain capped by the Xicochimalco fortress.

We climbed slowly to the top, over a series of terraces. From the summit, at 8,250 feet according to my altimeter, we could see the long slow curve of the mountains down to the coastal plain and even the glitter of the sea. We roamed among piles of stone that had been the temples and palaces where Cortés had been feted and provisioned. On the terraces and among the stones Indians had planted the corn for which the valley is famous.

According to local tradition, several decades ago an outsider—an official—had taken idols from the citadel. One was greatly revered as the god of corn. So fiercely did the local people protest that the statue was returned. Somewhere in the secret valley the Indians had hidden it.

I felt sure we were watched. In the valley no one had offered to talk to us—there are no guides here for infidels. But the corn still grows, and the Indians know why.

We left Xico, but at our next camp we heard of another venerated stone that sounded suspiciously ancient. Genaro and I resolved to find it.

The glacier-clad summit of Orizaba, called Citlaltépetl—"mountain of the stars"—by the Indians, rose above us. Suddenly Genaro gave a shout; ahead was a massive, distorted jaguar carved in volcanic rock. Large as a sofa, it faced Orizaba,

MAKING LIFE miserable for expedition hands Genaro Domínquez, left, and Julio Lagunes, a mule in the author's party gives a lesson on the meaning of stubborn. Though they proved to be good pack animals on the long journey, the mules could balk at being loaded up for the day. To be persuaded to perform their normal duties, they sometimes had to be hobbled with a rope and blindfolded with a handkerchief.

The Aztecs had never seen anything like a horse before Cortés brought his steeds ashore. Mistaken for giant deer by early eyewitnesses, they were thought to be hunting animals that could chase down enemies.

HANDS TAUGHT *by tradition shape Indian-style pottery* ***(below)*** *in a farmhouse near the town of Zautla, as grandmother sits nearby stripping corn from cobs for grinding. Outside in the dusty courtyard, the potter's husband leads a horse in circles* ***(left)*** *to pulverize clay needed for her work. As Aztec potters did, she builds up the sides of her bowls with clay strips, rather than using a potter's wheel. The Zautla area has been known for its pottery for centuries.*

sacred to many Indians in Cortés's time.

The summit is the first point in eastern Mexico to be lighted by the rising sun. I wondered how many centuries this fearsome deity had viewed dawn's first light reflected on the icy cone of the sacred mountain.

Homage is still paid to the stone carving when plagues threaten crops. For the people of this secluded realm, the present is never secure enough.

The monster's face is battered. The scars are old. Cortés. . . ?

THE TRAIL went higher, and deeper. Use and erosion had worn it as much as ten feet into the earth. Incessant rain soaked us and made the path a virtual streambed as we struggled upward. The route balanced on the sharp spine of a ridge, then became a tunnel, canopied with dripping ferns and branches. Muleteers had sketched in the mold that clung to the trail walls the outline of a rural bus—dreaming of mechanization and no more mules.

Finally we stumbled into Ixhuacán de los Reyes. Many hands helped us unload, and our health was toasted with brandy. We rested; we and the animals needed it.

The trail we came on had given wealth to this town. Ixhuacán once boasted several *mesones,* or inns, for packtrains taking goods across the mountains. Fireplaces warmed the guest quarters; water troughs were like swimming pools.

Today the inns are roofless and crumbling. Pack travel has declined, but more than that is at work here. The Mexican Revolution, that bitter era early in this century, lasted long in Ixhuacán, as it did in many mountain towns. Ambuscade, banditry, blood feuds: The violent legacy scourged the mountains until the 1930s or even the 1940s. Many people fled. With 2,600 citizens, Ixhuacán is smaller today than it was in 1900.

I walked out of Ixhuacán; my horse was too lame and too weak to carry me. When we reached Chololoyan, a crowd descended upon our campsite, indicating how rare outsiders have become. "Are you dentists?" demanded a woman with a shawl pulled close.

"No."

"Merchants? Do your mules carry merchandise for sale?"

"No."

And with diminishing hope, "You must have movies then? How much are you charging?"

We started for Nombre de Dios Pass. In gratitude Cortés gave that name to the 11,000-foot-high saddle in the Sierra Madre. It was, he wrote, "so rocky and at such an altitude that there is not one in Spain more difficult."

The pass was almost treeless. The wind roared. We had started this journey 24 days before and 150 miles away, with clouds above us. Now we were in them; they swept around us to be shredded into wisps.

I tried to imagine the Spaniards and their Indian helpers laboring to reach this height, burdened by provisions, cannon, and armor they dared not shed.

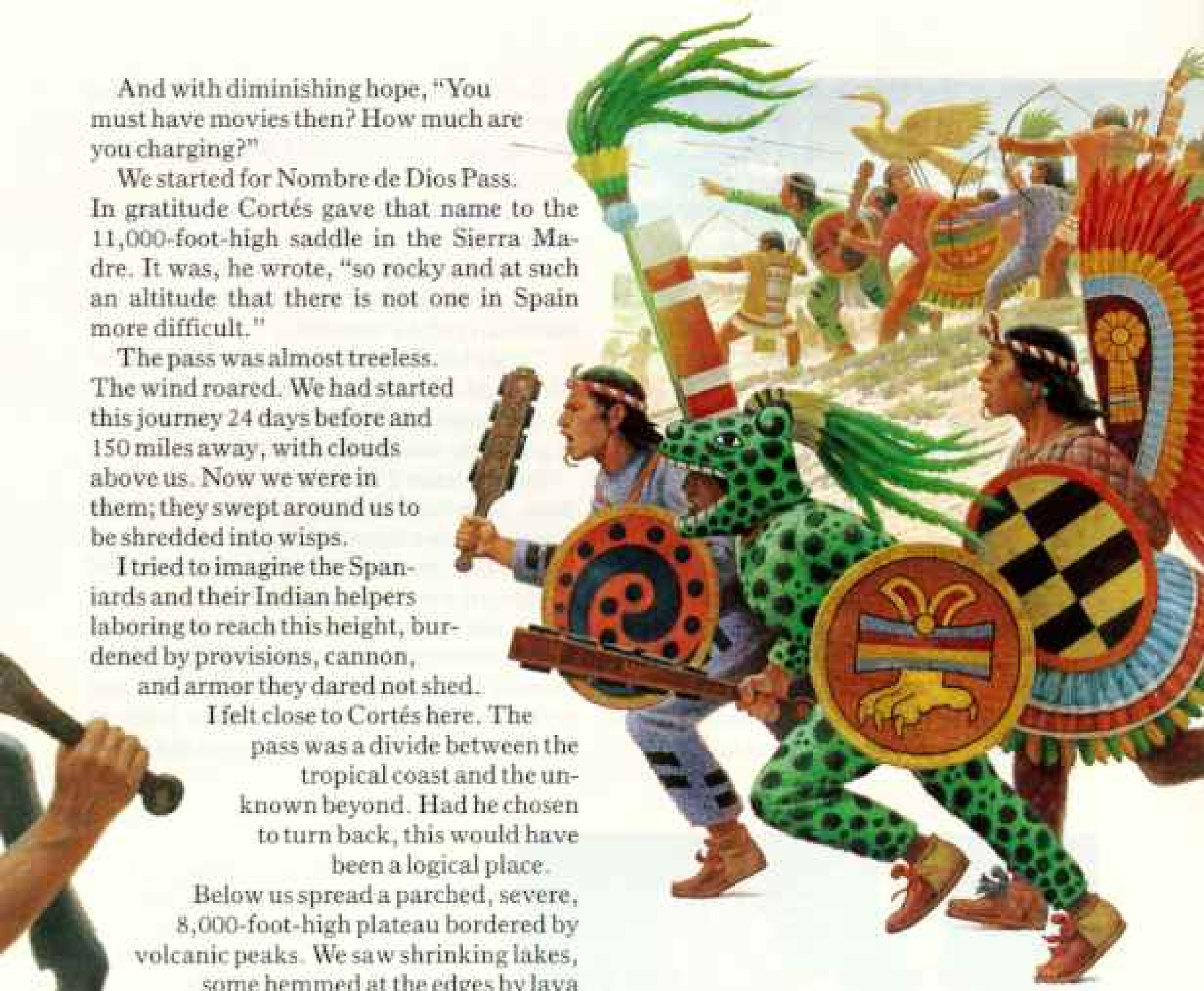
I felt close to Cortés here. The pass was a divide between the tropical coast and the unknown beyond. Had he chosen to turn back, this would have been a logical place.

Below us spread a parched, severe, 8,000-foot-high plateau bordered by volcanic peaks. We saw shrinking lakes, some hemmed at the edges by lava flows. It reminded me of the landscapes found by astronauts on the moon.

Cortés wrote: "God knows what hardships of thirst and hunger were suffered by my men." They were assaulted by "a whirlwind of hailstones and rain." Some of the Indians from Cuba, "who were scantily clad," perished. The army hurried across the plateau, marching more than 50 miles in three days.

We measured our crossing of this vast, dusty region by the ruins of haciendas. In the revolution and its aftermath, these great estates were expropriated for the landless or taken by squatters. The shells of the great houses, some scarred by bullets, endure as empty monuments to a violent time.

AFTER NEARLY a month of difficult terrain, our mounts were exhausted. At the ruined hacienda of Totalco we obtained fresh horses and mules and set out once more across the plains. Crossing



DRAWN INTO A TRAP, *Cortés and his force of 400 soldiers and several hundred Indian helpers were surrounded in Tlaxcala province by an army estimated to be 40,000 strong. The Tlaxcalans, a stubbornly independent people, had long defended themselves against Moctezuma's legions. But their bows and arrows, javelins, and clubs fitted with obsidian blades were a poor match for the Spaniards' cannon, harquebuses, crossbows, and armored men on horseback. After four long, bloody encounters they sued for peace with Cortés and later served as his loyal allies. The Tlaxcalans' battle formations with feathery battle dress were better suited for their ceremonial "flowery wars" with the Aztecs, when both sides vied in taking prisoners for sacrifices.*

jagged lava flows, we entered Puebla state.

On the third day we searched for a campsite safe from the chill of the rising wind. Finally we saw white buildings ahead and hurried for them. It was almost dark when we reached the old hacienda.

Suddenly four men appeared with shotguns and pistols leveled at us. No word was spoken. I rode forward and explained our purpose. The weapons remained pointed at us. It was getting colder.

I tried again to explain our journey.

One responded, "Who was Cortés?"

I tried another approach, fishing a letter from the governor of Puebla out of my saddlebag. The largest fellow looked at it curiously and handed it to another, who glanced and passed it on. I realized that none of the men could read. The wind howled.

By flashlight I slowly read the document aloud. One then explained that they came from the state of Tlaxcala. "Do you have a letter from *our* governor?" he asked.

Fortunately, we did. I read it. The guns were lowered; we could remain the night. We camped in a barn with a sagging roof—and barricaded the door.

The next morning we learned that our reception committee, farmers renting fields, had been as apprehensive of us as we of them. At old haciendas, strange riders in the night can still be menacing.

Cortés left the plateau over the Pass of the Firewood, so named by him because he saw "a thousand cartloads of wood neatly cut." It probably was for firing pottery.

Smoke trailed from kilns as, beyond the pass, we entered a dusty valley and came to Zautla, a town famous for pottery for centuries; in fact, its name may be a corruption of a Nahuatl word meaning "jar."

We arrived on market day. Indians from the surrounding mountains crowded about rows of turkeys and piles of vegetables and ceramics. "Would you accept two loads of pots for one of your mules?" I was asked.

*"BEAUTIFUL as a goddess," as one chronicler described her, Cortés's interpreter, Malinalli, played a key role in the conquest. Called Doña Marina by the Spaniards, she helped Cortés forge a crucial alliance with the Tlaxcalans. Her place at the center of this historic event is captured in a mural (**right**) at the government palace in Tlaxcala.*

Thought to be born to nobility, Malinalli grew up in the present-day state of Veracruz. After Malinalli's father died, her mother sold her to a band of traders who resold her in Tabasco. There she was given to Cortés, who learned that she spoke both Maya and the Aztecs' Nahuatl. She proved a lucky link, since a Spaniard rescued earlier on the Yucatán Peninsula was able to translate Maya into Spanish. Thus Doña Marina became a confidante to Cortés, as his translator and his mistress, and later bore him a son.

*A festival-goer at Veracruz recaptures the spirit of the lovely Malinalli (**left**).*

Mules are capricious creatures. When worked daily they adjust to a routine, but given a day's repose, they are apt to find the energy for extraordinary feats of resistance. Before loading again, we had to tie each to a horse and apply bridle, hobble, and blindfold. I should have sold them.

Modern Mexico, emphasizing its Indian heritage, has raised no official memorials to Cortés. But he is remembered in a village outside Zautla. A sign nailed to an adobe wall proudly announced that the dirt track was Hernán Cortés Street.

We entered rough, jagged terrain, well described by the name of the hamlet where we next camped: Barrancas, or "ravines." We set up our tents beneath a cliff and cooked beans and soup. Coyotes awoke us at 2 a.m. Dogs visited us at 6:30. As we packed, an avalanche of hundreds of goats descended the cliff, bouncing and prancing.

Our next stop, Ixtacamaxtitlan, was in Cortés's day an impregnable fortress atop thousand-foot cliffs hemming a narrow valley. We reached the top on foot, winding over ancient steps cut into the rock.

And they also asked what we did with those guns we had with us. We answered that with stones placed in them we could kill whom we pleased, and that the horses, that ran like deer, could catch anyone we ordered them to. And Olintetl and the other chief men said: "In that case, you must be gods."

BERNAL DIAZ listened to the conversation between Cortés and Olintetl, a vassal of Moctezuma, who discoursed on the grandeur and strength of the Aztec capital. Díaz observed that "such is the nature of us Spaniards that the more he told us . . . the more we longed to try our fortune." Díaz's enthusiasm surely was tempered when, roaming the plazas, he discovered the skulls of sacrificed victims "so neatly arranged that we could count them,

"THE ALLIANCE OF CORTÉS," BY DESIDERIO HERNÁNDEZ XOCHITIOTZIN

and I reckoned them at more than a hundred thousand. I repeat that there were more than a hundred thousand."

So pervasive was the Spanish shock at such displays that even the expedition's priest cautioned Cortés: "It is too early to leave a cross in these people's possession."

We rode on toward Tlaxcala, the next province on Cortés's itinerary. My notes on our 37th day read: "The wall is the order of the day. Morning rain, mist, heavy clouds."

The Spaniards encountered a stone wall, half again higher than a man, as they entered Tlaxcalan territory. Evidently it was built by neighbors to keep the Tlaxcalans in. Seeking this barrier, we followed the Apulco River, as did Cortés, through a steep canyon until boulders blocked us. We zigzagged up, found a path, and kept on. We never found clear evidence of the wall; my guess is that its rock was removed long ago for construction, the unhappy fate of many ancient edifices.

Cortés fought his way into Tlaxcala step by step. A few miles beyond the wall he and a small advance party were attacked. Two horses fell. The main Spanish force hurried up with artillery, harquebuses, and crossbows. The Indians retreated. The Spaniards bivouacked in a dry streambed, supping on Indian dogs specially bred for food. Sleep must not have come easily.

Soon after sunrise the Spaniards advanced—and were confronted by a vast army. Cortés tried, with the aid of Doña Marina and Aguilar, to read the Tlaxcalans the *requerimiento*, a formal decree commanding the enemy to accept Christianity and Spanish sovereignty in return for peace. The Spanish penchant for legality asserted itself; Cortés had his notary witness that he had extended friendship.

The Tlaxcalans, unconcerned with such formalities, charged. Their arms were slings, javelins, bows, and—the weapon that Bernal Díaz most vividly remembered—two-handed clubs of wood, fitted

IN THE OLD STYLE *of the Middle Ages, a bullfighter in Tlaxcala stays on horseback to work the bull. The first bullfight in Mexican history was held in 1526 to celebrate Cortés's return from Honduras.*

with pieces of obsidian that "cut worse than a knife."

Spanish armor included metal helmets, jackets of mail and leather, and small leather or iron shields. Some soldiers wore thick quilted cotton garments such as the Indians donned in battle; these proved particularly effective against arrows.

Tlaxcalan warriors determined to capture a horse. They slashed one mounted soldier with a broadsword. His mare fell under a blow that almost severed her head. The Spaniards rushed to rescue the dying horseman and to retrieve his saddle. The withdrawing Tlaxcalans dragged away the mare. Díaz said that he later heard that the Indians made an offering of her shoes.

At sunset the Spaniards and their allies from Cempoala and other towns retired to a temple on a hill. They fortified the spot and were besieged there for almost three weeks.

With less danger, but much apprehension, we rode cautiously through pastures among irritable fighting bulls to camp near that stronghold, a town known today as San Salvador Tzompantepec. Obsidian chips, perhaps from Tlaxcalan weapons, littered the slopes.

Bernal Díaz wrote of a party of 400 that encountered a multitude of warriors near here. "One thing saved our lives," he said, "and this was that they were many and massed such that the shots wrought havoc among them." Díaz was struck on the head by a stone and hit in the thigh by an arrow. More than 60 Spaniards were wounded.

The army was "weary . . . ragged and sick," Díaz wrote, and had lost 45 men to wounds, exposure, and illness. Cortés himself was ill but still led raids on surrounding towns to show the Tlaxcalans that his army was not beaten. The soldiers "wondered what would happen to us when we had to fight Moctezuma if we were reduced to such straits by the Tlaxcalans."

But peace came. Neither army had been able to conquer the other. The Tlaxcalan war leader, Xicotencatl, and other chiefs came to the camp. It was agreed that Cortés should go to their capital. There, with Doña Marina at his side, Cortés concluded a crucial, enduring alliance. Tlaxcala's warriors would help him overthrow Moctezuma. Without the staunch support of Tlaxcala it is doubtful that the Spanish conquest would have succeeded.

AZTEC EMISSARIES had closely watched events in Tlaxcala. Moctezuma was increasingly concerned. Was this invader really the returning Quetzalcoatl? Now he was starting toward Cholula, the sacred city of that god. Allied with the Aztecs, it had 20,000 houses and was the largest city the Spaniards had encountered.

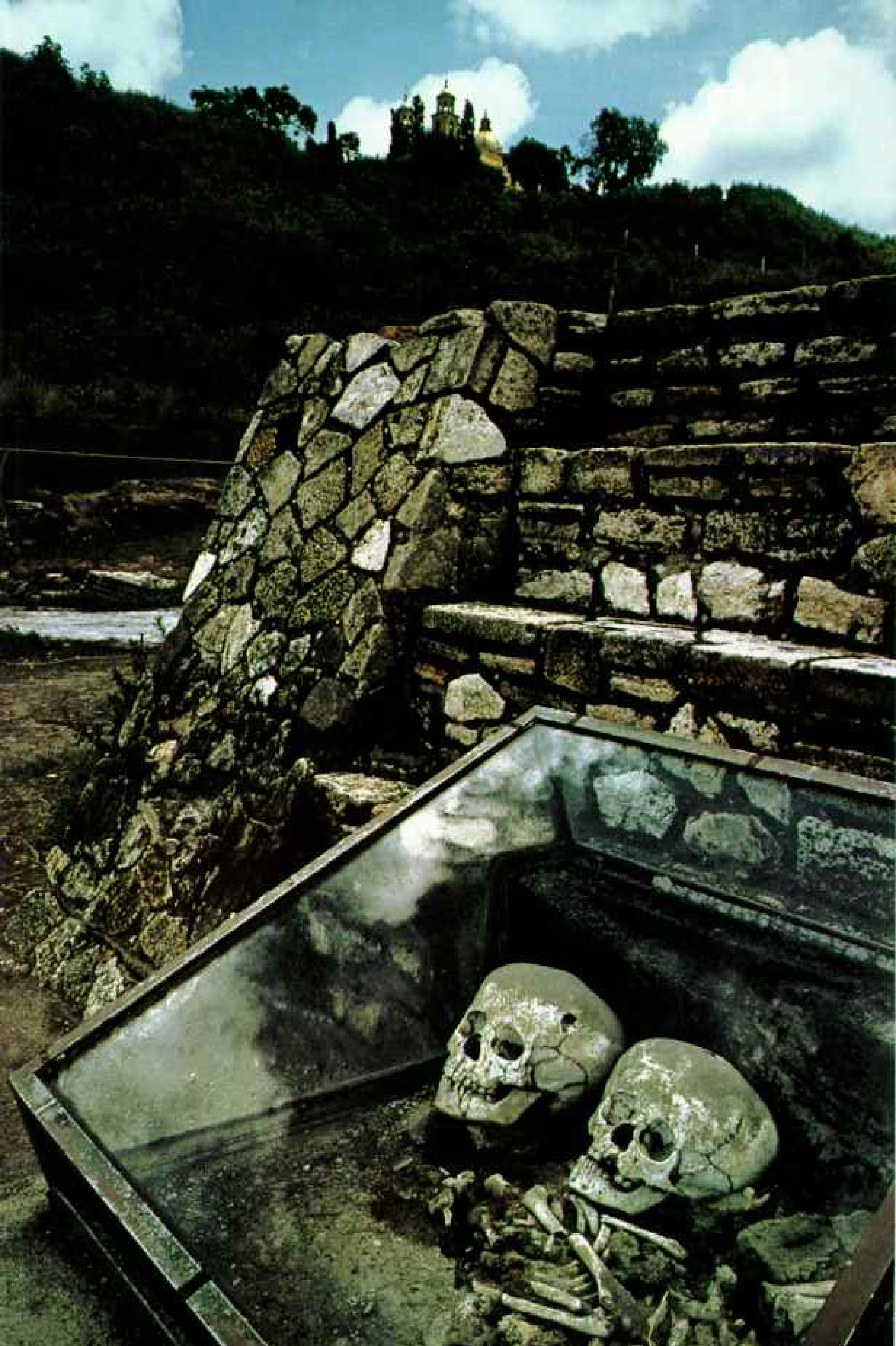
With great snowcapped volcanoes in front of us we had a one-and-a-half-day journey to Cholula. Old paths led us across the undulating plain that sweeps down from the high peak known as La Malinche. This is the only monument in Mexico to Cortés's remarkable interpreter, considered a traitor by many Mexicans today.

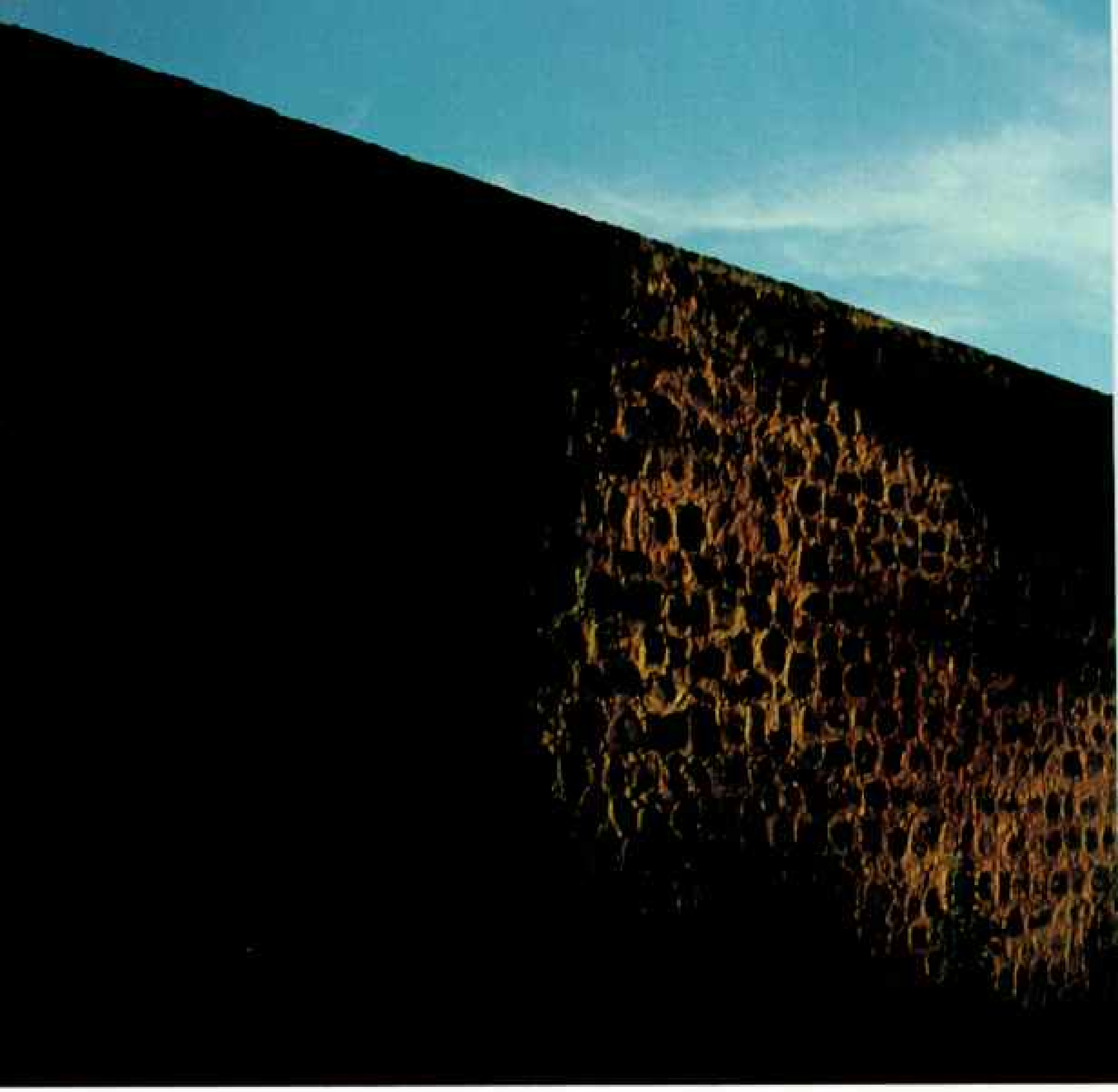
My view of her, like my view of the Tlaxcalans, is different. Did she, a slave, have a choice when Cortés pressed her into service? Rapidly learning Spanish, she became the conqueror's adviser. More than that: She became his mistress and bore him a son. In a document I studied in the Spanish archives, Cortés gave her the ultimate credit: "After God we owe this conquest of New Spain to Doña Marina."

We entered an area of greenery, where women clustered by pools and springs, chatting to the rhythm of wet clothes slapped against stones. My eye caught a glittering gridiron of ditches and fields, part of an ancient irrigation system that fed the burgeoning population Cortés encountered.

"You can't come here with horses!" a policeman exclaimed when we rode into Cholula's plaza. Town officials probably had wanted to say the same thing to Cortés and his Tlaxcalan allies. Finally the policeman allowed us a few minutes' "idling time."

CHILDREN OF SACRIFICE, *the remains of youths near the great temple of Cholula recall the countless victims who perished on Aztec altars. Cholula saw even greater bloodshed when Cortés, fearing a trap, killed 3,000 Indian warriors gathered in the city.*

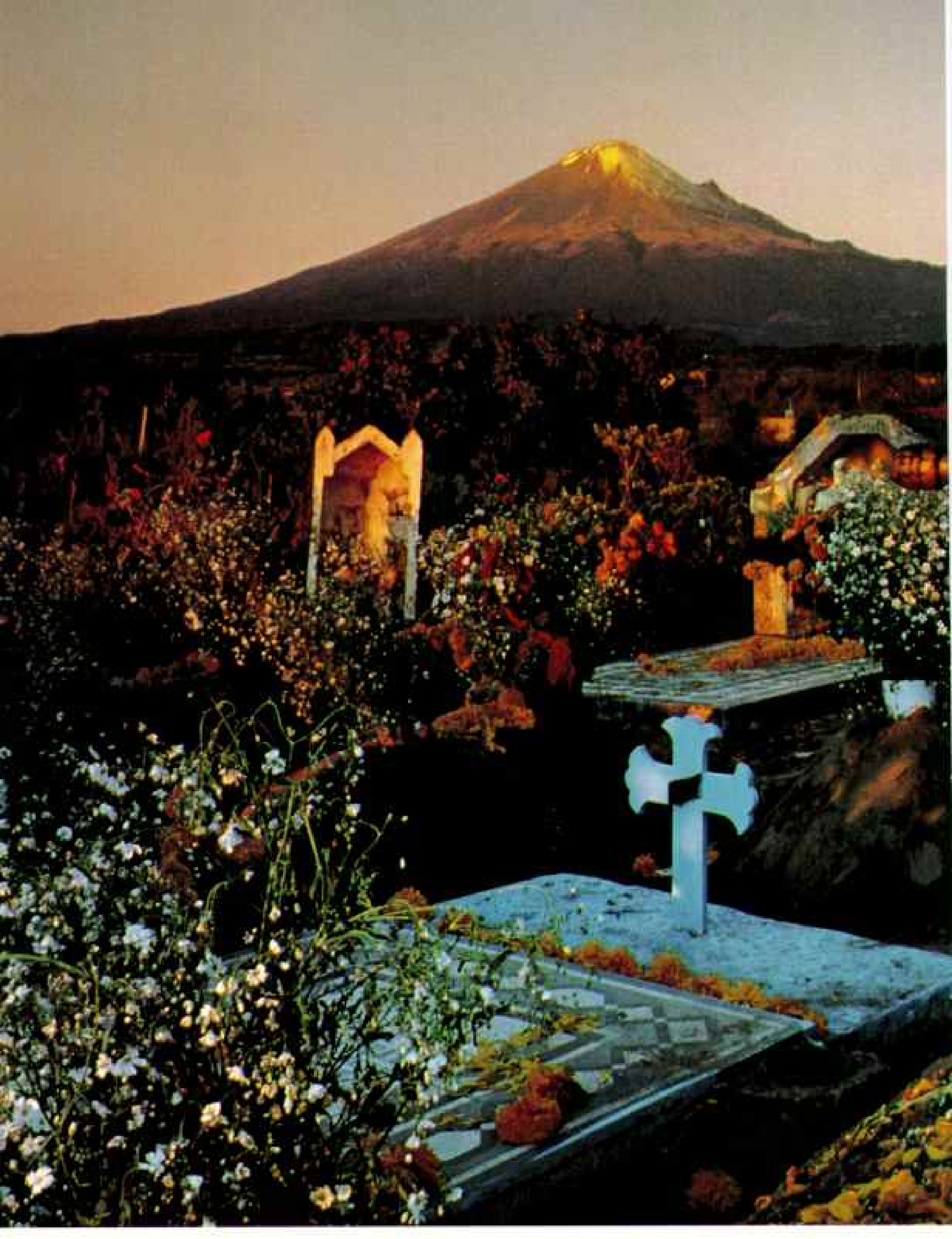




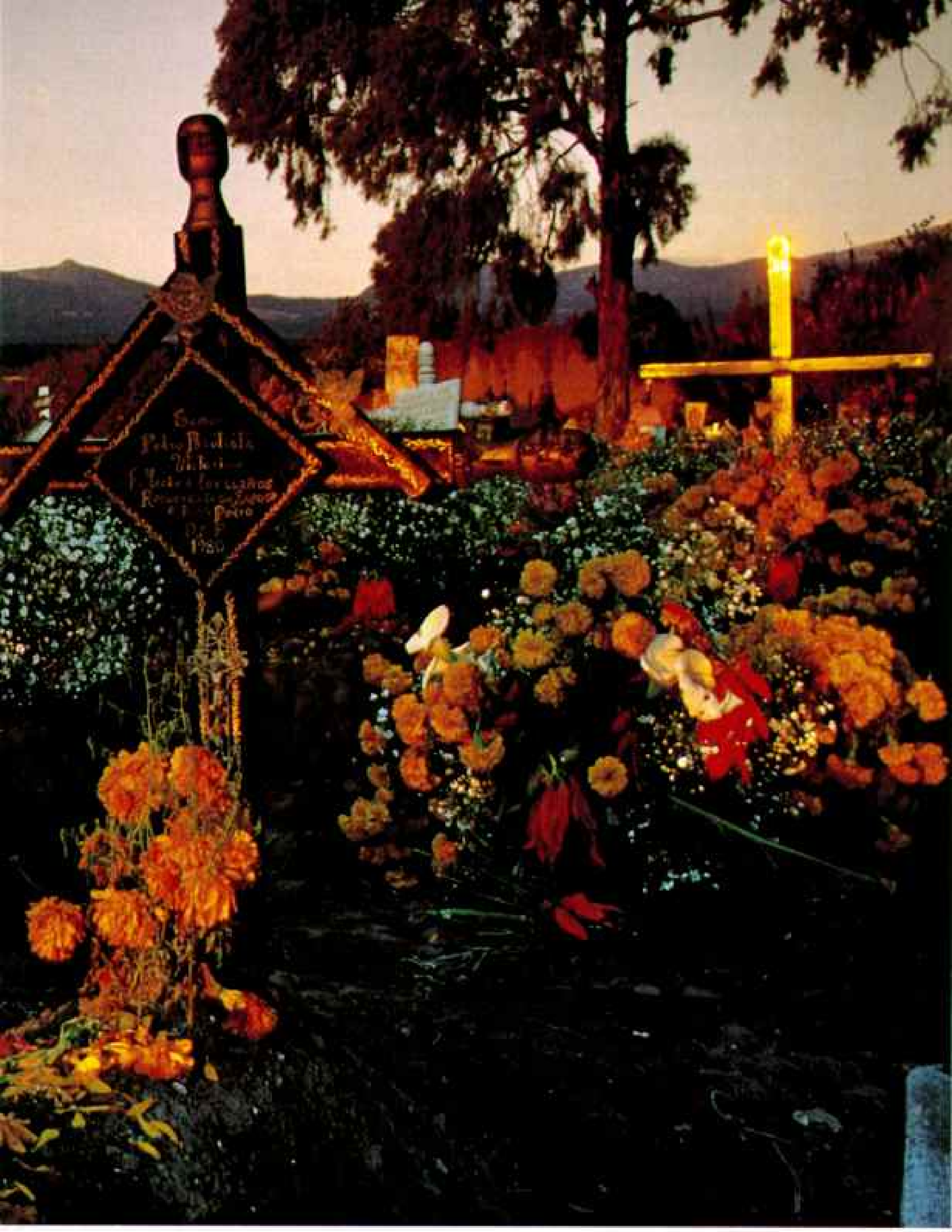
TEACHING THE FAITH to children at Calpan, a Franciscan monk (**left**) wears the centuries-old habit of his Roman Catholic order. After class, youngsters (**above**) race atop the wall of the monastery built about 1548. Franciscans, the first missionaries in Mexico, arrived in 1524, only three years after the final conquest of the Aztecs. Opening schools throughout the region, they spread the Spanish language and culture among the population while recording native traditions and beliefs.

One Franciscan, Bernardino de Sahagún, contributed greatly to the preservation of Aztec history. After probing the memories of respected elders, he wrote a treatise on the religion and social institutions of pre-Hispanic Mexico, complete with a native view of the conquest.

During the 18th century, the church grew into the country's largest landowner, and tension between church and government increased, erupting into violence after the Mexican Revolution. Today religious orders face a variety of restrictions under the constitution of 1917, though relations between church and state have improved.



BLENDING AZTEC AND SPANISH CUSTOMS, *the people of Calpan decorate their cemetery with flowers for November 2, the Day of the Dead, recognized as All Souls' Day by the Roman Catholic Church.*



The tradition reaches back to the Aztecs' honoring of the dead with offerings and torch lightings. Glowing in the distance, the volcano Popocatépetl catches dawn's eerie first light.

At Cholula, Doña Marina brought word of a large force of Aztecs camped nearby, preparing for an attack.

At dawn the Spaniards could see from their quarters large numbers of warriors entering the plazas around the great temple of Quetzalcoatl, the largest functioning temple in the Aztec Empire. At a signal, Cortés wrote, "we fell upon the Indians in such fashion that within two hours more than three thousand of them lay dead."

Later, critics such as the formidable Dominican bishop Bartolomé de Las Casas argued that the slaughter was unprovoked. The central question: Why were so many Indian warriors in the city that morning? Some modern historians suggest that they were there only for a religious observance.

Whatever the truth, one fact is certain: After this display of Spanish ferocity, Cortés encountered no further armed resistance as he moved through the high mountain barrier toward the great city of Tenochtitlan. If indeed he was Quetzalcoatl, he had certainly returned as an avenging god.

Moctezuma did not give up completely, however. He sent magicians to stop Cortés, but they returned to astound him with visions of the temples of Tenochtitlan in flames and the city destroyed!

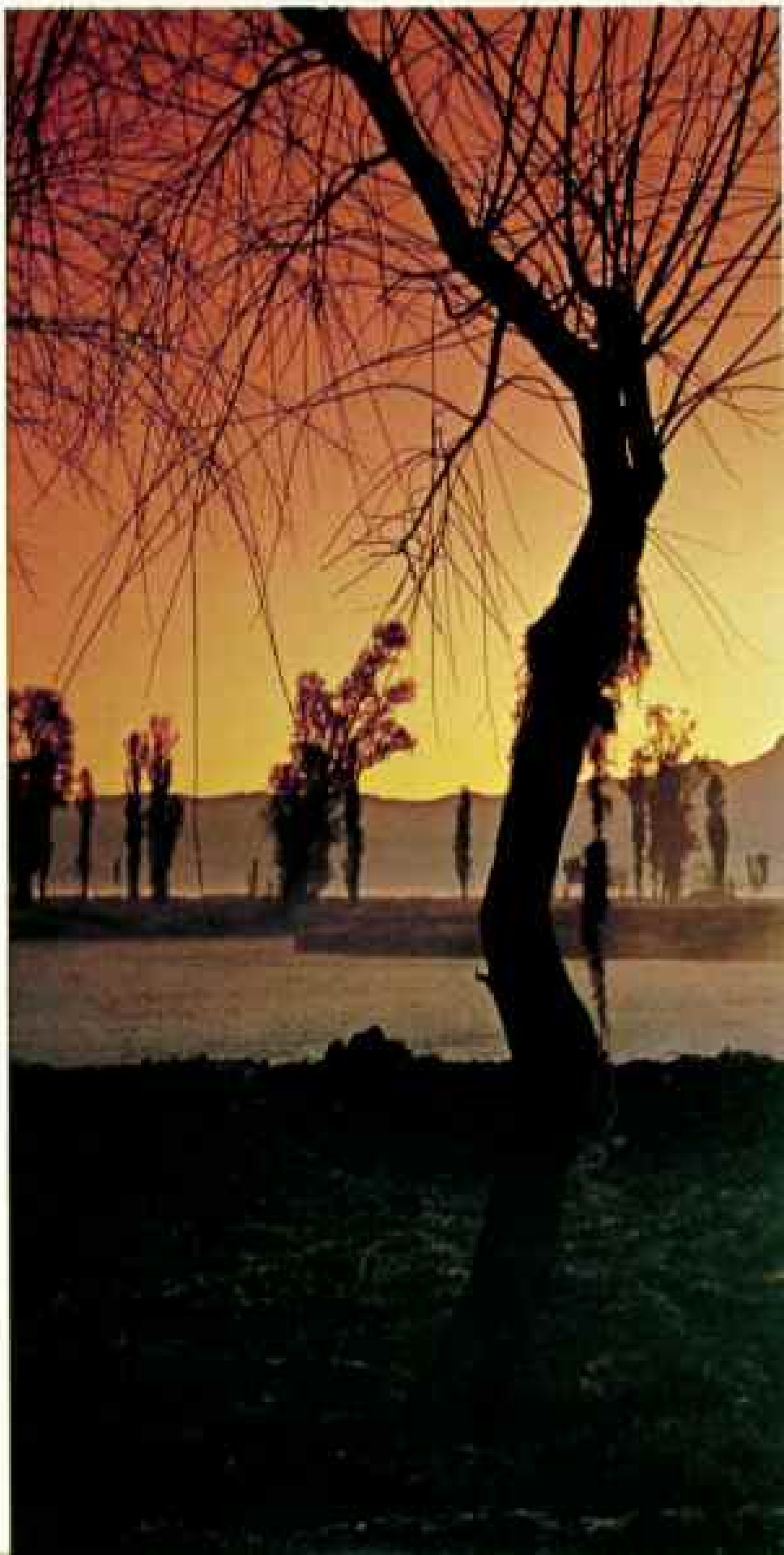
We rode out of Cholula on November 2, celebrated throughout Mexico as the Day of the Dead. A great religious center with more than 400 temples, according to Cortés, Cholula is intensely religious today. We met women carrying braziers with billowing clouds of incense and large candles. We covered the 12 miles to Calpan, perched at 8,233 feet on the slopes of the volcanoes, and arrived after sunset.

I peered into the church there. Candles flickered against the thick walls. In the sacristy I came upon three meditating Franciscans, members of the order that established this church in 1548. They wore brown habits that have changed little since the Middle Ages. I gazed silently, overwhelmed by the centuries-old vision, until Padre Meneses turned to greet me.

He let us camp in the churchyard. As we set up our tents, people streamed in to light votive candles upon tombstones or to sprinkle graves with petals. Soon hundreds of tiny flames danced in the chill night.

Next morning, day 48, dusty cornfields gave way to alpine-like pine forests as we climbed the steep volcanic slopes. Freezing rain poured down and the temperature plummeted. We needed a campsite fast. Through the gloom we spied a cabin. Three barking Saint Bernards bounded out, followed by the caretaker. He explained that there was only one room, but we could stay.

We toasted ourselves by the fire, then set



IN THE GOLDEN HAZE *of dawn, a farmer tends vegetables on land reclaimed by the Aztecs. The Indians built "floating gardens" here by piling vegetation and mud onto frames anchored in the lake.*

up our tents inside for further warmth. I thought our gear had nearly filled the space, but then the guardian came in and found a niche. Then the Saint Bernards. Then, somehow, three other dogs. And two more men. In the morning Vicki found a Saint Bernard firmly lodged in one of the tents.

IT WAS ONLY A SHORT WAY now to the Pass of Cortés. Crossing meadows fringed by snow, we stood more than 12,000 feet above the sea.

Mexico's highest pass is flanked by the great volcanoes Popocatépetl ("smoking mountain") and Iztaccihuatl ("white woman"). One would like to think that Cortés looked down from here on the great valley and its lakes, upon satellite cities, and great Tenochtitlan in the center. I believe intervening peaks denied him the sight of Tenochtitlan, 40 miles distant. It is hard to know now, because smog usually envelops Mexico City and its 16 million inhabitants.* In any case Bernal Díaz said it was snowing when the army, now augmented by 4,000 Indians, crossed the pass. We did it in an icy rain.

Cortés proceeded cautiously to towns in the valley. We followed him through pine forests to Amecameca, then over lava flows to Tlalmanalco and to Ayotzingo by the former lake margin. It was in Ayotzingo that Cortés received Moctezuma's nephew,

*Bart McDowell reported on the growing pains of this Mexican megalopolis in the August 1984 GEOGRAPHIC.

Cacamatzin, who, at the emperor's bidding, greeted the visitors. Here, too, a young town official gave us an impassioned discourse on that event and welcomed us to the "land of the Aztecs." For Cortés, and for us, the door to Tenochtitlan had formally opened.

The Spaniards marched in astonishment across causeways into the populous heart of the Aztec realm. Díaz marveled at "great towers and temples and buildings that stood in the water, and all of masonry, and there were even some of our soldiers who asked if what they saw was in a dream. . . ."

At Mixquic we passed some of the last "floating gardens." Once numerous, these artificial islands had provided the Aztecs with corn and vegetables. Nearing Iztapalapa we found a stretch of dirt road flanked by neat corn plots—a rural isle in a sea of people. But for the most part we encountered dust, concrete, and garbage; modern Mexico City has reached out to swallow the many towns and lakes of yesteryear.

And this was our venturesome and daring entry into the great city of Tenochtitlan Mexico, on the eighth day of November, the year of our Savior Jesus Christ one thousand, five hundred and nineteen.

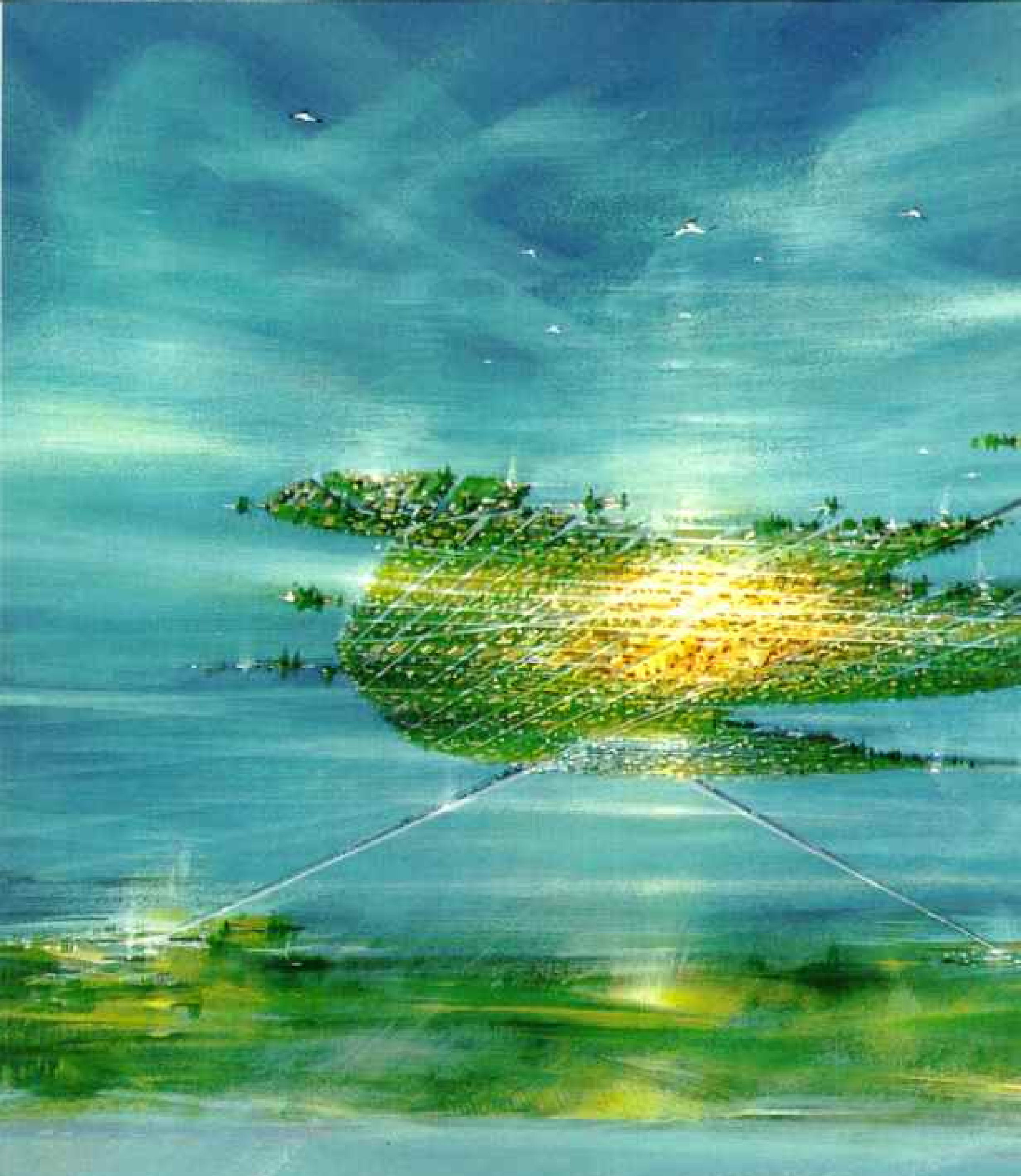
NOVEMBER 8. The exact date that Cortés entered Tenochtitlan. It was Sunday for us; even so, the traffic was formidable. My horse was almost struck by a car. I thought one of us would surely be killed. We had been promised a police escort, but none came.

Riding on the sidewalk, dodging wires, awnings, cafés, and construction pits, we traveled a hundred blocks to the broad avenue still called the Tlalpan Causeway. A police car finally came—and broke down.

Cortés entered Tenochtitlan on a causeway over the lake here. Curious hordes

LIKE A VISION from a dream, Moctezuma's capital, Tenochtitlan, dazzled Cortés and his men when they first saw it in 1519. An island city of soaring temples, neatly ordered avenues, busy canals, and bustling markets, it spread over four square miles of a shimmering lake.

PAINTING BY JOHN BERRY



HAUNTED BY THE PROPHECY *that a god-ruler named Quetzalcoatl would someday return from the east to claim the land, a reluctant Moctezuma greets Cortés and his bold adventurers on a causeway leading*

lined the way to see the fair strangers from another world. The causeway was wide enough for eight horsemen to ride abreast. Our corridor had eight lanes, plus a Metro track.

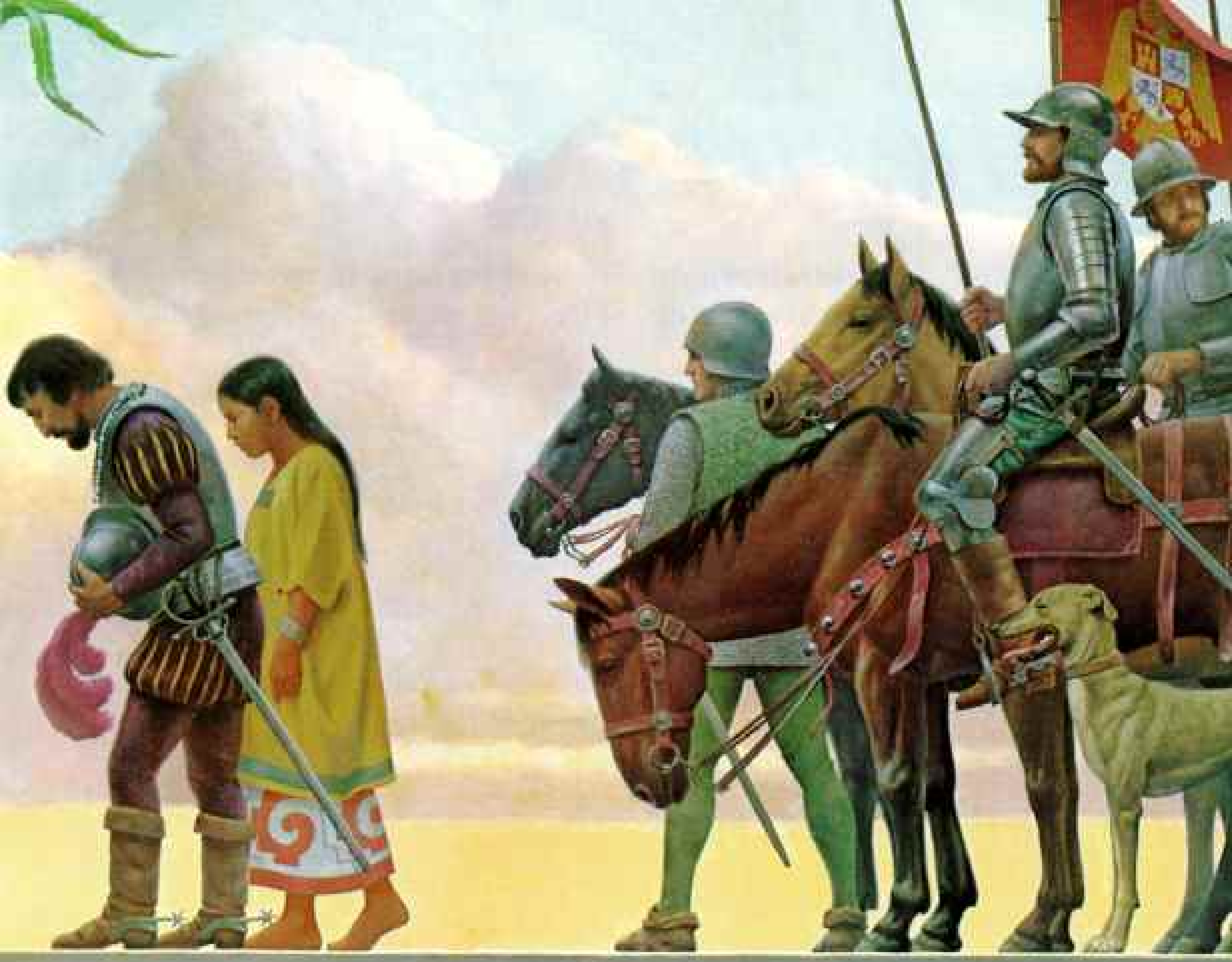
The Veracruz ranch horses performed wonderfully in the city din. At a café I asked for a bucket of water for them. No one took me seriously until a horse's head peered in the doorway. Then everyone rushed out, asking, "Are you with a circus?"

On reaching the island city of Tenochtitlan, Cortés dismounted. Moctezuma stepped down from his litter and approached with Aztec nobles sweeping the ground before him. The moment one had sought, and the other feared, was at hand.

Moctezuma graciously bade him welcome. Cortés responded through Doña Marina, wishing him good health. They exchanged gifts of necklaces and then walked together to the palace prepared for Cortés and his men.

Our train paused at the spot of the momentous meeting. Here Cortés endowed the Hospital de Jesús Nazareno, which still functions today. Though he died in Spain in 1547, his will stipulated that his heirs must "take my bones to New Spain." They rest in the hospital's chapel wall.

We had only a few blocks to go now to the Zócalo, the great plaza that was, and is, the city's heart. At the National Palace, built atop Moctezuma's palace, nervous presidential guards waved us on. The towers of the national cathedral glowed in



PAINTINGS PRODUCED WITH THE ASSISTANCE OF PATRICIA RIEFF ANAWALT, UCLA MUSEUM OF CULTURAL HISTORY

to Tenochtitlan on November 8, 1519. With Doña Marina at his side, the Spaniard approaches to pay tribute to the Aztec ruler, whom he would soon plot to make his prisoner. It was the beginning of the end for the Aztecs.

the afternoon light as we passed. Traffic swirled around us at the National Pawnshop. Here once stood the structures where Moctezuma quartered Cortés's army, and here Cortés would later build his own palace. City officials greeted us in the center of the Zócalo as we dismounted to end our trek.

That was not the end of the drama of Cortés and Moctezuma. Soon after reaching the city, Cortés imprisoned his host. Six months later he left to confront a Spanish army in Cempoala, sent by the angry governor of Cuba. Cortés defeated this much larger force, pressed it into his service, and marched back to find a general revolt in Tenochtitlan. Moctezuma, stoned by his own people, died. The Spaniards and their allies, attempting to flee the aroused city, were routed with terrible losses. They regrouped in loyal Tlaxcala and began a siege of the city, capturing it on August 13, 1521. By then Tenochtitlan was in ruins, just as Moctezuma's tearful sages had foretold.

Cortés energetically rebuilt the city as the capital of New Spain. He sent expeditions throughout Mexico and Central America, gathering to him an area much greater than the Aztec Empire. Today's modern Mexico would not exist without the foundation laid by Cortés, greatest of the conquistadores.

All was set in motion in 1519 along the sinuous track we had followed. At times the footprints are faded or covered by the veneer of modern life. But the path is there. Today's Mexico is both past and present—and the route of Cortés still connects them. □

Iberia's Vintage

Inspiration for the name of Portugal, as well as its prized port wine, the city of Oporto guards the mouth of the

River

By MARION KAPLAN

Photographs by STEPHANIE MAZE

Douro River. Born in Spain as the Duero, the binational river courses through a region cloaked in tradition.

I HAD NEVER BEFORE held a *remolacha* in my hands, or met a witch, or a wolf, or drunk a magnificent port wine 77 years older than I, or stood on great granite cliffs where vultures flew in deep gorges below me and golden eagles soared above. But in my travels through the seasons along a single Iberian river—the Duero in Spain, Douro in Portugal—I would know these and other singular beings and experiences.

But first that remolacha. . . . It's a sugar beet. On a January morning, on the banks of the Duero near Tordesillas, tutored by a Spanish farmer named Abundio Higuera, I rolled its splendid name on my tongue and hefted its earthy weight. Beside me in the winter-brown field, stout Abundio puffed from the effort of forking the beets onto a wooden cart.

"It never stops," he muttered. "Sowing, planting, harvesting. Wheat, barley, grapes, potatoes, remolachas. It never stops." In these words I heard a farmer's familiar grumble, not discontent, for Abundio tills fertile soil in Old Castile, the heartland of Spain. Castilla-León, as the region is called today, is the nation's most abundant producer of cereals, and now—in truth, a sweet success—more than half of Spain's yield of the sugar-rich remolacha comes from the 30,000 square miles that the Duero drains in Spain.

The river, a dark green artery as it runs past Abundio's land, rises at an altitude of more than 5,000 feet in the Picos de Urbión in north-central Spain, above Soria. It runs west and south for 570 miles through picturesque, fertile landscapes, emptying into the Atlantic at Oporto, 175 miles north of Lisbon. (See **A Traveler's Map of Spain and Portugal**, a supplement to this issue.)

The river—two-thirds of it in Spain—is Iberia's third longest, after the Tagus and the Ebro. Its basin, 37,000 square miles in extent, is the peninsula's largest. To Spain the Duero gives more hydroelectric power than any other of its rivers. To Portugal, also, the Douro is the greatest single provider of hydroelectric energy. In addition it flows through some of the world's wildest wine country, a harsh panorama of plunging hills that is heaven to the port-wine grape—a commodity so valued that in 1756 the Marquês de Pombal, then prime minister of Portugal, created a wine company in the upper Douro to regulate trade and define the areas from which the wine could be drawn.

Along the frontier between the plains of Castilla-León and the port-wine region, the river has excavated a 75-mile-long granite canyon, the domain of eagles and vultures.

THIS THRUSTING, powerful, peculiar river—how, I wondered, does it begin? The crunch of my feet in snow is the only sound in the Urbión pine forest. Climbing toward the river's source, I hear the babble of water: a tiny brook half covered in ice. Is this the source? No—I hear more singing water. Small dark lakes are close by; above, more trees and gray crags mantled in snow.

I feel alone and small on Urbión's sloping shoulder, but, yes, I am there: Each icy cascade and mountain rivulet falls to the rill that grows to the stream that becomes the Duero River. For the towns of Duruelo de la Sierra and Covaleda at the foot of the sierra, the pine forests mean timber—thriving lumber yards, pine planks stacked high.

The Duero is shallow enough here for villagers to water their cows and for anglers to wade in and cast for trout, but it is already developing muscle. At Molinos de Duero—my lunch in this pretty village is *pan*, a long loaf hot from the bakery—I watch children leaping the stepping-stones that ford the swift stream. Close by is the Duero's first dam, Cuerda del Pozo.

Soria Province is quiet country—below the sierra is red earth, gently rolling and unpeopled landscape. With negligible industry, Soria is rich in history, especially in

Dean of port-wine tasters, *the Ferreira wineries' Fernando Nicolau de Almeida pursues the artful science of blending port, an alchemy that takes place in lodges across the river from Oporto in Vila Nova de Gaia. A saccharimeter tests sugar content, but the taster's senses make the final judgment. The marble-mounted spittoon catches samples swirled in the mouth but never swallowed.*

Free opinions *and fresh Atlantic seafood, served up by fishwives* (**right**) *from the nearby Douro village of Afurada, fill Saturday's market in the oldest quarter of Oporto* (**above**). *Portugal's second largest and most industrial city accounts for 60 percent of the nation's economy. Shoaling at the Douro's mouth forced Oporto to expand port facilities at nearby Leixões in the 1940s.*

The facade of an Afurada tavern (**facing page**) *goes political with posters for the Communist Party and associated United People's Alliance (APU), but, in this Douro district, Socialist candidates prevail.*

CASA MACHADO

Vota APU

Juventude escolhe o futuro!

DESTA VEZ

DESTA VEZ

Vota APU

a solução
para o governo
para a saída da crise

PCP

COMÍCIO

ANGELO VELOSO

PAV. ACADÉMICO

Marcha

GAIA

Vota APU

a solução

Marcha

GAIA

Roman ruins. The Romans, who called the river Durius, weren't welcomed by the local population. In 133 B.C. Numantia, north of modern Soria, withstood Rome's legions for many months. Rather than submit, legend holds, the people burned Numantia to the ground and committed mass suicide.

Sorianos are proud of their heritage—of the Romanesque churches that grace their capital and the marvelous Moorish castles, huge stony sentinels guarding peaceful medieval villages and empty landscapes.

PEACE? EMPTINESS? Not in Soria during the San Juan fiesta, six sparkling days at the end of June when the countryside is green and gold and glowing. Each day's ritual focuses on *el toro*. I went with Joaquín Pardo González and his wife, Angelines—and a few thousand others—to nearby Monte Valonsadero to watch the release of a dozen bulls from a corral. Every vantage point was taken up. The crowd could hardly see the bulls for all the horsemen herding them. One of the bulls, I heard later, died a most untraditional death, struck by a car.

A classy bullfight restored convention. One of the three bullfighters was Soria-born José Luis Palomar, a tall, handsome 30-year-old. That day, as he donned a gleaming new gold "suit of lights," I asked him how he felt about fighting in his hometown. "People expect the best from me," he said quietly. "Therefore I must be the best." I'm no aficionada, but clearly his boldness, grace, and skill delighted his fellow Sorianos.

Eager that I should see his city at work as well as play, Julio Villar Hernández invited me on a tour of his family's processing plant for *jamones* and *chorizos*. And what splendid hams I saw—"We salt and hang the best quality over seven kilos [15 pounds] for a year," Mr. Villar told me—and roomfuls of sausages curing in the rafters. The plant produces as much as 22,000 pounds of

sausage a day and 6,700 cured hams a week.

Daily, Villar's big white trucks take to the open road, joining others with name or slogan in big letters above the windshield. *Carmen* is popular; *Beba vino*—drink wine—my favorite. The great trucks roll through virtually empty countryside.

Here, along the twisting poplar-fringed ribbon of the Duero, Rodrigo Díaz de Vivar, the fabled El Cid Campeador—champion, winner of battles—rode his war-horse Babieca. El Cid lived a violent life (from 1043 or thereabouts to July 1099) in a violent era.

The Duero region was the embattled north-south frontier between Islam and Christendom. Here Christian battled Moor. But Christian kings fought and intrigued against each other too: Sancho II of Castile versus younger brother Alfonso VI of León.

El Cid fought for Christian, for Muslim, for himself. His ethics are still hotly argued, his valor unquestioned. Legends sprang up around his name, his family, his exploits, his horse. Spain's oldest epic, *Cantar* or *Poema de Mío Cid*, wonderfully confuses the facts, elevating soldier of fortune to chivalrous hero, history to literature.

El Cid, legend relates, slew the Count of Gormaz and married his daughter. Historians have it otherwise, but there was—and is—a Gormaz. Today it is a tiny village beside the river at the foot of a great castle built ten centuries ago by the Moors. El Cid fought there and at times claimed it as his own. For a while, alone on that bleak hill, I too took possession. Restoration is in progress. However faithfully it is done, I fear the jutting crags of *my* Gormaz castle will never seem the same.

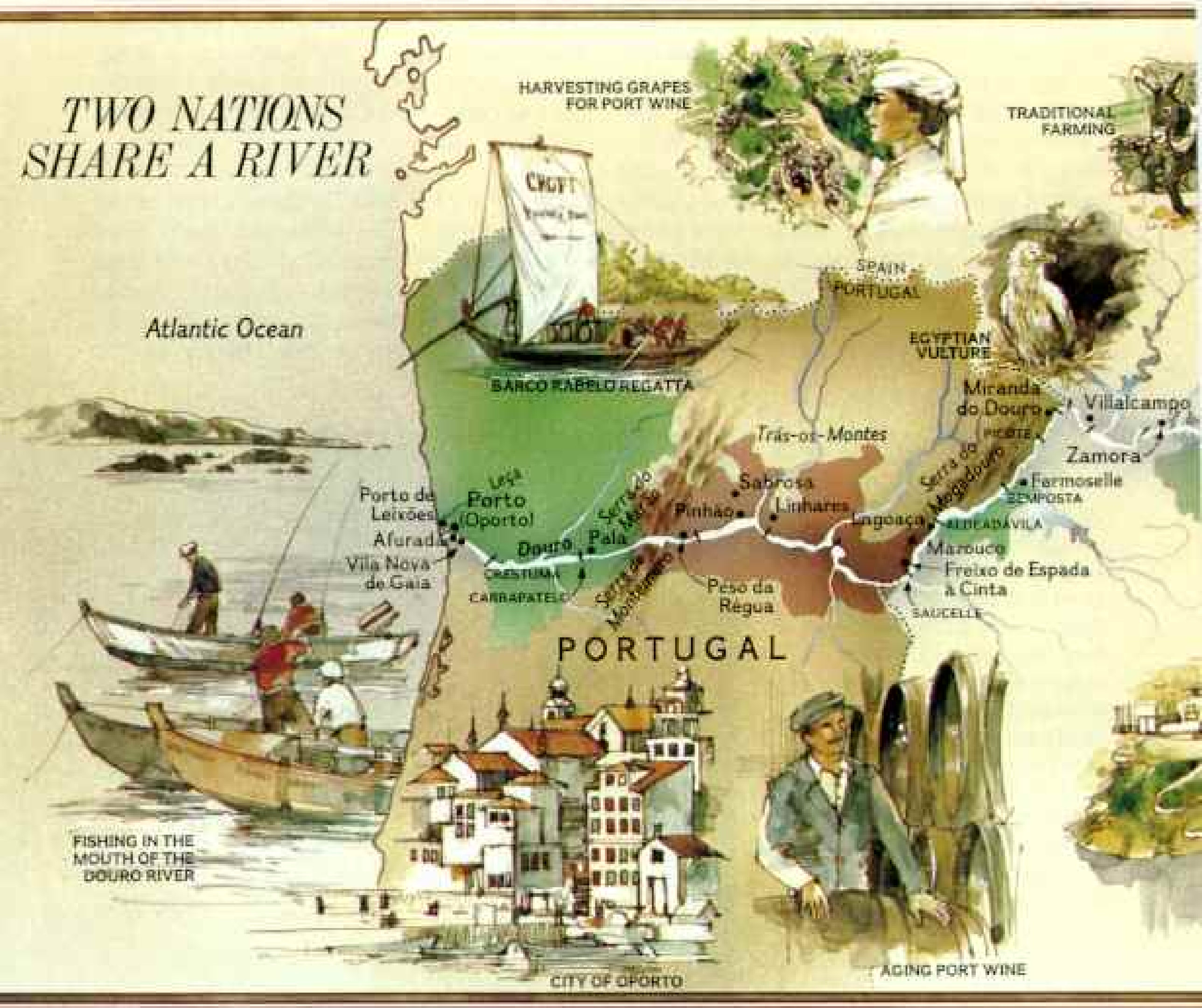
"*NEVER MIND*. Have a taste of my wine." The invitation came from Felipe Palomar Palomar, who lives below the castle in a house of red clay and century-old timbers. I asked him about strange doorways on the hillside at the

Oporto's British accents—*carried in the diction and tradition of teatime at the Cricket & Lawn Tennis Club* (**left**)—*were cultivated in the late 18th century. British shippers developed the port-wine trade as their supply of Bordeaux claret dwindled along with relations with the French. Portuguese own most of the 57 port-wine firms, but the British still figure heavily in exports. Traders forged a brotherhood, Confraria do Vinho do Porto* (**right**), *in 1982, adopting gowns of port-wine hue and hats of the style of Oporto-born Prince Henry the Navigator, who led Portugal into world exploration in the 15th century. Standing clockwise around founder Robin Reid are officers Fernando Nicolau de Almeida, Manuel Pocas Pintão, Michael Symington, and José Antonio Rosas.*

village's edge. *"Bodegas,"* he said. "Wine cellars. We all have one, or share one. Look, we press the grapes in a stone trough here; the wine runs down." Down we went into the cool, dark hillside. (Had El Cid stored wine here too?) A candle showed barrels and a couple of earthenware jugs. The wine was light, cold, and delicious.

I had admired Felipe Palomar's simple single-story house with its timbered facing. In Berlanga de Duero and other small towns I saw more stunning architecture: giant timber supports, rough clay walls, arcaded streets. In Berlanga's main square, modern architects have harmoniously blended old and new. So does the town's garbage-collection system: an elderly man and an aged horse towing a wagon with hygienic sliding doors of aluminum.

Many of these graceful villages and towns



IBERIA'S third longest river gathers waters from some 50 major tributaries to form the peninsula's largest river basin, draining 37,000 square miles. Rising at more than 5,000 feet in Spain's Picos de Urbión, it journeys 570 miles to the Atlantic through mostly rural landscapes. Harnessed by 17 dams, the once wild stream is now the major source of hydroelectric power for both Spain and Portugal. Difficult to navigate, it nevertheless became the lifeline of

National Geographic, October 1984

were built to defend a frontier, to protect vital Duero bridges—some, Roman built, still standing. Glorious Gormaz is one of several castles. City walls are still strong at Almazán and Aranda de Duero. Art endures in one magnificent church after another—divine art of a powerful Roman Catholic Church. A century ago almost a third of Spain's bishops came from Old Castile.

Another monument to faith, I noted, as I passed a 12th-century monastery at Sardón de Duero, east of Valladolid—and stopped. I had an appointment at this one, not with monk or bishop but with a commercial seed producer, PRODES. Its *finca*, a 1,700-acre farm on the banks of the Duero, is an experimental station—the monastery merged with farm buildings.

"We have 5,000 varieties of cereals here: wheat, barley, oats, corn, and sorghum,

Portugal's port-wine industry nurtured in the 950-square-mile Demarcated Region. Dredging channels and providing locks for dams, Portugal hopes to make the Douro navigable by 1987 and open markets for timber, granite, coal, and iron ore.

The river irrigates more than a million acres in Spain and helps make the Castilla-León region the nation's leading grain producer. Architecture along its Spanish trail traces the succession of power—from Numantia, the ancient town razed and rebuilt by Rome in the second century B.C., to castles of Christian kings victorious over the Moors. Valladolid, where Cervantes worked on Don Quixote, saw the wedding of Ferdinand and Isabella in 1469, the funeral of Columbus in 1506.

Rowing across the river, fishermen out of Pala on the lower Douro

mainly," Antonio Pascual Polo told me. A technician, he has worked on the farm for 26 of his 43 years. "Look at this beauty—stalk strong, head high. We don't sell seed here, though. We breed, crossbreed, and make comparison tests." It was early July. Test strips of ripe and ripening grain rising to the flat, bleak hilltops formed a pattern of subtle color, green to palest gold.

PRODES's finca, unlike most farms in the great dry upland of Castile, does not depend on rainfall for its cereals. Drawing water straight from the Duero, ten high-pressure sprinklers can spray nearly a quarter of a million gallons an hour.

Farther west, close to Toro, I would see

Photojournalist **Marion Kaplan** has covered subjects ranging from Arab dhows (September 1974) to the conquest of smallpox (December 1978) for the GEOGRAPHIC. **Stephanie Maze**'s most recent article, "Mexico City: An Alarming Giant," appeared in the August 1984 issue.

pass terraced vineyards yielding Portugal's light table wine, vinho verde.

small farmers operating guillotine-like traps to draw water from a Duero-fed canal. More than a million acres in Spain's Duero basin are watered by canals or wells.

Water. Few farmers have all they want: Four years of drought . . . too little rain, or too late . . . low reservoirs. I heard the refrain again and again. In January Spain's national reservoirs held only two-fifths of total capacity, although this year's wetter-than-usual spring has helped somewhat.

"The Duero's no water tank, but it's the cleanest of all Spain's major rivers," a mining engineer remarked. Why? "No exploitation. Valladolid, on the Pisuerga River, close to its confluence with the Duero, is the Duero basin's only major industrial city."

Once Valladolid was a royal capital. Here I found palaces of another age and more grand churches. In a small house in Valladolid, Miguel de Cervantes wrote some of the unforgettable adventures of Don Quixote

and Sancho Panza. In Valladolid in 1506 died the man Spaniards call Cristóbal Colón, better known in America as Christopher Columbus.

On the outskirts of the city beside the Canal de Castilla, one of the basin's first man-made waterways, is the low, green-roofed building of the Duero Center of the National Institute for Agrarian Research. Here, too, they worry about water.

"We have six departments for agricultural research," the center's youthful director, Enrique Asensio, told me. "One, agro-hydrology, studies all aspects of water, from erosion problems to irrigation from saline wells. We provide technical help to the small farmer—with remolachas, for instance. Much the largest problem is insufficient water. Those sugar beets need a lot.

"I'm an entomologist," Enrique told me. "We have a pollination program, developed with the U. S. Department of Agriculture at Logan, Utah, to study which bees are the best pollinators for different seeds." His face lit up. Clearly, to Enrique, bees are beautiful.

"But farms are small," he sighed, "and ownership is fragmented—a historical problem that impedes mechanization and raises the cost of production."

I WENT BACK into those open spaces, the plateaus and plains of the Duero, with a new eye. On a July day I revisited my farmer friend, Abundio Higuera. A summery straw hat had replaced his black winter beret. Remolachas out of mind, he'd hired a combine harvester and was bringing in his barley; wheat would follow. He didn't pause for a moment—the harvester was costing him some 3,000 pesetas ($17) an hour. He had 150 acres of grain to cut in several different places; this piece was 15 acres.

The plains of summer, old gold to platinum blond, to me are vastly beautiful, the giant harvesters from a distance resembling bright insects. I also saw grain threshed the hard way: Beside a poor pueblo near Spain's Aranda de Duero, a mule, endlessly circling, dragged a stone-weighted thresher through heaped barley. A few days later, near Portugal's Miranda do Douro, I watched more than a dozen people working nonstop to load a modern thresher, bag the grain, and sift the chaff from the straw. The wheat had been cut by hand and brought to the rented machine.

Tordesillas, west of Simancas—where a gray turreted castle stores national archives—is little more than a village now. In former times it was a lordly town where kings—and a mad queen—resided. Juana la Loca, Crazy Joan, she was called. For 46 years the world of the widow of Philip I was

Keeping Douro history afloat, *Joaquim Vieira Marques* ***(facing page,*** *foreground) and family are the last to build barcos rabelos—"boats with tails." Designed with a flat bottom and high steering bridge, the sailing craft could take the fury of the pre-dammed river and deliver port downstream. Marques's $5,000 creations are collector's items. Replaced by railroads and trucks, barcos last carried port in 1965. Douro fishing boats reflect their lines* ***(above).***

*"**Eating lava and drinking sunshine,**" by one adage, port-wine grapes thrive in dry, torrid summers on the rocky soil of river terraces. Though many shippers maintain vineyards, they also depend on thousands of smaller growers. Harvested in fall,*

the grapes are crushed and the juice is drawn off and mixed with brandy to halt fermentation and maintain sweetness, then aged. Most valued are vintage ports blended from exceptional harvests, such as 1982. That port will reach perfection about the year 2000.

limited to a convent in Tordesillas overlooking the Duero, the broad river her comfort or her binding chain.

THE TWO PROUD NATIONS of Iberia, neighbors who to this day no more than tolerate each other, fought a bloody battle in 1476 in Toro to the west. Wandering in the medieval city behind its screen of ugly apartment blocks, I came to a cliff and looked down upon a tremendous bend in the Duero, thriving farms extending to a far horizon.

Toro is the heart of a significant wine area, one of several along the Duero. Last year the Toro area produced six million gallons of wine—"a good year for both quality and production," reports Angel María Arenaz, a government representative. These vines are stubby and misshapen, rooted in sandy soil. I happily consumed a bottle or two of the finished product.

Local cheeses, made with ewe's milk, are as estimable as the local wine. On a farm below Toro I watched as Juan Díez, his father, and an uncle milked a score or more snuffling ewes packed in a pen. These flocks are more valuable for their milk than for their meat; their wool is least profitable of all.

I met quite a few shepherds along those riverbanks in Spain. Like their sheep, castellanas or churras, they seemed to come in two sorts: shy and silent or formidably loquacious. With rudimentary Spanish I found the rapid flow hard to follow—a humbling experience, for it was clear that the shepherds' dogs understood every word.

Zamora, one legend has it, is where the young El Cid was knighted, where dreadful deeds took place in his lifetime—a siege, battles, betrayal, murder of his king, Sancho II, perhaps even incest. Sancho's sister, Urraca, the ballads hint, loved above all others her brother, Alfonso.

With a population of just 60,000, Zamora has 16 *cofradías*, or brotherhoods. One dates from the 15th century. During Holy Week, I watched one pious, eerie procession after another. The mood is mixed: Solemnity lifts to reveal religion's social face—gathered families and grinning students. Small children are grace notes in the drama. A young man told me proudly that he was a member of four cofradías, another boasted of nine, a third that he'd spent 15,000 pesetas for the heavy cape he wore for a nighttime procession—"but it's an honor." Moments later he was an anonymous hooded penitent.

On Easter Sunday I too was with family—at Villalcampo, a stony village close to the stark frontier gorges. I'd met Teresa Codesal Calvo here Saturday morning. A spritely lady in black, she was off to plant potatoes on a distant patch of bleak land fenced by granite boulders.

Plowing and planting done, I was invited to Sunday lunch with her husband and daughter. After the feast Teresa went to change for the Easter procession. She emerged, her hair neat and uncovered, wearing a smart coat and good shoes in place of her mournful black dress. Like the Duero itself, Teresa was part modern, part timeless and traditional.

FRONTIERS by their nature should be wild and challenging. The canyon through which Iberia's boldest river thrusts its sinuous way, dividing Portugal from Spain for about a seventh of its length, is as wild and remote as anyone could hope.

The grandeur of the gorge diminishes human woes and fears—and from my view this was just as well, for I suffer from vertigo. Towering granite walls rise a thousand feet above the river. Huge, tumbled blocks are bigger than a house. In places, green slopes reach to daunting crags in a vast rock garden.

This sublime world is the habitat of some 80 species of birds, half of them migratory. Egyptian and griffon vultures, golden eagles, Bonelli's eagles, and black storks nest on ledges and in crannies of the tall cliffs. It is a crucially important breeding area for several rare species.

"A haven, yes," says Luis Palma, a Portuguese specialist in birds of prey, "but bird populations are low and most are declining. The pressures on them—human activity, diminished food resources for the vultures, insufficient protection or management—put their future at risk."

Palma lives in Lisbon, Portugal's capital. To work on the international Douro, he had brought a rubber dinghy with a powerful

outboard motor. Methodical Jorge Morais, Palma's biologist colleague, had briefly mislaid some kit. Would we be up the Douro without a paddle? A fisherman loaned us a pair. With Jorge at the tiller, Luis Palma ready with notebook and survey map to chart the different nests, and ecologist Luis Oliveira, a keen climber, we took to the river. Six hawk eyes—and mine.

Of all the birds, I longed most to see a golden eagle. Only six pairs are known to breed here. Specks in the sky and soaring silhouettes were frequent. Griffon vultures glided long and far in search of food. We glimpsed a rare peregrine falcon. My wish was fulfilled when Palma spied a female eagle approaching a nest high on a cliff. There was no easy viewpoint, but eventually a blind was rigged. Luis Oliveira, with a proper regard for my safety, used his pitons to moor me to a rock.

For hours I watched the white downy chick with dark new feathers just starting to appear. It sat on its bottom, sturdy legs jutting forward, or rolled on its breast, staring with its predatorial glare. Often the eaglet staggered to the edge of its nest to defecate—a giddying, comical performance. At last the mother arrived; I departed. A few weeks later we took another cautious look: The eaglet, dark feathered and perched at the rim of the white-circled nest, was doing fine.

WITHIN THE GORGES of the frontier river are five dams—two Spanish, three Portuguese. For both countries the energy produced is vital. Spain's dams, Aldeadávila and Saucelle, in 1983 recorded close to 3.1 billion kilowatt-hours of a Duero total of 4.3 billion.

A few fishermen in wooden motorboats are permitted to lay nets along the frontier. Some still row facing forward, long oars crossed, a habit learned on the dangerous Douro before it was dammed. From the lake at Bemposta's dam wall, weekend anglers reel in golden carp weighing three pounds and more. But there are no multitudes here; this is the Trás-os-Montes—literally, "behind the mountains." Towns are few, communications poor, and hamlets, high above an unseen river, are little changed by time.

Júlia and António Rodrigues of Lagoaça, their children grown and gone to cities and skilled jobs, run a small café-bar in a street of ancient stone houses, where mules are stabled downstairs and families live in small, neat rooms above. "Our central heating," a

New generation *of port-wine shippers, brother and sister Cristiano and Teresa van Zeller, of Dutch and Portuguese ancestry, oversee Quinta do Noval, a firm established in 1813. Perched near Pinhão, their 370-acre quinta supplies 15 percent of Noval's annual 211,000 gallons of port. While Cristiano, 25, handles European markets, Teresa, 24, aims to expand sales in North America.*

Top importers France, Belgium, and Luxembourg now account for more than half of port-wine sales. Portugal ranks next in consumption, slightly ahead of Great Britain.

Stubborn as the economy *in the isolated region Trás-os-Montes—"behind the mountains"—a burro resists stabling in Lagoaça. Dependent on small-plot farming and seasonal work in the wine industry, many residents emigrate. A navigable river may improve opportunities for the Douro's youth* (**above**).

woman smiles, indicating a placid mule. The Rodrigueses grow most of their own food. Almonds, olives, figs do well here. Júlia makes cheeses, even her own soap. She crochets beautiful bedspreads—a local industry, but she doesn't sell her handiwork. "We don't need the money," says António. "We have all we need." Even a medical service? "Many women know their herbs—Dona Amélia, especially."

Amélia de Jesus Fregata is a bent, 82-year-old widow with a deep, lilting voice. On a cold, wet day in May she and Júlia sat beside the fire talking about herbs—and poetry. *Orações* (orations) are part of the cure. Dona Amélia revealed her recipe for repelling bad spirits: nine grains each of rye and salt, nine drops of olive oil, a pinch of incense—and an oração. The common cold? At least five herbs help. Sick with love? Softly, the old lady recited a poem on the five senses that would move any heart.

"They call me a *bruxa*," she says. A witch. It's an honored occupation in rural Portugal.

Dona Amélia herself is an esteemed lady belonging to a large respectable family.

In that far corner of the land I found—along with witchery—warmth, humor, and poetry. An art perhaps as ancient as witchcraft can be glimpsed on a riverside cliff below another village, Mazouco. *O carneiro*, fisherfolk call it—the sheep. To expert eyes it's a horselike animal, the first Paleolithic art discovered in open air in Portugal.

I had no doubt at all, though, that the leaping, cold-eyed creature with the dark fur in the town of Freixo de Espada à Cinta, meaning "ash tree of the belted sword," was a wolf. Female, 14 months, her name is Diana. Found in a den by shepherds, the pup was reared as a pet by José Manuel Cardoso, who works in Freixo's hospital. I met no other wolves. "They're no longer numerous," I was told, "but we hear them from time to time. They are out there."

In those ancient towns there is a concern for history and tradition. Quiet Freixo has a notable church and fine paintings; Miranda

do Douro has a noble clifftop cathedral that contains among other treasures a tiny Christ child. Commemorating a 17th-century Mirandés victory over Spanish forces, it is outfitted with a grand, if miniature, wardrobe from underwear to opera cloak. I counted seven tiny embroidered shirts.

This Menino Jesus da Cartolinha appears outside only once a year, on Miranda's patron saint's feast day in August. It is quite a moment. *"Jesu' saï,"* the crowd whispers. "He is leaving." And on a trestle borne by four children comes a doll-like figure in courtly costume, bow tie, and top hat.

BUT THE DOURO'S richest treasure is in neither church, nor city, nor mine. Here wealth stems from port, a fortified wine rich in color and aroma and taste. In 1678, so the story goes, two young shippers from Liverpool, anxious to stabilize wine for transport to England, added a little brandy—and created port. The brandy also preserves the fruity sweetness, a process better understood by the 19th century, when science described port's fermentation process. Through it all the British have been prominent in the world of port.

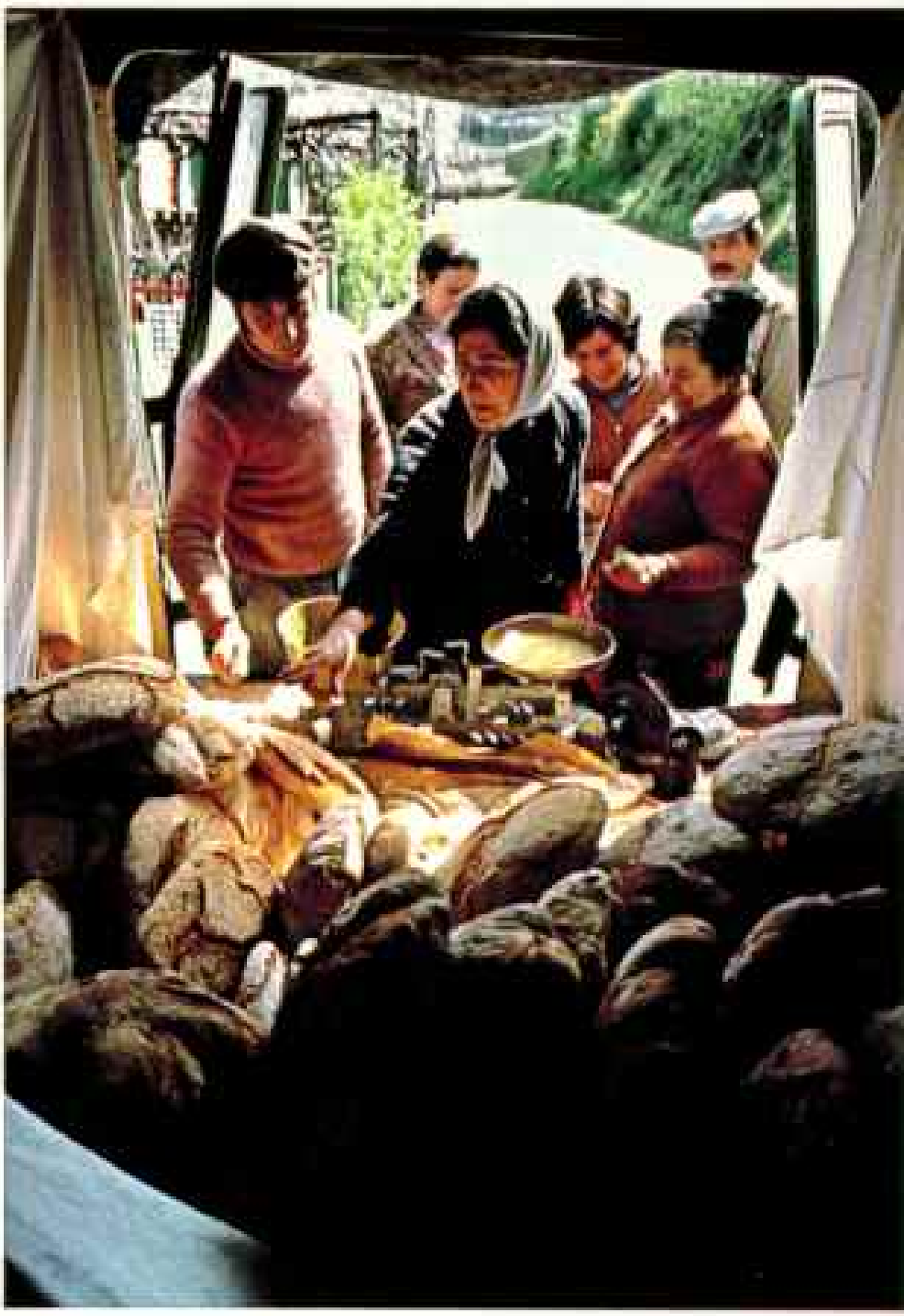
Port is sold in several types: the notable

vintages that appear perhaps three times in a decade and "wood" ports aged in casks—rubies, and tawnies, and an aperitif white. The quantity made, stored, and sold, as well as quality, is regulated by the Port Wine Institute in Oporto; no wine is more strictly controlled. Portugal's 1983 exports of port wine earned a hundred million dollars.

Port shippers age their wines to maturity 50 miles or more from the vineyards. Their lodges at Vila Nova de Gaia, dark, humid warehouses on the south bank of the Douro opposite Oporto, have survived civil strife, war—Wellington defeated Napoleon's troops south of Oporto in 1810—and the infestation of phylloxera that ravaged vineyards across Europe in the 19th century.

Life in the lodges seems leisurely, a matter of waiting, watching, tasting, and blending. But in the vineyards each year at harvesttime—*vindima*—the calm breaks. Grape pickers, mainly women and girls, dot the slopes. Stocky young men, proud of their strength, carry the 110-pound baskets of grapes along dizzying terraces.

Inside the cool winery at Vargellas, the upriver *quinta* (property) of Taylor, Fladgate & Yeatman, founded 1692, barefoot



Wearing widowhood *for the rest of their lives, as custom requires, neighbors mend by candlelight in Linhares.*

Vital supply link for villagers who trek down from the Serra de Montemuro, a mobile vendor sells bread and other staples on the main road along the Douro's south bank ***(above)****.*

men tread the grapes in open tanks called *lagares*. An accordionist eases the task. After dark so do grape pickers who come to watch and to dance, usually with each other.

In the hills in ancient wineries the treaders tread without music or female company, carefully supervised by each buying company's technician. Obliged to hold large stocks, the major firms buy from small wineries. Shippers and their enologists are upriver now, working with urgency; fortunes depend on this three-week vindima.

John Burnett, technical director of Croft's, had been my host at an elegant luncheon in the British Association's 194-year-old Factory House in Oporto. Now John, in blue jeans, is driving a jeep up the steep slopes. Contracts. Handshakes. Checking—grapes, must, juice, the vital Baumé readings measuring sugar content, and the vineyard itself, graded from a perfect A to a lowly F. Like pioneer British buyers 300 years ago, he woos the quality growers.

ACROSS a precipitous valley, Fonseca's big Bruce Guimaraens has his head deep in a wine maker's empty barrel. He emerges exhaling an ecstatic *"Maravilha!"* No barrel may receive the new wine without the buyer's approval.

Teresa van Zeller speaks of her late uncle Luis, an esteemed wine taster. "He had a beautiful nose," she sighs. This is the greatest of tributes; tasters judge bouquet, examine color, establish taste. Young and chic, Teresa with her brother, Cristiano, guards an old family port business, Noval, where men stand on planks above the granite tanks to crush the grapes with *macacos*, giant wooden stirrers.

All shippers aim for wine with concentration, with body; each has a different technique. At the winery of Seagrams-owned Sandeman near Régua, gleaming "autovinificators" process the grapes. With their three other wineries Sandeman handles a good share of the Douro's port-wine harvest.

The House of Ferreira is descended from Dona Antónia Adelaide Ferreira, who, in the 19th century, owned vineyards across the Douro. It's still a distinguished family firm, run by her descendants. Dona Antónia's great-great-great-grandson, 15-year-old Francisco Olazabal, plans to become an

Medieval outpost *of Mazouco, in Portugal, faces Spain across the river that divides the two countries for 75 miles. A cliff face below the town displays one of Portugal's finest examples of Paleolithic art, an incised horselike figure.*

Bets fly in a taverna in Toro, Spain, ***(right)*** *as men gamble at mus, akin to poker. Even before crossing the international frontier, the Duero has established its reputation in wine. Six million gallons of table wine flowed from the Toro area last year.*

enologist—and he doesn't even like wine yet. I do, and am lucky enough to have tasted many glasses of delectable port. In Ferreira's dusty cellars in Vila Nova de Gaia, I experienced an exceptional honor: a full-bodied port wine bottled in 1863.

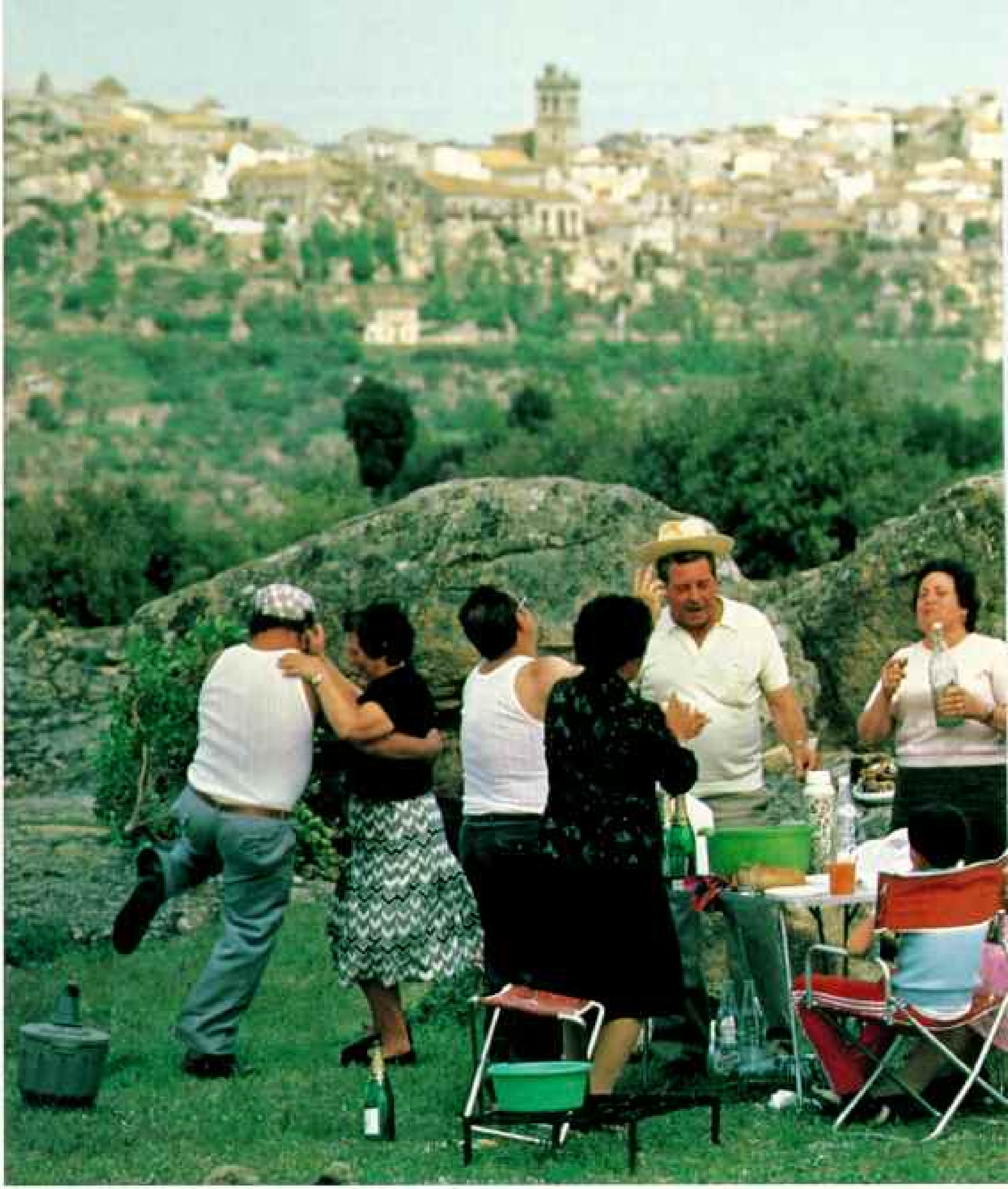
PORTO the wine; Porto the city—Oporto its English name—and Porto the port, or harbor. Where the river meets the sea a huge sandbar has been an obstacle since before Crusaders landed in 1147 and were persuaded to join Afonso Henriques, Portugal's first king, in conquering the Moors.

As a port, Oporto has always been fraught with hazards—the curse of sand and, worse, sudden floods that flashed down the gorges. The Douro is periodically closed to all shipping except fishing trawlers and small boats. Leixões, a port built in the mouth of a small parallel river, Leça, just north of Oporto, offers an alternative. The city of Oporto now has two ports.

I crossed the bar myself—aboard the *Maria Elizabete*, a sardine trawler, setting out in late afternoon from the fishing village of Afurada on the Gaia side. I'm at home in a boat, but this was no pleasure. The Atlantic mist chilled my body, diesel fumes stirred my stomach, and the nightlong blaring radio provoked a thumping headache. The great fishing net went out again and again. Rewinching was a slow process, and we caught few—and measly—sardines. Oporto next morning was a welcome sight.

To the 350,000 people of this northern commercial capital there's no confusion in the multiple Oportos. The city and its satellite towns form a congestion of factories and workshops that is the biggest, busiest industrial zone in Portugal. No vast industry dominates. Shipping, textiles, timber, electrical equipment, metalwork, furniture,

Battleship fortress *of Christendom, the Peñafiel castle was launched in the tenth century when Christians challenged Moorish power along the Duero. Enlarged in the 1300s, the stronghold saw Castile rise as the nucleus of modern Spain. Nearby Simancas castle, once a Moorish palace, holds national archives* ***(above)*** *of more than 30 million documents dating from the 12th through the 19th centuries. Scholars of Spanish history rank it among the world's most valuable collections.*



Easter weekend celebration *unites families in song and dance near the border town of Fermoselle. Local products—including wine, pork sausage, and sheep cheese—set the picnic table. Local history records the passage of a varied multitude, from the original Iberians to the Celts, Hannibal's Carthaginians, the Romans, Visigoths, Moors, and Christians.*

agriculture, table wines including *vinho verde*—young green wine—as well as port add up to 60 percent of Portugal's economy.

Its poets write that Oporto, afflicted by war, flood, disaster, is gray with grief. I saw sturdy endurance in granite structures set solidly beside a quicksilver Douro, and quaint, florid touches in baroque pinnacles. Narrow streets press one on another, with rattling trams and rushing traffic.

It's a city of tumbling red roofs, fine bookshops, crowded cafés, palaces—the showy

Bolsa, the lovely crumbling Freixo. It's a city of steps—I climbed the Clérigos tower and lost count. I heard laughter, not tears, even in the poorest quarters: terraces where large families squeeze into midget houses—their laundry flying like flags.

Portugal's origins lie in Oporto. Prince Henry the Navigator, who inspired great voyages of discovery, was born here in 1394. He adapted Douro *caravelas* to sail the unknown oceans. And it was Ferdinand Magellan, born in Sabrosa above the Douro, who led the first voyage around the world.

The sails of a Douro craft—the beautiful *barco rabelo*—emerge from river mist like a ghost ship from the glorious past. For more than 200 years these flat-bottomed wooden boats braved the rapids of the Douro to carry casks of port wine downriver. But with the coming of the railway, dams, and tanker trucks, the barco rabelo was doomed. Port-wine companies, eager to revive the boats, organized a race. Loud cheers acclaimed each newly built barco as it crossed the line

The solemn spell *of Holy Week falls over Zamora as 1,500 members of the Cofradía del Santísimo Cristo de las Injurias make their three-hour pilgrimage under a vow of silence. Sixteen cofradías, or brotherhoods, one dating from the 15th century, parade during ten days of Easter remembrance. Their headgear derives from that worn by men who led prisoners to execution during the Inquisition.*

*With poise won by seven years in the ring, gold-suited matador José Luis Palomar (**facing page**) stands with a banderillero before facing two bulls and 14,000 fans in the Plaza de Toros in Valladolid.*

under the Dom Luis Bridge. Who won mattered not at all.

Three bridges span the last gorges of the Douro at Oporto; the Dom Luis is one of two lace-metal arches. The other, completed in 1877, designed by Eiffel before his Paris tower, still carries trains. Traffic is heavy; a new rail bridge is planned.

UNDER THE BRIDGES an even greater plan is evolving for a navigable river. The Douro, because of its tumultuous passage and steep drop—426 feet in Portugal's 130 miles—has earned high points for hydroelectricity and none, until now, for navigability. It's been a controversial issue, furiously debated in Oporto and by one government after another in Lisbon. Finally, the decision was made for an open, navigable Douro up to the frontier.

Daniel Pinto da Silva, a Douro man, born 59 years ago near Peso da Régua and now a hydraulics engineer for EDP, the national electricity company, has the title of project coordinator. He knows the river from childhood, before a dam was raised, and he has devoted his life to it.

EDP wanted energy, and there are eight Douro dams—three at the frontier—to provide it. The last, Crestuma, 12 miles from Oporto, is nearly complete. But 25 years ago EDP's engineers had a dream, the same vision of an open waterway. Each of the five dams within Portugal has a lock, with hydraulics designed by Pinto da Silva, to lift and lower Europe's standard barges along the Douro's length. The lock at Carrapatelo is 114 feet high, tallest in the Western world.

There are sizable deposits of iron ore buried in the Trás-os-Montes, and coal, granite, and timber lie close to the river. Dredgers are at work, clearing the way to these riches in an impoverished region. River ports and piers are coming. At Oporto, engineering will restrain shifting sands and reopen the river mouth. The people of Portugal's northeast will enter the modern world.

The Duero, the Douro—I know it well. I have bathed in it, boated on it, drunk its waters and its noble wines. Like vintage port, the river is maturing, developing. There's patience, care, and excitement in the waiting; time is nothing, really. I raise my glass to its golden future. □

POLLEN

The perils of pollen*—sneezing, wheezing, and nose-twitching misery—are allegedly thwarted by the Hincherton Hayfever Helmet, which enables sufferer Jim Greenbaum to mow his Virginia lawn. Some 15 million Americans suffer from hay fever, but its cause, pollen, confers blessings as well. Bearing the male sex cells*

BREATH OF LIFE AND SNEEZES

By CATHY NEWMAN
NATIONAL GEOGRAPHIC STAFF

Photographs by
MARTHA COOPER

of flowering plants and conifers, these minuscule grains—sacred to the continuity of life—launch the formation of a seed.

ONLY TWO WEEKS after moving to the sunbaked brilliance of Tucson, Arizona, from the smog of Trenton, New Jersey, Bill Flynn sat in a doctor's office and . . . *twitch, sniffle, gasp . . . aCHOO!* Welcome to sneeze city. Flynn learned he could count on 21 pollens—from Arizona ash to Russian thistle—to provoke the misery he thought he'd left behind. For the next several years he faced regular allergy shots.

Flynn, a large man with an easy laugh, whose hay fever had marred his enjoyment of such simple outdoor pleasures as a pick-up game of softball, was dismayed:

"Before I moved here, I thought: It's like Lourdes. I'll walk off the plane and be cured. Don't believe it. There are grass and trees out here."

And hedges, weeds, and other veritable pollen factories, he might have added.

What happened to the healthy air? It was polluted by allergy refugees and other newcomers who sowed the seeds of their own discomfort by greening the desert.

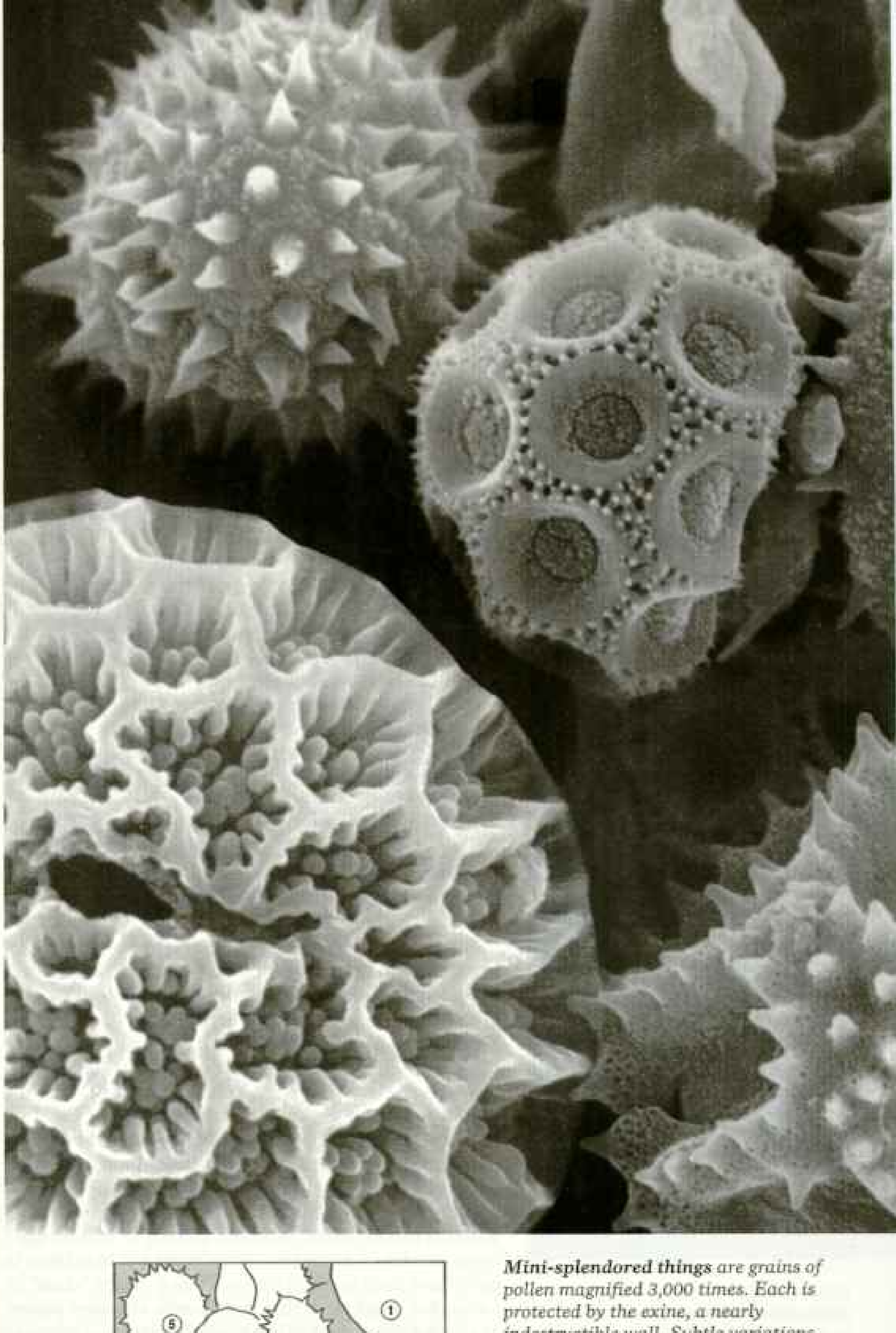
As Flynn's allergist, Dr. Jacob Pinnas of the University of Arizona Health Sciences Center, explained, snowbirds addicted to their lawns had migrated here and refused to transfer their affections to native plants like creosote bush and cactus.

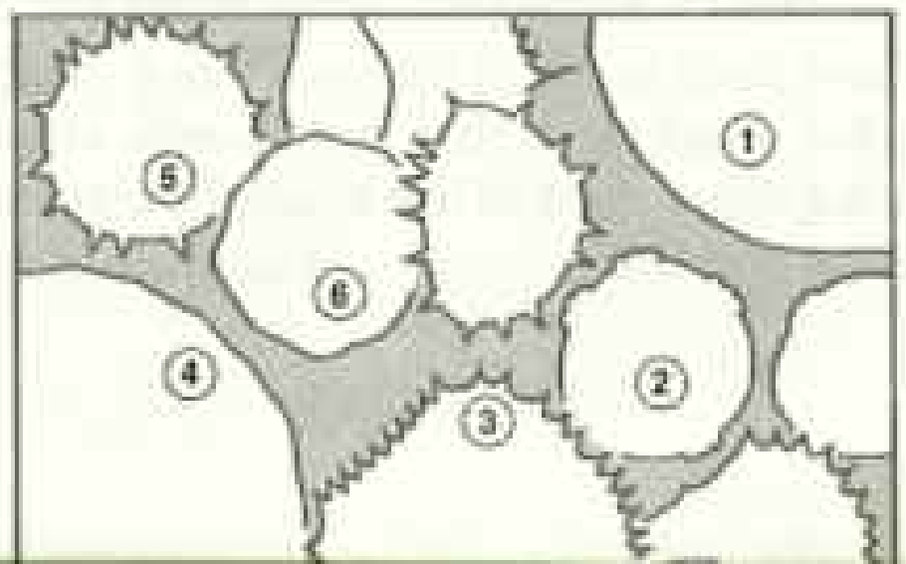
Instead, they had planted alien species—Bermuda grass and elm trees among others—and hoisted the pollen count to levels matching Milwaukee, Brooklyn, and Pittsburgh—places they had fled.

"People who moved here didn't think about pollen," Dr. Pinnas said. "They just wanted a lawn and a tree."

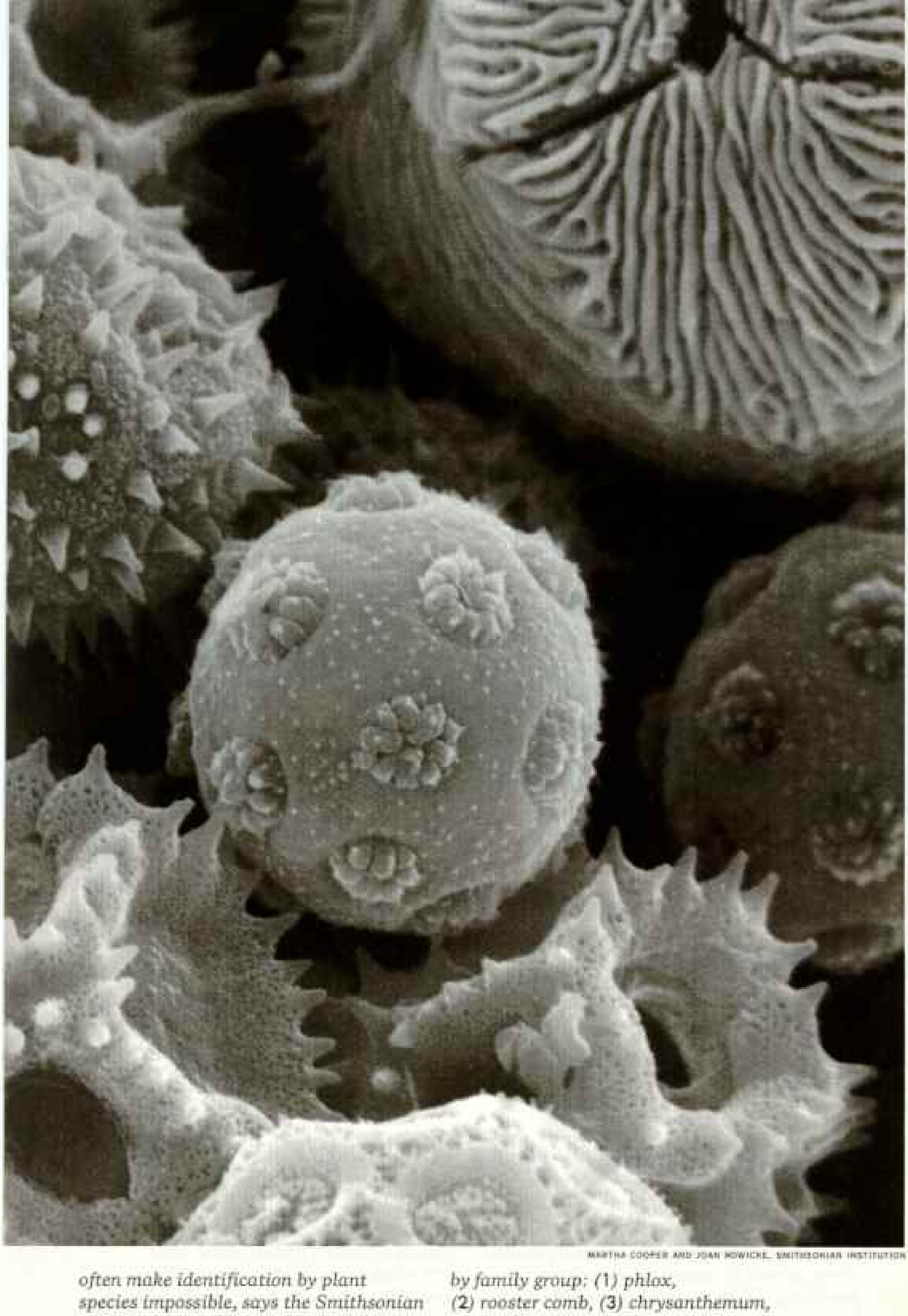
When the statistics were in, they got a jolt. The allergy prevalence in Tucson, where nearly a third of the population had moved for health-related reasons, had jumped to three times the national average. The allergy haven had become a Kleenex-littered hell.

If the mention of pollen brings tears to your eyes and wheezes to your lungs, as it does to some 15 million hay-fever-stricken Americans, let me point out that there is more here than meets the nose. Pollen means "dust" in Latin, but brush aside that fact for now and view pollen as a living cloud, cast to the winds by trees and grasses, descending on the *(Continued on page 496)*





Mini-splendored things *are grains of pollen magnified 3,000 times. Each is protected by the exine, a nearly indestructible wall. Subtle variations*



MARTHA COOPER AND JOAN NOWICKE, SMITHSONIAN INSTITUTION

often make identification by plant species impossible, says the Smithsonian Institution's pollen expert, Dr. Joan Nowicke. So grains here are identified by family group: (1) phlox, (2) rooster comb, (3) chrysanthemum, (4) smartweed, (5) smartweed (a different species), (6) geranium.

ANATOMY OF A SNEEZE

*WHEN RAGWEED releases pollen, it floats through air to the nasal passages. Those primed for allergy by heredity start producing a Y-shaped molecule in the blood, known as immunoglobulin E (IgE), which attaches to mast cells lining the respiratory tract (**above**).*

On subsequent exposure to ragweed pollen, a protein (yellow dots)—the offending factor in the pollen—leaches out of the grain and binds closely aligned IgE molecules on the mast cell. The body's response to the pollen invasion is under way.

PAINTING BY NATIONAL GEOGRAPHIC ARTIST REID W. SEIDLER

The linkage of the IgE molecules sparks a tiny explosion in the mast cell. Various chemical mediators (red dots), including histamine, leukotrienes, and prostaglandins, leak from the cell. These chemicals cause the symptoms of allergy, like sneezing, congestion, itching.

If an individual has taken a series of allergy shots—increasing dosages of the specific allergen—the body builds up an antibody known as immunoglobulin G (blue), an allergy-countering factor. But for unknown reasons, immunotherapy seems to work only 80 percent of the time.

fragrant blooms of glittering cities and desolate deserts.

Pollen is to plants what sperm is to animals: the agent of viability. It is the breath of life as well as of sneezes.

It also tickles human experience in important, fascinating, even offbeat ways.

In the past year my pollen prospecting has led me to a murder in Vienna, where pollen provided the most critical clue; to a Navajo medicine man's hogan, where pollen blessed a man suffering from pneumonia; to Texas oil fields, pinpointed in part by fossil pollen; and to an athletic field in Finland, where Olympic runners who used pollen in their diet lapped the competition.

Conducting a nasal appraisal, *Dr. Peter Creticos of the Johns Hopkins University records a patient's reaction to a challenge test* ***(above)****, whereby pollen grains, blown up the nasal cavity in increasing dosages, determine sensitivity to an allergen. At the slightest hint of a breeze, nonallergenic pine pollen smokes from a tree* ***(facing page)*** *in Oregon's Crater Lake National Park.*

IN PARIS I peered through a microscope at a 50,000-year-old pollen grain from the grave site of Neanderthal man. "Senecio, a type of yellow daisy. It blooms now on the hills of Iraq," speculated Dr. Arlette Leroi-Gourhan, director of the Musée de l'Homme's palynological laboratory.

The grain comes from soil samples sent to her by noted anthropologist Ralph Solecki, who unearthed several Neanderthal grave sites in Shanidar Cave, Iraq, 25 years ago.

Hoping to determine the prevalent flora, and thus climate, during the time of these early humans, Dr. Leroi-Gourhan searched for pollen. Samples from soil beneath the skeletons yielded a stunning discovery.

"I was stupefied. They were so rich in pollens. But not just pollens. Bits of wood. Even a butterfly wing scale," she said.

The pollens were from ornamental flowers—hollyhocks, grape hyacinths, and others. She also identified pollen from *Ephedra*, a many-branched shrub with tiny scalelike leaves. There was little chance that these had been blown far back into the cave by winds or tracked that far in by animals. No, the flowers had been placed there by mourners. And the *Ephedra* pollen proves, Dr. Leroi-Gourhan feels, that the dead had been placed on a bier of branches. The burial took place in late May or in June, she estimates.

The tiniest of clues had revealed a new dimension of cave-dwelling Neanderthal man. He grieved.

We don't know if he suffered allergies. Hay fever doesn't mark bones, as do arthritis and some other diseases. Many doctors feel that the rise of civilization and allergies paralleled each other. Others say today's abundance of allergies merely reflects medicine's improved ability to diagnose.

But allergy and anthropology are secondary roles in the life of pollen. It quickens the ovule of flowers and so forms a seed. Touched by pollen, trees and bushes respond with huckleberries or hazelnuts or pears. Pollen fertilizes the tree of life.

Amber waves of pollen, *some nearly half a mile wide, gild Crater Lake during summer when surrounding forests pollinate. A small percentage of the world's plants, generally trees and grasses, are wind pollinated and shed*

tremendous amounts. A single pine tree may produce more than 320 billion pollen grains over a 50-year span.

Buoyant and winged, such pollens are sometimes dispersed thousands of miles from their point of origin.

Though the Assyrians recognized the sexuality of plants and Pliny called pollen the material of fertilization, it was not until the development of the microscope in the 17th century that man could actually see individual grains. The English microscopist Nehemiah Grew, one of the first to describe them, colorfully characterized their shapes as miniature peppercorns, Holland cheeses, and fish.

You need a microscope to really study pollen, though you just might see a large grain, like that of corn, with the naked eye if you knew it was there and squinted. Not so a forget-me-not pollen grain. You could fit nearly 10,000 of them on a pinhead. Pollen grains are so tiny and uniform they have been used to calibrate precision instruments that measure in thousandths of an inch.

IF NOT FOR the more than a quarter of a million plants that reproduce through pollination, about the only produce sold in supermarkets would be plants that can reproduce asexually, by spore formation or underground stems called rhizomes.

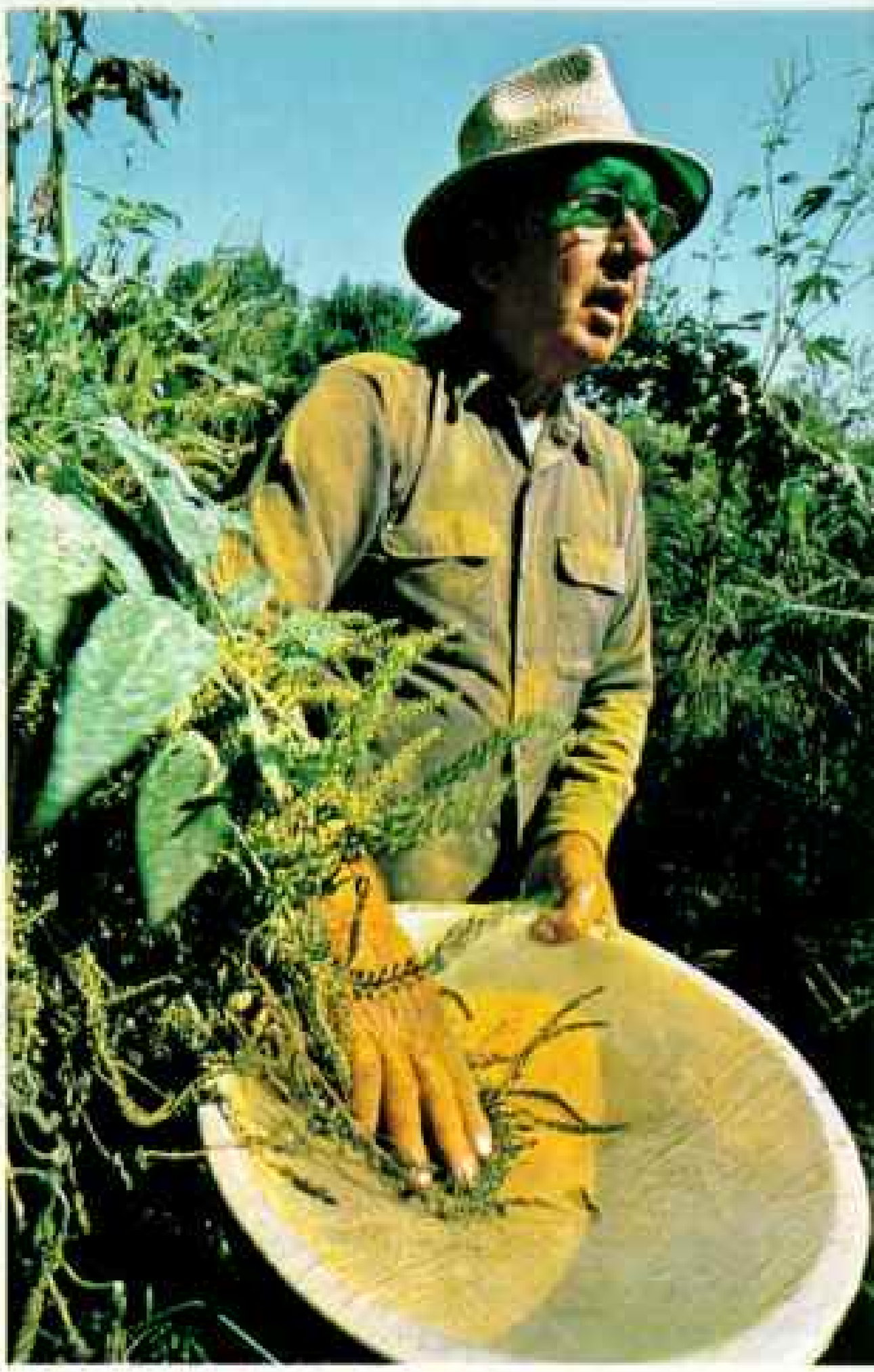
That means we would be limited to potatoes, onions, bananas, and—assuming we developed a palate for such fare—lichens, mosses, seaweeds, and ferns. We would be deprived of paper, croissants, wooden chairs, cotton shirts, cigars, beer, and wine, since all depend on pollen-bearing plants.

When a pollen grain, produced in a sac called the anther, is launched and lands on the stigma of a flower of the same species, a recognition factor gives it the green light. (Thus a tomato pollen grain does not waste its time trying to germinate on an eggplant.) The grain extrudes a pollen tube that conducts two sperm to the ovule. The first one unites with the egg to form the actual plant embryo. The second helps form the endosperm, or food source and protective covering. How fast this happens depends on the species. Geraniums fertilize in a matter of hours. Orchids take months.

Many plants are pollinated by animals, such as bees, birds, or bats. But other plants, mostly grasses and trees, are wind pollinated and shed whopping amounts. Much of Sweden, for example, is covered by conifers. By one estimate, if that country's pollen production were evenly spread, it would cover every Swedish square meter with 300 million grains.

Most of the pollen wafted into the air never finds its target. It may travel two feet or 2,000 miles and settle into the soil, immortalized in the fossil pollen record.

Embedded in earth the pollen's nearly indestructible shell, called the exine, endures epochs of continental drift, the advance and retreat of ice sheets, the formation of seas,



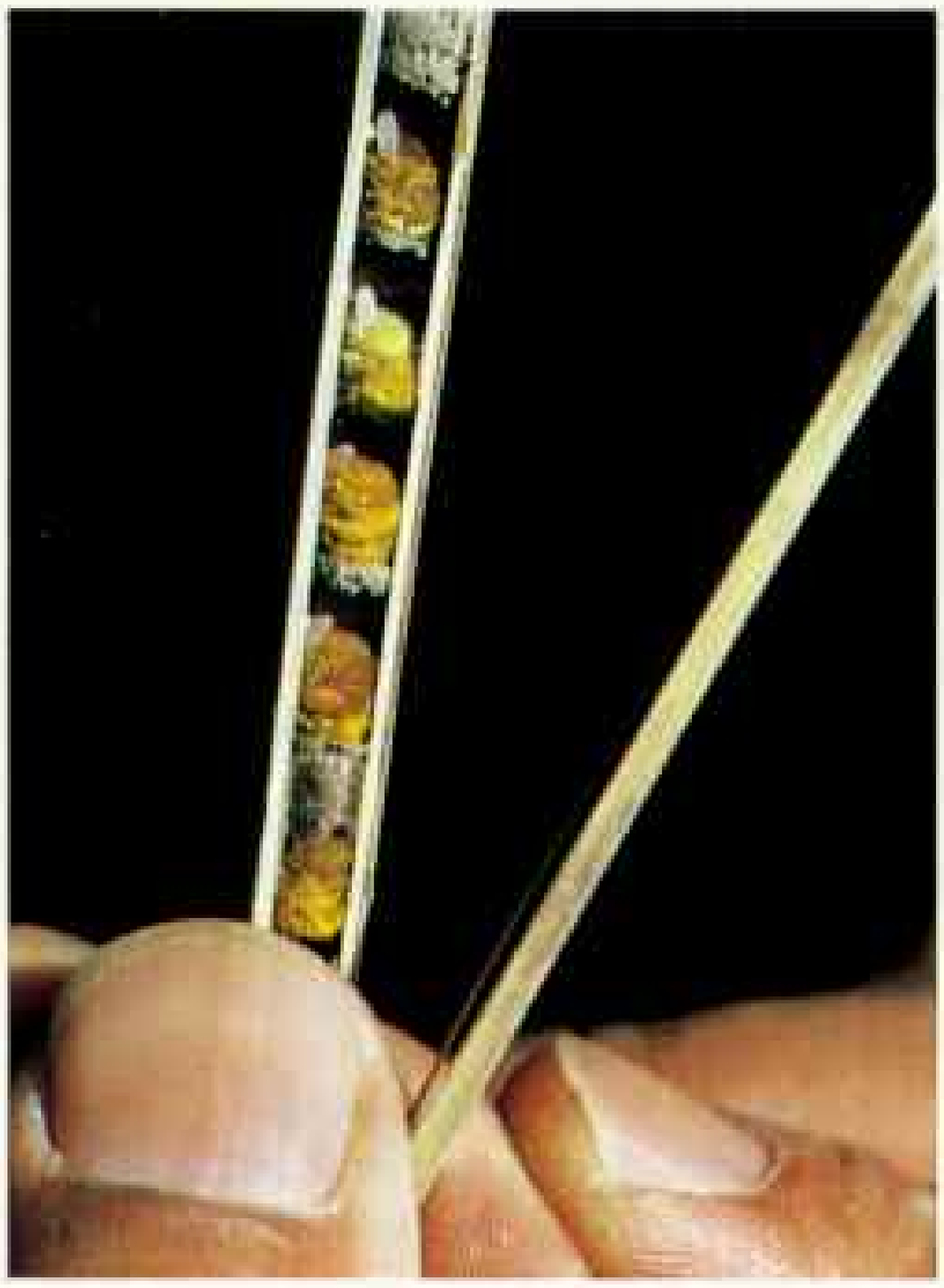
Blossoms shower *from an almond tree* ***(facing page)*** *in an orchard near Manteca, California. After separation from flowers, the pollen is sold to pollinate orchards where bees may have been killed by pesticides. Ragweed pollen is harvested by Willie Parsons* ***(above)*** *for Greer Laboratories in Lenoir, North Carolina, producers of allergy extracts.*

the rise and fall of mountain ranges. That is why pollen experts, called palynologists, can find ancient fossil grains, some nearly 300 million years old and their viability long gone, in corings from such locales as Antarctic ice, ocean beds, bogs, or deserts.

Once a coring from ocean bed or bog is retrieved, the sediment is boiled in a series of acids to separate out the pollen. The palynologist can then identify and count the grains. To define flora is to define climate, and so a thin slice of pollen-filled earth may represent a landscape scenario millions of years old.

IF COUNTING GRAINS one by one through a microscope sounds tedious, it is. "It's like looking through the end of a Coke bottle for hours," Vaughn Bryant, professor of anthropology at Texas A&M told me (page 507). "And if you don't wear glasses by the time you're 40, maybe you haven't been working hard enough."

As we stood under a ledge that provided respite from a broiling sun in Seminole Canyon, near Del Rio, Texas, Dr. Bryant kicked aside a few clods. But they were not just ordinary clumps of dirt. They were coprolites, an innocuous, if fancy, name for fossilized



A light dusting *of pollen with a goose-down-tipped stick* ***(left)*** *promotes fertilization of pear trees in Japan, where pesticide overuse has decimated natural pollinators such as bees. During the blooming period, farmers enlist the aid of family, friends, and schoolchildren. As an alternate solution, some farmers have introduced colonies of horn-faced mason bees* ***(above)****, efficient pollinators cultivated in reeds. Female bees stuff the reeds with nourishing pollen pellets, lay an egg on each, and intersperse the cells with mud.*

feces. By extracting the pollen from these remains, Bryant has reconstructed the diet of prehistoric man who lived in this canyon 9,000 years ago. The menu? Cactus, agave, sotol (a plant with spiked leaves), and mesquite flowers and seedpods, among others.

The tales told by pollen enhance our knowledge of man's history, and even of the world before man, in some fascinating ways. Consider:

• A specialist on pollen found in honey can decipher the Viking recipe for mead by identifying pollen scraped from the bottom of drinking horns.

• Pollen analysis has pinpointed the beginnings of agriculture in Ontario and Denmark. (The pollen profile shows a reduction in tree pollen, indicating land clearing, and a subsequent rise in the pollen of cereal grains and pasture grasses.)

• Scraped from the floors of ancient pueblos in the Southwest, corn or grain pollen can indicate whether a room was used for food storage and cooking.

"Archaeologists concentrate on cultural materials: pottery, grinding stones, and flints," Dr. Bryant said. "But these grains pack as much information in them." In the

annals of early man, pollen helps illuminate chapters in the dark struggle for survival.

CAN A GRAIN OF POLLEN convict a man of murder? I open my case by presenting the evidence: a missing man presumed dead and a pair of leather boots belonging to the suspect.

The place is Vienna, Austria, the year 1959, and police interrogate a suspect, a young man who hotly declares his innocence. He claims that at the time of the murder he had been climbing a steep, sandy mountain.

The boots are given to a palynologist with the geological survey, Dr. Wilhelm Klaus.

He carefully scrapes them. But the suspect has cleaned them well. Less than a gram of dirt remains.

It contains 1,200 pollen grains.

They include spruce, willow, a plant called *Filipendula*, and a 20-million-year-old hickory grain. They speak not of high, dry land, but of a river basin, and because of the ancient hickory grain, a specific swampy outcrop, 20 kilometers north of Vienna.

"We confronted the suspect," Dr. Klaus, now professor of paleobotany at the University of Vienna, recalled. "'You lied,' we said. 'You were really near the Danube.'" Shocked, the man confessed. He led police to the scene pinpointed by pollen. In a shallow grave—in damp ground—police uncovered the body of the murdered man.

The late Max Frei, a noted Zurich criminalist, specialized in cases that hinged on such minutiae. Consider a few definitive pollen clues from his casebook:

- Hazel and birch pollen on a newly greased gun barrel refuted the murderer's alibi that the pistol had remained unused since the previous March.
- A grain of Atlantic cedar pollen embedded in the ink of a signed, dated document proved it a forgery, written in October, and not in June as claimed.
- Pollen from the body of a murdered woman did not correspond with the area in Sweden where the body had been found. Thus, the murder had been committed elsewhere.

Frei's work included cases like the kidnapping of former Italian Prime Minister Aldo Moro. When Frei died last year, he was pursuing a more baffling intellectual puzzle:

To build a better tree, *plant geneticists bag the maturing cones of one of 200 select Douglas firs (**left**) in California's Shasta-Trinity National Forest as part of the United States Forest Service's Superior Tree Program. The bags prevent random fertilization from surrounding trees. When the cones are ready, pollen from another superior tree is introduced by geneticist Chuck Frank (**right**). The seeds are collected in the fall and will produce higher-yielding, faster-growing trees.*

the Shroud of Turin, the cloth that some believe wrapped the body of Christ. Frei's scrutiny of the shroud in the 1970s yielded 56 pollens—some of them from plants found in Anatolia and Palestine—which suggested to him that at some time the cloth had been in these lands. The findings sparked controversy; after all, some palynologists argued, the pollens could have resulted from contamination.

And so the shroud remains a mystery. Evidence inconclusive. Case unsolved.*

TEXAS, a state that likes to brag of bests, biggests, and mosts, can add this claim to the list: Big, frenetic Houston boasts more industrial palynologists than any other U. S. city. Naturally. It's the vortex of the oil business, a major employer of pollen specialists. On the soggy August day of my visit, the oil industry limped. I clicked on the radio. Spot crude had dropped a dollar. I turned on the TV. The Texas rig count was down 11 from the previous week. But rigs were still pumping; the world was still trading. And in Exxon's laboratories, senior research associate Lew Stover was examining several of the more than 15,000 slides his laboratory processes each year from drill-core samples sent in from rigs worldwide.

*Kenneth F. Weaver wrote of "The Mystery of the Shroud" in the June 1980 NATIONAL GEOGRAPHIC.

Palynology, Stover explained, can help indicate where and how deep to drill. Fossil pollens and spores act like a dipstick and locate the drill bit geologically. Such knowledge can help make the difference between a well that makes money and one that doesn't. That's why some 170 palynologists work in the energy field in the United States and Canada. Exxon alone employs 25.

"Take Sumatra, Borneo, Malaysia," Stover said. "If you're exploring there, you look for a prehistoric mangrove environment. That means pollens from mangroves, palms, and such. In Korea, though, you look for temperate species, oak and willow, in sediment as old as 25 million years.

"It's detective work on the grandest scale," he continued. "People regard oil exploration as static. It's not. Think of mountains uplifting, seas drying up, plants evolving. What could be more grand?"

Later that day, imprisoned in a Texas-size traffic snarl and the fumes from all those hydrocarbon-fueled engines, I wondered just how grand the end result was. I leave that one to the urban philosophers.

A FRIEND, a confirmed jogger, mentioned that he ate four pollen tablets a day. "For fitness," he said.

Is pollen the breakfast of champions? Olympic sprinter Steve Riddick, who sported a "Bee Power" T-shirt after winning the

To see the world in a grain of pollen *is the work of experts like Dr. Vaughn Bryant (**facing page**) of Texas A&M University, whose assortment of plants duplicates the diet of Indians who lived in the Texas desert 9,000 years ago. Clues for the reconstruction of the larder were supplied by pollen found in coprolites, or ancient feces (**above**). Pollen provides a wealth of information to scientists, who can reconstruct ancient vegetation and climatic conditions by analyzing fossil pollen found in core samples. Pollen grains 78 million years old spill from a broken anther, or pollen sac (**below**), found in Sweden.*

gold in the 400-meter relays in 1976, thinks so. So does world-class marathoner Gary Fanelli, who takes ten pollen tablets before a race and often pops one while running.

Such health-food products contain bee-gathered pollen. To collect it, beekeepers place a trap at the entrance to the hive. A wire screen (page 510) scrapes the two pollen pellets carried on the bee's hind legs into a collection drawer beneath the hive.

The collected pollen is pressed into tablets or sold loose, but some companies add a binder of honey and concoct pollen bars—said to be a favorite of Ronald Reagan. The President would, a White House spokesman assured me, "keep a supply on hand if he knew where to get some."

Well, I sent several pollen bars along to the President, but despite my inquiries, I never did find out if they replaced jelly beans as the presidential snack.

POLLEN POWER: Is it all fact or fad? A track coach reminds me that races are won in splinters of a second. If there is a pill that promises a legal physical advantage, you can bet any athlete worth his salt tablet will glom on to it.

During the 1970s the Finnish Olympic track team, including distance runner Lasse Virén, who won two gold medals in 1972 and two in 1976, took pollen supplements at the request of head coach Seppo Nuuttila. Nuuttila now coaches the Olympic rowing team, for whom he recommends pollen. He feels it's an effective supplement, high in B vitamins.

At Louisiana State University in Baton Rouge, I proffered pollen to Ralph Steben, assistant professor of physical education.

He tried some and frowned. "It doesn't taste very good," he said.

As far as I know, Steben has done the only controlled studies in this country involving athletes' use of pollen. His three experiments involved weight lifters, swimmers, and cross-country runners.

"It really doesn't help," he told me. "It's subjective, though. If an athlete thinks he's going to perform better, maybe he will."

Perhaps the most devout believer in pollen I met was Jim Devlin, a former Catholic priest who converted to pollen several years after leaving the clergy. Now he spends his

Sleuthing for oil *at Exxon's research laboratory in Houston entails examining fossil pollens in core samples and scrutinizing photographs to identify types* ***(above)****. Certain pollens help indicate whether conditions favored the formation of oil, assisting scientists in pinpointing promising drill sites. A microscopist in training at the Chicago Police Department Crime Lab studies soil from a boot* ***(below)*** *for pollens that may yield crime-solving clues.*

time on the road, doing the radio-TV talk-show circuit in praise of pollen, which he sells. To Devlin, pollen is manna. Literally.

"Do you know what the Bible says about manna?" he asked me. "It says it tasted like honey wafers."

As we drove to his home in the hills above Prescott, Arizona, Devlin related how he discovered pollen.

"I was 45, sickly, overweight . . . ," the story began.

In short, Devlin, a 212-pound weakling, first bought pollen from a beekeeper at a flea market. It transformed his life, he said. He lost weight, gained energy, looked younger.

"It's also done wonders for my virility," he added.

I edged slightly closer to the car door.

Like other pollen evangelists I met, Devlin claimed that pollen acts as a health restorative and preventive medicine.

"Those Russians who live to be 125," Devlin told me. "They're beekeepers. They eat pollen."

How did he know?

He handed me a study conducted in Bulgaria and a clipping from a screaming-headline tabloid.

"If pollen is so good for you," I asked, "why isn't it selling like aspirin?"

"The medical profession," he replied. "They're afraid of losing business.

"You can't expect miracles with it," Devlin told me. "Remember it's a food, not a medicine." When I last saw him, he was on the phone arranging another appearance.

IN ENGELHOLM, SWEDEN, the Cernelle Company has been making pollen-extract products since 1952. Cernelle manufactures a pollen toothpaste, pollen face cream, pollen animal feed, and a score of other such concoctions.

I watched a machine stamp out tablets at the rate of 80,000 an hour. Business is as healthy as the pollen purports to be. Last year sales totaled 2.5 million dollars, a 50 percent increase over the previous year. To make 140 million tablets, the company harvested some twenty tons of pollen from surrounding fields.

Twenty tons? How? I asked Cernelle Chairman Åke Asplund and several of his executives.

The men averted their eyes. I felt as though I had picked up the wrong fork at a state dinner.

"It's very secret. We don't talk about it," Asplund said.

Later someone muttered something about a machine that operated on electrostatic principles, but no one offered any details.

Cernelle's pollen tablets are licensed as a drug in eight countries, including France, Argentina, and Japan. But not in the United States. And not in Sweden.

"No one is a prophet in his own country," Asplund said. He looked sad.

"It's not like taking penicillin. The results aren't dramatic," Asplund added. "We do feel it's a healthy product. Don't forget, pollen does produce new life."

So who was I to pass up a chance at long life and good health? I tried the stuff myself for a month. But my squash game didn't improve. And I caught my usual winter cold. Perhaps a two-month trial would have rendered me invincible and immortal.

In this country the Food and Drug Administration sidesteps the pollen controversy. As long as the pollen is properly labeled and sold as a food, the FDA is satisfied.

But in St. Louis, Missouri, Dr. Walter Lewis, professor of biology at Washington University and a noted authority on folk-plant remedies, regarded a bag of bee pollen skeptically.

"I think it's a scandal," he said. "I see nothing in pollen that is not in most plant cells from a nutritional point of view. Yes, it's rich in amino acids. But so is a handful of sunflower seeds."

Lewis points out that because of the allergenic properties of pollen, eating the stuff carries the slim, but real, chance of life-threatening acute reactions.

Whether fact or fad as health food, pollen's prime function remains unchallenged. It greens the world—and our lives.

IT IS EARLY FEBRUARY in blossom-studded orchards of California's San Joaquin Valley. In an almond grove near Manteca, alongside a dozen high-school kids, I am "knocking the trees," to gather almond pollen for supplemental pollination of orchards. It turns out to be more punishing for me than the trees.

YELLOW RAIN

RAIN OF CONTROVERSY dots three leaves in the collection of Harvard biochemist Dr. Matthew Meselson. The top leaf, collected by Hmong tribesmen in Laos, is allegedly from the site of a chemical attack in March 1982. The two bottom leaves, found in India, are spotted with bee excrement.

Argument centers on charges by the U. S. government that the Soviet Union supplied toxins to allies who sprayed deadly yellow rain on villages in Laos and Kampuchea. Pollen showed up in some samples. Killer pollen? "It's the perfect agent for dispersal of a toxin weapon," says Gary Crocker, a U. S. Department of State spokesman. "It's easily spread over a wide area." From 1975 through 1982, the U. S. claims, at least 7,000 people have died from chemical agents in Southeast Asia. The Soviets deny the allegation, and findings of a 1982 United Nations investigation were inconclusive. Since then, several U. S. scientists, including Dr. Meselson and Yale bee expert Dr. Tom Seeley, have attributed yellow rain to bee excrement. Their theory, bolstered by a trip to Thailand, rests on the fact that bees make defecation flights that can splatter large areas with yellow spots. The Smithsonian's Dr. Nowicke, who examined alleged yellow-rain samples under the scanning electron microscope, agrees that they are probably bee excrement.

But at last look, the State Department was sticking to its guns. The controversy continues, unabated, unresolved.

To harvest pollen, *a beekeeper in New Mexico inserts a wire trap at the hive entrance. When worker bees gather pollen as protein for larvae and return to the hive, they must squeeze through a mesh screen (**above**) that knocks the pollen off their hind legs. Falling to the bottom of the trap, the pollen collects on a drawer that is periodically emptied (**above right**). The pollen is packaged and sold as health food. Devotees claim it gives athletes a competitive edge and promotes good health, though many scientists doubt such claims.*

Under the guidance of Bob Firman, president of Pollen Services, Inc., one of six agricultural pollen companies in this country, I swing a ten-pound mallet at the trunk. My first swipe misses, and I suffer an embarrassing wrench familiar to a golfer who whiffs the ball. A second swing brings a shower of pale white blossoms onto a tarpaulin beneath the trees.

Almonds are merely one species of about ten billion dollars' worth of crops pollinated by bees. As with apples and pears, almonds of like-variety trees are generally not self-fruitful. A Red Delicious apple tree, for example, cannot pollinate another. A different

variety, say, Golden Delicious, is needed nearby for pollination to occur.

Bees make it happen. They forage among blossoms for nectar and pollen—the main protein source for growing larvae. The pollen brushes off on the bees' body hairs. The bees comb their hairs and scrape the pollen into a saddlebag-like basket on the hind legs. Back in the hive the pollen is packed into the comb cells to feed larvae. In a year's time bees gather 80,000 tons of pollen in the United States. As the bee goes from flower to flower, pollen gets brushed onto the stigma; fertilization occurs.

But pollination can be a dicey business. Sometimes bees are not around where or when you want them. Bees can be fastidious about working conditions. They won't fly if it's too cold or raining. Sometimes pesticide spraying inadvertently kills colonies.

That sort of bad luck spells good luck to Bob Firman. He collects pollen from pears, apples, and almonds (one percent of the blossoms can be plucked without affecting the crop yield), processes it, then sells it to orchard growers. They apply the pollen to their trees by tractor sprayer or plane.

Bob and I stood in a barn and watched the kids dump bags of blossoms into a machine that separates pollen from petals. "It's very

A MISERY INDEX

FOR THE HAY-FEVER CURSED there is no refuge, only respite. As this month-by-month chart shows, except for seasonal dormancy, most states have something pollinating sometime. Ragweed is the biggest troublemaker, with grasses close behind. But tree pollens, like those from oak and cedar, are notorious hay-fever culprits too. Ragweed blankets most of the country east of the Mississippi. Its prime time is late summer. Grasses cause trouble in summer, and trees in spring. But in other parts of the country, different weeds, trees, and grasses pollinate at different times of the year. And some states, like Texas, have vegetation that pollinates year-round.

Furthermore, it may do no good for a ragweed-allergic person to move to a ragweed-less place like Portland, Oregon, or Juneau, Alaska. The body's immunological system can re-key itself and develop an allergy to plants those places do have. As noted Chicago allergist Dr. Max Samter wryly comments: "God takes care of allergists."

Darker brown indicates pollen season of short and giant ragweeds, considered the most prominent allergens in North America.

LOCATION	J	F	M	A	M	J	J	A	S	O	N	D
ALABAMA												
ALASKA												
ARIZONA												
ARKANSAS												
CALIFORNIA												
NORTH												
SOUTH												
COLORADO												
CONNECTICUT												

LOCATION	J	F	M	A	M	J	J	A	S	O	N	D
DELAWARE												
DISTRICT OF COLUMBIA												
FLORIDA												
NORTH												
SOUTH												
GEORGIA												
HAWAII												
IDAHO												
ILLINOIS												

NATIONAL GEOGRAPHIC CARTOGRAPHIC DIVISION; PAINTINGS BY CHRISTOPHER A. KLEIN; RESEARCH: SUSAN B. MALOSKIN; PRODUCTION: JAMES E. MCCLELLAND

LOCATION	J	F	M	A	M	J	J	A	S	O	N	D
INDIANA												
IOWA												
KANSAS												
KENTUCKY												
LOUISIANA												
MAINE												
MARYLAND												
MASSACHUSETTS												
MICHIGAN												
MINNESOTA												
MISSISSIPPI												
MISSOURI												
MONTANA												
NEBRASKA												
NEVADA												
NEW HAMPSHIRE												
NEW JERSEY												
NEW MEXICO												
NEW YORK												
NORTH CAROLINA												
NORTH DAKOTA												
OHIO												
OKLAHOMA												
OREGON WEST OF THE CASCADES												
OREGON EAST OF THE CASCADES												
PENNSYLVANIA												
RHODE ISLAND												
SOUTH CAROLINA												
SOUTH DAKOTA												
TENNESSEE												
TEXAS EAST												
TEXAS WEST												
UTAH												
VERMONT												
VIRGINIA												
WASHINGTON WEST OF THE CASCADES												
WASHINGTON EAST OF THE CASCADES												
WEST VIRGINIA												
WISCONSIN												
WYOMING												

PRIMARY CONSULTANT: WALTER H. LEWIS, PROFESSOR OF BIOLOGY, WASHINGTON UNIVERSITY

CHART ADAPTED FROM SEASONAL ALLERGENIC POLLENS, PHARMACIA DIAGNOSTICS

simple," he said. "No pollen, no almonds. If the weather conspires against the bees or throws off blossoming time, you might be left with a nice crop of leaves. There's not much of a market for leaves."

Suddenly, Bob paused, and sneezed. "Occupational hazard," he shrugged. And there is the rub. For all the blessings pollen strews in our paths, it also presents us with a giant bane: allergy.

Paradise lost: *Tucson, Arizona, once haven for hay-fever sufferers, now boasts an allergy prevalence three times the national average, largely because of such nonnative plants as mulberry trees (**facing page**). Desert pollens (**above**) from the Tucson area are, from left, winter mix, cottonwood, mistletoe mix, fan palm, creosote bush, amaranth, jojoba, summer mix, almond, sumac, and saguaro.*

NOW HERE was something to sneeze at! The jar beneath my nose held 525,325,000,000 grains of ragweed pollen—give or take a few thousand. Elizabeth White, director of Greer Laboratories in Lenoir, North Carolina, which turns such pollens into immunotherapeutic extracts—also called allergy shots—suddenly thought of a question she should ask. "You're not allergic, are you?"

Fortunately, like 13 out of 14 Americans, I am not.

With impunity, I sniffed and noted a grassy odor. Ragweed, the biggest seller of the 165 pollens Greer stocks, is not fussy. Scratch the poorest ground and it grows. And grows. Each year a quarter of a million tons of its pollen is launched into the air in this country.

Now suppose Mrs. White had held that jar under the nose of my allergic Tucson friend Bill Flynn. Bill's immunologic system is keyed to produce immunoglobulin E, an antibody that can be a hundred times more prevalent in the blood of the allergy afflicted. Once produced, the IgE molecules latch themselves to mast cells—cells that line the mucous membranes of the digestive and respiratory tracts. When an allergen like pollen arrives on the scene, it links IgE molecules and ignites a mini-explosion in the mast cell. Bam! Histamine and other chemicals leak out (diagram, pages 494-5). Bill Flynn sneezes, his eyes water, his nose drips. A sneeze is born.

A disease of sneezes and wheezes does not provoke the historical interest of say, Ludwig van Beethoven's deafness or Claude Monet's cataracts, so assessing hay fever's impact on the course of human events and accomplishments yields a scant, but interesting, harvest. President Richard Nixon is in the hay-fever league. So was French novelist Marcel Proust, who was so allergic to pollen that he sealed himself in his room, windows shuttered, curtains drawn. And so, reputedly, was Hippias, the Athenian traitor who guided the Persian invasion fleet at Marathon. In 490 B.C., while mustering troops after the landing, he coughed and sneezed so hard that a loose tooth sailed out of his mouth and into the sand. History held its breath while he dug around trying to retrieve it.

Those who dismiss hay fever as a minor affliction should consider its economic toll. In 1975 hay-fever-suffering Americans spent two million dollars on hospital care, 224 million in doctors' bills, and 297 million on drugs. But what about the physical toll?

An allergist advised me that to really appreciate the misery of hay fever, I should wear nose clips for a day.

The discomfort! I complained to him later. The feeling of pressure in my head, the inability to clear my ears. The annoyance of breathing through my mouth.

"That's just it," he nodded. "And at least you can take the clips off."

MY SYMPATHIES aroused, I searched for news of a cure. At the Johns Hopkins University in Baltimore I found Drs. Philip Norman and David Marsh experimenting with an altered form of ragweed pollen. Called an allergoid, it will require far fewer shots than current immunotherapy, in which increasing dosages of the offending allergen are injected on a weekly schedule and build up the immunoglobulin G antibody—an allergy-countering mechanism.

In La Jolla, California, I spoke with Dr. David Katz, who thinks his discovery of a suppressive factor of allergy will stop allergies in their molecular tracks. This suppressive factor in the blood (SFA, he calls it) operates as an on-off switch and can, he claims, block the allergic response. His company is manufacturing SFA using genetic-engineering techniques, and he expects to begin clinical trials early next year.

Ultimately, the answer seems focused on the realm of genetic tinkering. One day doctors will know how to identify those with a predisposition to allergy and how to turn off the mechanism that causes it.

An allergist in Washington, D. C., opened her drawer, and boxes of nose drops and pills spilled out. Some were antihistamines; they counter the congestion, nasal drip, and itching. Others were steroids; they suppress inflammation. Although such medications can control symptoms in the vast majority of people who suffer from hay fever, the sad truth remains: At present, no cure exists.

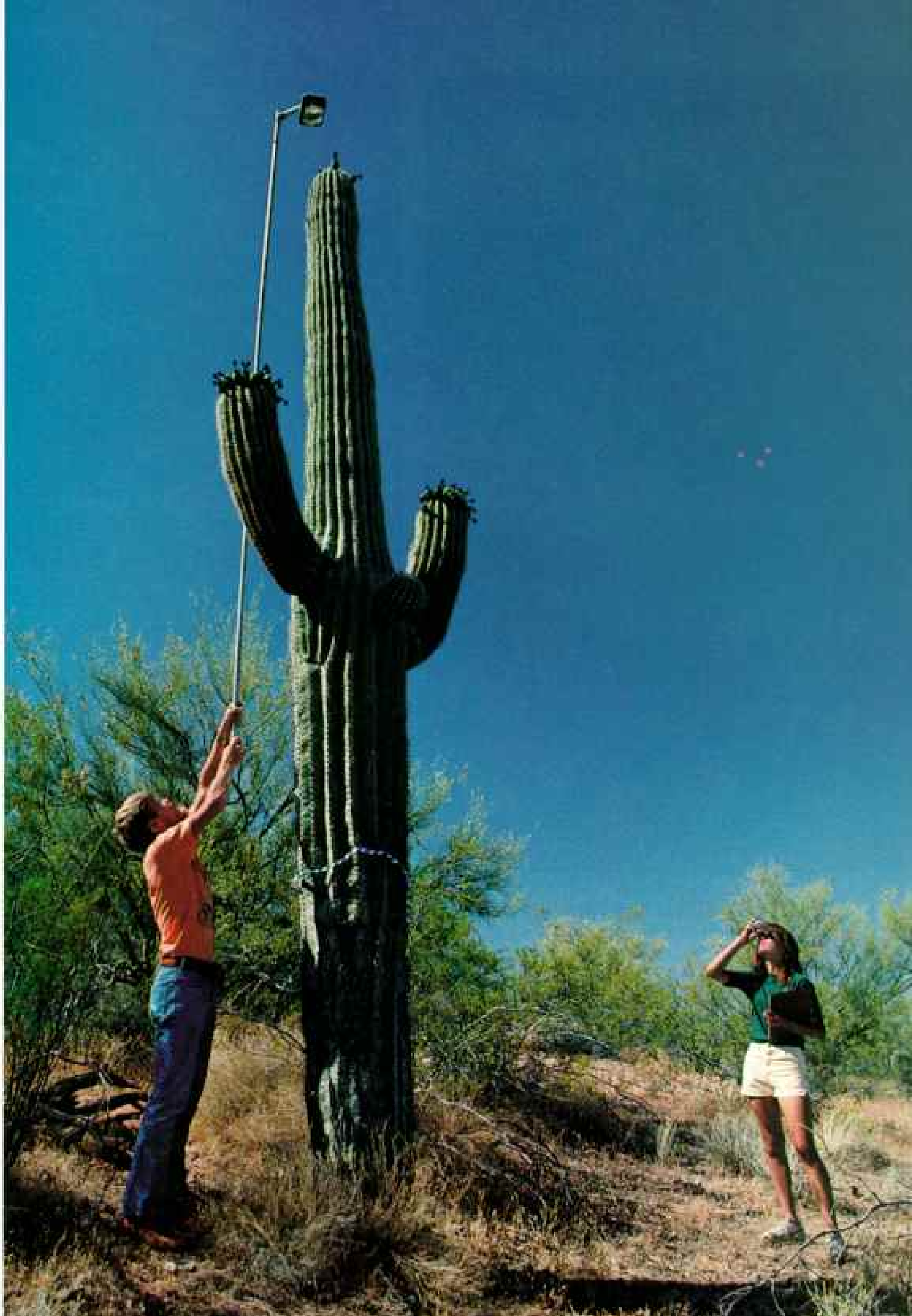
Looking for relief? You could leave town—at least during the major pollinating seasons of spring and fall.

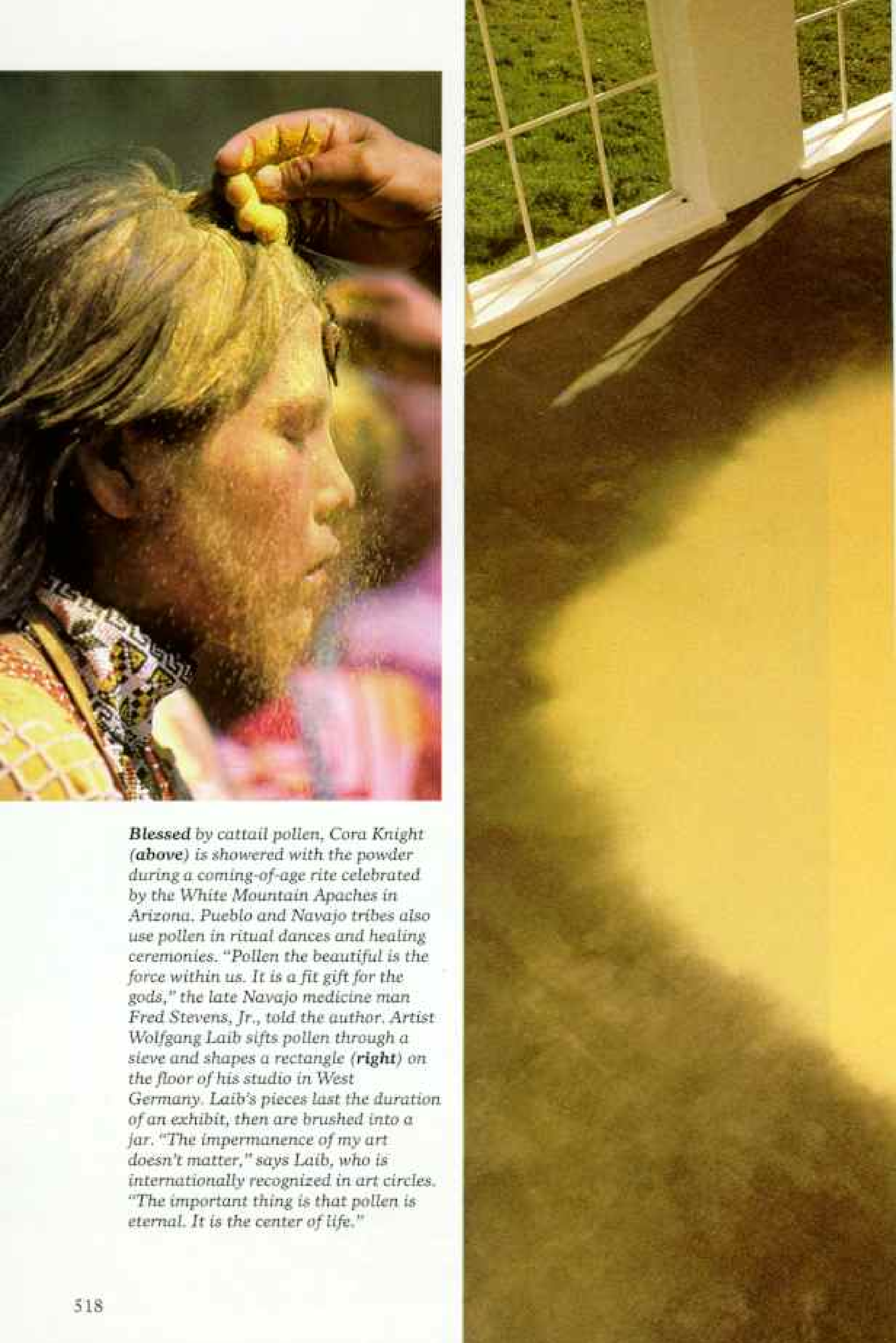
Several years ago Dr. Harry Swartz, an allergist then living in New York City, proposed a hay-fever-sufferers cruise. The ship, staffed by a complement of nurses and doctors, would set sail for ragweed-free seas during the height of the season. The enterprise sank, though, when the travel operator backed out. "Too bad," Swartz said. "I'm sure it would have been tax deductible."

Name the hay-fever capital of the United States. Des Moines? Wichita? Newark?

Answer: They're all potentially bad. Or good. It depends on your allergy. If ragweed is your nemesis, compare ragweed samplings in September 1983 compiled by the American Academy of Allergy. The daily

A mirror image *of a saguaro cactus blossom* ***(above)****, viewed from a pair of binoculars on the ground, enables research entomologist Dr. Justin Schmidt and Diana Diaz* ***(right)*** *of the U. S. Department of Agriculture bee lab in Tucson to tally the number of flowers that open in May and June. The study explores the interrelationship between the plant and its bee pollinators.*





Blessed *by cattail pollen, Cora Knight* ***(above)*** *is showered with the powder during a coming-of-age rite celebrated by the White Mountain Apaches in Arizona. Pueblo and Navajo tribes also use pollen in ritual dances and healing ceremonies. "Pollen the beautiful is the force within us. It is a fit gift for the gods," the late Navajo medicine man Fred Stevens, Jr., told the author. Artist Wolfgang Laib sifts pollen through a sieve and shapes a rectangle* ***(right)*** *on the floor of his studio in West Germany. Laib's pieces last the duration of an exhibit, then are brushed into a jar. "The impermanence of my art doesn't matter," says Laib, who is internationally recognized in art circles. "The important thing is that pollen is eternal. It is the center of life."*

averages: Sarasota, Florida, 12 grains per cubic meter; Brooklyn, New York, 48; Boulder, Colorado, 173; Des Moines, Iowa, with the highest count, 407 grains.

Of course you could flee to Washington State, which has hardly any ragweed. There is a catch. Washington has its own crop of allergenic plants: dock weed, sagebrush, and wormwood, for example. A few years out there, and an allergy-prone person may be sneezing just as loud and long.

So how to get away from it all? At the height of Chicago's ragweed season I sat in the office of Dr. Max Samter, senior allergy and immunology consultant at Grant Hospital, and pondered the question on behalf of the sniffling patients who filed past.

"Well," suggested Dr. Samter, "if you don't mind penguins, you can always go to Antarctica."

You won't want to go to Arizona. Since the Sunbelt cinched a constricting band around the desert, pollen counts there have risen about tenfold in two decades.

"We used to have a shortage of allergists," said Harry Hayes, a medical technologist, who has kept a 30-year pollen-count record for the Tucson Clinic. "But not any more."

With Harry as guide I took a pollen tour of Tucson. Every street led us by an exotic, and problematic, pollen producer. Hayes rattled off their names: olive, privet, eucalyptus, cypress.

We passed vacant lots. "Look at the weed growth in those alleys. There's a big old canyon ragweed. I call it a sneeze weed."

We stopped at a mobile-home park. Hayes pointed to the neat, clipped yards. Each had a lawn . . . and a flowering mulberry tree.

The mulberry tree, an Asian native, gained notoriety three years ago when the Tucson city council tried to ban its planting on the grounds that it was a prolific pollen producer and a health hazard. The issue flared into a civic fuss. Why, some asked, pin all the blame on the mulberry? After all, Bermuda grass and olive trees were no more native to Tucson than mulberries; they produced hefty doses of pollen too.

For a time mulberry defenders prevailed. But last March the Pima County board mustered enough support from allergy sufferers to pass Ordinance 1984-29. No longer, it said, would mulberry trees be sold in the county. Furthermore, homeowners with Bermuda grass lawns now have to mow them often enough to prevent pollination.

IF POLLEN is a curse to some, it is a sacred blessing to others. In the Southwest, Pueblo and Apache tribes use it ceremonially—in puberty rites, at special dances, and at healing rituals. And to the Navajos pollen is the single most sacred item in the universe—a symbol of life, fertility, peace, and plenty.

The Navajo owner of a brand-new pickup truck, I was told, sprinkles pollen on the tires to bless it. Pollen even has value as barter. Patients unable to pay a medicine man cash can often pay in pollen.

"Corn pollen is a true thing. It is our life," the late Fred Stevens, Jr., a venerated medicine man in Chinle, Arizona, told me. "When a child is born, we feed it pollen, and it is in his spirit the rest of his life. At weddings it blesses the young couple. And when a man is dying, pollen is put on him too."

In a hogan by the mouth of the Canyon de Chelly, Fred Stevens placed a string of sky blue turquoise around his neck, tied a wisp of red cloth around his forehead, and began the Night Chant to cure a man who complained of lung congestion. Underscored by a gourd's hollow rattle, his wailing voice rose and fell. The patient, seated in the middle of a sand painting of two *yeis*, or ceremonial figures, joined in.

At the end of the ceremony Stevens took a pinch of pollen from a small deerskin pouch and flicked it in the air. Sunlight streamed through a hole in the roof of the hogan, illuminating the golden dust as it drifted down.

Pollen had blessed the realm of human life once more. □

***Beauty and the bees** pair off in Lyvia Sylva's New York salon, where pollen-mask facials are touted as wrinkle therapy. Despite the controversy over pollen as a health and beauty formula, its known virtues remain unblemished. It ensures that grasses yield grain, trees bear fruit, and life continues in full flower.*

Maoris: At Home in Two Worlds

Article and photographs by
YVA MOMATIUK and JOHN EASTCOTT

A RAINSTORM engulfed us. The streams began to roar, swollen with frothy current and tumbling boulders. White-and-red Maori meetinghouses stood silent along the deserted road, their cavernous porches opened into the rain. On razor-sharp ridges the ruffled crowns of cabbage trees hovered in the galloping mists.

My husband, John, and I had just returned to his native New Zealand. We were heading for the East Coast of North Island, to live among the Ngati Porou people, a major group of some 40 Maori tribes. The foul weather lent weight to our apprehension. Although John's brother, Andrew, a dentist, is married to Tai, a Ngati Porou, there was no guarantee that the close-knit rural Maori community, wary of *pakeha* (PAH-keh-hah), whites, would welcome us.

Our 2½-year-old daughter, Tara, slept in the back of our car, oblivious of the storm. A winding side road branched off, dipping sharply toward the sea.

"Anaura Bay," exclaimed John. "This is where we summered when I was a child. When I think of a beach, I think of Anaura."

We settled in Ruatoria, a town of 2,000 nestling between the hills beside the Waiapu, revered river of the Ngati Porou.

Slender Lombardy poplars, gaily painted farmhouses, and small orchards give Ruatoria a faintly Italian flavor, but it is Maori through and through. While the Maoris constitute only 10 percent of New Zealand's population of three million, here the proportion is reversed, with a pakeha minority.

More than a thousand years ago the ancestors of today's Maoris migrated to this land from the islands of eastern Polynesia, navigating their seagoing canoes over the vastness of the Pacific (map, page 526). Here they developed a unique culture, considered one of the most advanced in all Polynesia. Now, after 144 years of colonization by the British, the Maoris' way of life is largely Western, and most speak English daily. But their language, skin color, and features are rooted in Polynesia, and their spirituality belongs to Hawaiki, the mythical ancestral home that lives in Maori hearts.

We bided our time, knowing we could not win immediate entry to the Ngati Porou. In the evenings flightless birds—*wekas*—chased in the weeds around our house, like small hunchbacks with hands in their pockets. Little morepork owls fed on insects, lizards, and mice, calling out *"more pork! more pork!"* in the warm night. If only somebody would drag us straight into the Maori world, so near, yet seemingly inaccessible.

Our first chance came in the form of a *hui*,

Warmed by affection, *Rere Moana Aupouri lets her hair down for her granddaughter, Rangimai Warmenhoven, near Reporua, New Zealand. At 80 Rere Moana delights in sharing insights with Rangimai, who returned from city life to her East Coast homeland, where a Maori majority finds strength in kin, traditions, and land.*

Playing as hard *as they work, young men race along Anaura Bay after a strenuous morning clearing scrub for sheep pasture at Maori-owned Nuhiti Station. A Polynesian people, the Maoris revel in physical activity and in the company of friends. These men belong to the Ngati Porou, a major tribe among some 40 in New Zealand, where Maoris make up about a tenth of the population of 3,100,000.*

a ceremonial gathering to celebrate the visit of the Maori Anglican bishop. We collected our cameras and courage and went.

In New Zealand there are nearly a thousand ceremonial gathering places, or *marae*. A typical marae includes a meetinghouse, dining hall, utility buildings, sometimes a church. A rural marae belongs to descendants of a distinguished ancestor, sometimes to the whole tribe. Here all community ceremonies receive their proper frame, the

Maori language is spoken, Maori food eaten. There are nearly a dozen marae around Ruatoria, open to visitors but intimidating to those unfamiliar with marae etiquette.

Our arrival was barely noticed. The marae bustled. Hundreds of place settings were being laid out in the dining hall. Snowy sheets covered mattresses in the meeting-house, where abalone-shell eyes of carved ancestors glowed green and mysterious in the dim light. Men prepared the *hangi*, the earth oven, in a pit full of fire-heated stones to steam hundreds of pounds of mutton, pork, beef, chicken, eel, cabbage, and *kumara*—sweet potatoes.

In the kitchen, women worked fast, greeting arriving relatives with warm hugs or a *hongi*, the traditional pressing of noses with eyes closed and a low "mm-mm" of acknowledgment.

Suddenly a man came over to us, angular, strong, and dark. "I know why you are

WORLD OF THE MAORIS

ORAL TRADITION of the Maoris speaks of their origin in eastern Polynesia (above) and of migrations in great sailing canoes. The voyagers found forested islands, teeming with fish and birds. They developed a warrior tradition that included posturing and recitation before battle, a ritual used today in ceremonial welcomes. On Lt. James Cook's first visit in 1769, he estimated the Maoris numbered 100,000; they were divided into numerous tribes mostly on North Island. In 1840 Britain annexed New Zealand in the Treaty of Waitangi, promising equal rights for Maoris. For greater strength, some tribes elected a king, but nothing could stop European newcomers or defeat them in war. Much Maori land, formerly held in common, was sold or confiscated. New leaders arose, among them Apirana Ngata of the Ngati Porou. A gifted orator and member of New Zealand's parliament, he established Maori land corporations, encouraged a cultural revival, and helped raise the Maori 28th Battalion of World War II.

The haka, Maori battle posturing

Capt. James Cook and the Resolution, 1777

Polynesians reach New Zealand

HBR CARTOGRAPHIC DIVISION RESEARCH: JOHN R. TREBOR PRODUCTION: ROBERT CROMAN PAINTING BY ROBERT DACY

Sacred is the mountain *Hikurangi and the river Waiapu to the Ngati Porou, who identify with these landmarks. Here in Tikitiki* ***(above)*** *200 Ngati Porou live in small households like the pakeha, or European New Zealanders, but gather to celebrate special occasions in the Maori way at their marae, a complex that includes a separate meetinghouse and dining hall, upper right. On a weekend at Tokomaru Bay* ***(right)*** *all ages play together in the marae dining hall, while a day-school fund-raiser at Te Kaha joins grandmothers with twin granddaughters* ***(left)****. Maoris reserve their meetinghouses for serious talk and ceremonial occasions.*

here," he said gravely. "You won't take any pictures at this marae without the permission of the elders. We are not impressed by pretty books."

Inaccurate journalism has made many Maoris mistrustful of reporters. Maori tradition requires the utmost accuracy in spoken accounts, and they now expect the same of the written word, often in vain. Commercialization of Maori culture by pakeha also adds to resentment: The people often consider such presentations profane. Maori culture is not for sale.

The man returned to his chores. We followed and apologized for causing alarm. He pointed to a huge mound of unpeeled potatoes: "Get yourselves some knives. Without this food, there will be no hui." A quick smile warmed his severe face. We had shown humility, much cherished among his people.

THUS we entered Maoridom peeling potatoes, learning to hongi, and finally plunging into this feasting, laughing, singing crowd of Ngati Porou. The people welcomed us as visitors, and their exuberance helped us enjoy the festive mood. But alert eyes rested on our tape recorders and camera cases, which remained shut on this and many future occasions.

Not long after the hui we sat in the kitchen of Tom Fox, a member of the New Zealand Maori Council, an advisory body of the government. Like most Maori farmers on the coast, Tom runs sheep and cattle on his ancestral land. Our talk that day was not of agriculture but of fate.

"We believe that we inherit our abilities," Tom said. A thickset, balding man, Tom spoke with care. His infant grandson slept in his arms. "Unless a Maori was born to be a leader, he seldom asserts himself. But this humility often hurts him in his dealings with the aggressive, competitive pakeha."

I wondered why Tom had stayed here while so many others had moved to the cities. For all its beauty, the coast today is one of the most isolated and economically neglected parts of New Zealand.

He smiled, remembering. "Oh, the temptations. People wrote home: 'Come, money everywhere.' But we kept the home fires burning for the Ngati Porou, and now some are returning."

"How well do they fit in?"

"Some are impatient. They speak about changes. They call for industrialization, experiments in land use, political aggressiveness. What they don't notice is the trend back to old values. For years we learned the pakeha ways. Now we ask, 'Where is our Maoriness?' Our children don't speak Maori, don't know the ancient chants."

Tom placed the sleeping child on the couch. "You know many of our youngsters get in trouble in the cities," he continued. "They have lost their *Maoritanga*, the Maori pride and sense of belonging. So now we must call upon our traditional knowledge to give strength to our children."

After World War II thousands of Maoris migrated to the cities. The government encouraged this with loans and housing to provide growing industries with labor. The increasing Maori population has changed from 75 percent rural to 75 percent urban in

Mourners come to stay *at a three-day funeral, or tangihanga, in a Reporua meetinghouse* ***(right)****, where speeches and action songs in the Maori language go on far into the night. Families sleep under images—carvings or photographs —of their ancestors.*

"Our anchor in time," Maoris call the treasured book ***(above)*** *that records a family's descent, or whakapapa, from its most famous ancestor. Since each name evokes an event, the book becomes a tribal history as well. Genealogies are also memorized, to be recounted with rhetorical flourish by the most skilled orators, who relate their ancestors to those of hosts and guests. So strong is the sense of obligation to attend Maori ceremonies that even kin working in distant cities spend much money and personal effort on such gatherings.*

the past 40 years. Alienated young Maoris formed street gangs; the crime rate escalated. Claims for ancestral lands were sometimes reinforced by protest marches and demonstrations. New Zealand has been forced to take a hard look at its fondly described "best race relationship in the world."

A *TANGIHANGA*, a Maori funeral, was to be held at a marae in nearby Whareponga. We drove there over a narrow gravel road. A hawk struck its prey and soared above the hills, a rusty speck in the luminous, unpolluted sky. Whareponga, once the lively heart of a prominent descent group called Te Aitanga-a-Mate, was nearly deserted, emptied by urban drift. Only about 3,000 people, less than a sixth of the Ngati Porou, still live on the coast.

Beyond an expanse of grass stood a meetinghouse, old and lovely. Beneath the carved window on the porch an open casket

rested on flax mats, surrounded with flowers and portraits of departed relatives. Women in black reclined around the coffin, heads bowed. Some wept. One woman, large and handsome, stood apart. Her high-pitched voice sent out a *karanga*, a plaintive, wailing call, remembering the dead and welcoming the living: *"Haere mai, haere mai. . . .* Come here, come here. . . ."

We approached respectfully, and the speeches began. English is seldom used during marae ceremonies. Only a masterful command of Maori can evoke sacred images, history, and ancient tales. Our hosts saluted the deceased woman, paid tribute to their ancestors, and welcomed us.

John replied. Although the Ngati Porou grant their women the privilege of speaking in the marae, this right is infrequently exercised. But women support orators with songs, and soon it was my turn.

I knew that during World War II the New Zealand Maori 28th Battalion had fought at Cassino in Italy alongside my countrymen, Polish soldiers. I sang in Polish an old army song of untimely death, of red poppies of Monte Cassino nourished by young Polish blood, and suddenly their tangihanga became mine.

We pressed noses with the mourners, cleansed ourselves with water as custom requires, and were ushered to the kitchen.

Near a huge hearth a thin old man covered camp ovens with hot embers. He was Riwai Haenga, the husband of Daisy, whose embalmed body rested in the open casket outside. He baked Maori bread, leavened with homemade potato yeast, for his wife's tangihanga and spoke in a low whisper, constantly touching the golden loaves as if their warmth gave him badly needed security.

"I was never the one to speak at the marae. This is where I used to be, poking at the embers around the pots. So here I am, where I do best."

His sadness contrasted sharply with laughter that punctuated ceremonial speeches outside. What was happening? "Laughter cushions the sorrow," explained a butcher, carving huge slabs of beef. "It reminds the family that life goes on."

During the day several chartered buses arrived, bringing mourners. Many had taken time off from work, losing days of pay. Family and friends contribute a great deal to such ceremonial gatherings, providing food, cash, or personal help.

Night brought cold rain, but the meeting-house was still warm from the hours of sun. People settled in the dim, richly decorated interior. Exhausted, I fell asleep, but soon woke, confused. Where was I? From the porch came male voices singing a sweet Italian ballad, "Mamma Soltanto Felice," a midnight serenade in the rain and the mist. Suddenly I felt they were responding to my Monte Cassino song.

Next morning, after a church service, we buried Daisy in a grave dug by her menfolk. With her went suitcases of clothing and personal belongings that she had cherished.

OUR days passed, dewy mornings melting into hot noons, followed by brisk updrafts at dusk. Native bushes and conifers stood green, but European willows and poplars changed to pale gold.

Life on the coast resembles that of other rural regions of New Zealand. There is stock work with keen dogs and good Ngati Porou horses, big livestock sales, Friday nights in the pub with friends and pints of beer, Saturday rugby games, and Sunday church. People farm, work in gas stations, post offices, banks, stores, government departments, and schools.

But we always felt the impact of Maori self-awareness. While the great majority have some pakeha ancestors, light skin, and English names, they stand apart, insular in their spirituality and in the minority status that makes them fully conscious of themselves—and of pakeha.

Yet in today's New Zealand the two cultures are truly inseparable. Maoris know that Western ways, modified to suit their needs, are here to stay. At the same time, Maori names of birds, plants, and places are used throughout New Zealand, and Maori motifs adorn everything from stationery to high fashion. Maori culture and its visual images represent New Zealand in the international forum.

Unlike many other tribes, the Ngati Porou have retained most of their ancestral land and the *mana*—prestige and power—that comes with it.

The land is a lure for some who once left it. Koro Dewes (page 536), a former senior lecturer at Victoria University in Wellington, returned eight years ago as a full-time manager of his family's land. One day we found Koro waiting for his livestock agent.

"How did your tribe react to your return?" I asked. Koro recoiled.

"Did you say 'tribe'? You mean 'primitive, simple, and savage'? How come you never use it to describe yourselves?"

"Why did you come back?" I persisted.

Koro's big fists rested in a patch of sun on his knees. "When you know how poor some Maori people have become due to bad administration, pakeha laws, bad luck, even stupidity, you swear it's not going to happen to the Ngati Porou."

Koro looked toward the Waiapu River, where paradise ducks chased cloud shadows over the *toetoe*, a tall graceful riverbank grass. I said, "Many young people feel that their Maori upbringing was weak. Often they blame their parents."

Silence. Did he hear me? Then Koro said, "They think we can give it to them on a platter. But culture connotes dynamic, continuous changes. You learn it all your life. They are impatient, the young ones."

"They need help," I said.

"They need university education," he replied. "They should take advantage of being Ngati Porou. We have land. We produce excellent educators. We have always had leaders. Take Sir Apirana Ngata, to whom all Maoris looked for guidance. Take his son Henare, who assures that legislation affecting Maori land is not detrimental to us."

Sir Apirana Ngata, lawyer, statesman, and scholar, died 34 years ago. He was a fighter for the survival of Maoridom, which during his early life seemed doomed, decimated by civil wars and a high mortality rate, plagued by the rapid loss of land and a dispirited leadership.

Ngata led the Ngati Porou to establish land corporations. Other tribes followed suit. Under his guidance magnificently carved meetinghouses were erected, traditional arts and crafts came back to life, and the pride of the people shone.

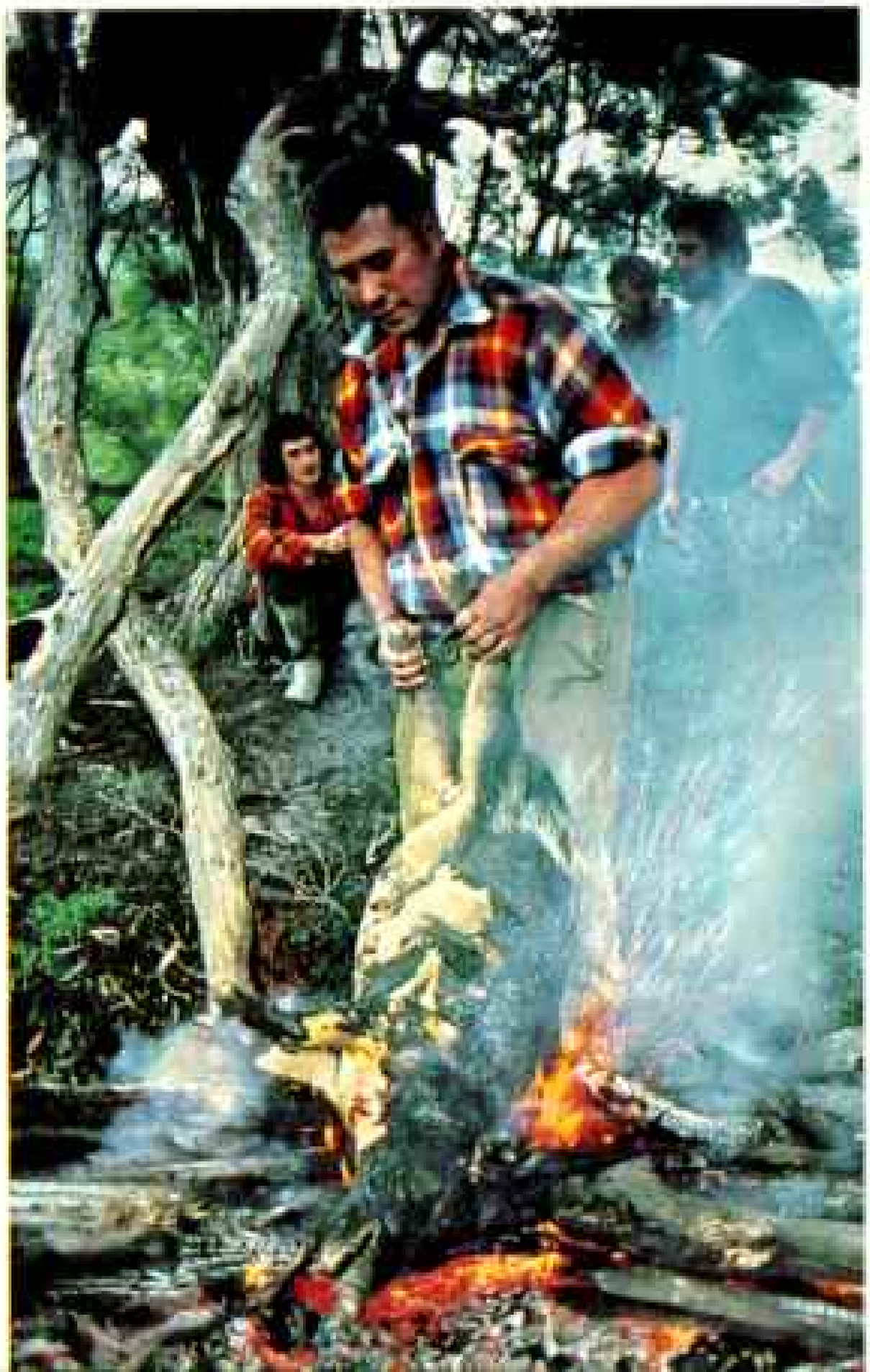
His youngest son, Henare, was knighted in 1982 for his services to the Maori people. "Unfortunately," Sir Henare told us, "the political voice of Maoridom is not heeded a great deal, partly because Maori views are expressed by only four members in a parliament of 95. For an average pakeha, land is just another asset, while we think of it in the tribal sense of continuity and belonging."

Can this steep, eroded corner of New Zealand nourish the Ngati Porou in body as well as soul? Nearly 90 percent of their farmlands

Fast food from the sea: *Kina, or sea urchin, is a delicacy to Carol Mataira, a student at Ngata College. On a field trip, she and her friends eagerly introduced the authors to their shore, its food, and taboos. Don't shout near the ocean. Don't eat below the tide line. Most young people leave their Ngati Porou homeland to find jobs; less than a sixth of the tribe's 20,000 remain.*

Stoic bearing *hides the feelings of Ned Reuben (***facing page***) as he escorts Jac, his last daughter, to the altar of Waipiro Bay Church. Although seemingly done in pakeha style, weddings are Maori through and through. Scheduled for Easter or Christmas so that relatives from afar can attend, rites at church or meetinghouse are conducted in Maori, followed by speeches and feasting. Kinfolk bring their harvest of sweet potatoes, cabbages, seaweed, seafood, beef, mutton, and pork, to be cooked in wire baskets in stone-lined underground ovens. Women serve the steaming repast from the marae kitchen (***above***).*

*Hunted for food, wild pigs are tracked by dogs in the scrub country and dispatched with long blades. Puke Manuel singes the hair from his kill (***right***) and later butchers and divides the carcass for home freezers.*



Man perishes, the land endures, *not as a commodity as in the pakeha world, but as a heritage conveying mana, or spiritual power, to future generations. Koro Dewes (**below,** at right), a former university lecturer in Wellington, returned to manage his family's land and raise cattle and sheep. "People who come home," he explains, "will be short of cash but much richer in terms of themselves."*

*Sheep worked by pakeha shepherd Ross Kingan (**right**) belong to Nuhiti Station, an operation that consolidates small holdings of some 3,000 Maoris to get maximum efficiency for owners.*

are used to graze sheep and cattle. Some owners of rich river flats are trying to develop orchards producing kiwi fruit, grapes, avocados, citrus fruit, and other labor-intensive crops. Afforestation, recently introduced by the state and private companies, provides lease revenues and employment for the Maoris.

Maoris link themselves to many tribes throughout New Zealand. People can trace their origins perhaps 40 generations and repeatedly refer to their forebears in speeches, songs, and greetings. The Maori mind looks into the past to seek guidance from the silent ranks of the ancestors.

TO LEARN more about tribal ties, we visited the Whanau-a-Apanui, neighbors and brothers of the Ngati Porou. At Te Kaha, school principal

Wiremu Tawhai offered us hospitality.

Indeed, Tawhai's door never seemed to close. Visitors arrived in waves, with high tides of humanity peaking toward evening. Matters of importance mixed freely with fun. Once, when students came to borrow a school javelin, Wiremu greeted them bellowing lines from Shakespeare. During his Auckland years he had played the role of Othello for the university drama club.

The village of Te Kaha embraces the sea. People gather seafood at low tide, following the intricate pattern of Maori sea laws: Put the rock back exactly as it was so that mollusks will attach themselves to it again; never eat below the tide line, because food pollutes the sea and attracts sharks—the list goes on.

One evening Wiremu snorkeled in the cold autumn sea and brought out enough

Grief knows no bounds *for Mrs. Albert Gordon, who unveils the gravestone of her husband two years after his death. A veteran of the Maori 28th Battalion, Gordon fought on Mediterranean battlefields during World War II. Comrades who fell did not receive a proper tangihanga until relatives recently visited the sites.*

Laughter and song *cushion the sorrow felt for all tribesmen who didn't return from World War II. At Tikitiki on Anzac Day, April 25, the Reverend Rewete Green sings with a kinswoman. New Zealand's memorial day holds special meaning for the Ngati Porou. The government had exempted Maoris from compulsory service overseas, but Maori member of parliament Sir Apirana Ngata insisted they serve in World War II as the price of citizenship. Fellow tribesmen signed up en masse.*

After Anzac Day services, veterans **(left)** *greet each other with the hongi, the customary Maori pressing of noses accompanied by a low "mm-mm."*

kina, sea urchins, to warrant a feast. Wiremu pushed his knife into a spiky globe, cracked it open, and with his thumb scooped its raw, murky content directly into my mouth. "I remember Sundays in Auckland," he said. "How I longed for these rocks to gather seafood."

"But couldn't you find rocks near Auckland?" I asked.

"They wouldn't have been my rocks, my crabholes, or my mussel beds."

"Why did you go to the city?" asked John.

"Many of us went to master the pakeha ways," replied Wiremu, "yet tried to keep our self-respect."

"This was the hardest problem," said Minnie, his wife. "Pakeha schoolteachers change students' Maori names to English ones and make a face when they hear that a child collects kina with his family. How would a pakeha child feel if his name and family ways were ignored or ridiculed?"

Such statements underline a new Maori assertiveness. The people now speak through their writers, artists, educators, and politicians, through their weekly national TV program, workshops, and meetings. Maoris also receive the support of many pakeha who search for their country's roots beyond its British affiliation.

Among the Ngati Porou, Ngoi Pewhairangi is a respected leader, composer, and teacher in Maori language and culture throughout the country. People fall silent

when she speaks: Her presence emanates power and wisdom.

We sat in Ngoi's kitchen. Our daughter, Tara, ran in, addressed me in Polish, and switched to English to ask Ngoi for a drink of water.

"Beautiful," said Ngoi. "You talk with your daughter in your mother's tongue. For years our children were punished for speaking Maori in school. We had to learn English to survive. Now they no longer know Maori. The few schools that do teach it treat it as a foreign language. But we will change that. We are establishing kindergartens all over New Zealand in which our little ones will speak Maori only: *te kohanga reo*—the language nest."

IN JUNE the antipodean winter brought frosty nights full of pale stars. We moved from Ruatoria to the nearby Reporua marae, where several women and one young man were renovating the old meetinghouse. The people let us into their lives simply, gracefully.

To answer our questions properly, every evening a formal hui was held in the meetinghouse. While a cold wind whistled outside, we huddled in our sleeping bags and asked questions, letting them float until someone answered. We listened to tales of the sea and the sun, of God and men, and talked about our feelings. Marino Te Hei, a father of 11 children, rose to his feet:

"We can see that both the pakeha and Maori cultures are beautiful, befitting the people of each. If only we could sit down together and for the sake of future generations get to know each other better. How strong, united, and inspired we could then make our young ones!"

On our last day in Reporua we woke at dawn. The sea was alive with screeching gulls. Marino Te Hei said, "You are leaving. What else would you like to know?"

"Could you tell us about *haka*?" John spoke our longtime wish.

Haka! Once Maoris put on this startling display of hostility and pride to intimidate their enemies. Now it is performed to welcome visitors, from the Queen of England to rugby teams.

The Maoris of old lived by war. They fought for the honor of the descent group, for arable lands, fishing grounds, swamps, and forests teeming with fat birds. The warriors' motto was "Die like a shark, fighting to the last; don't give up limply like an octopus."

Four men stepped in front of the meetinghouse, four generations: octogenarian Kawhia Milner, stocky Marino, Waldo Houia, and young Ron Te Hei. They froze for a moment with feet apart, knees bent, fists clenched, then charged the cold air with a throaty, bloodcurdling chant that was music and war cry, agony and triumph:

"Ka mate, ka mate!—It is death, it is death!

"Ka ora, ka ora!—It is life, it is life!"

It was a show of power, with punching arms, flashing teeth, rolling eyeballs, and thrusting tongues, until the final leap brought them, thundering, back to earth.

"This haka," Marino panted, "the Maori Battalion did on the island of Crete before our first bayonet charge against the Germans, and. . . ." His voice dropped to a whisper, "I've seen those soldiers, madame, with my own eyes. They were no cowards, yet they turned and ran. Imagine a thousand voices rumbling 'Ka ora, ka ora!' " A cold shiver went down my spine.

We made our farewell to the coast. There were warm hugs, even small tears of sadness. We said, *"E noho raa*—stay well"; they replied, *"Haere raa*—go well"; and we left.

On our way south we stopped to touch the place John loved so much. The sea in Anaura Bay sparkled with cold light. We walked along the beach, into the wind.

I looked up. Ahead on the beach, where John used to play as a child, our daughter was running, pounding wet sand with her bare feet, dazzled by the light and the wind. May she remember her Maori days to help her grow strong and wise. □

Idyllic stretch of childhood *gives rural Maori youngsters freedom to roam with their friends and pets. After school these boys from Te Kaha gather to watch the sunset. From infancy they are brought into the rituals and traditions by relatives and tribal leaders—an ongoing initiation to the world of the Maoris.*

Maoris: Treasures of the Tradition

By DOUGLAS NEWTON

CHAIRMAN, DEPARTMENT OF PRIMITIVE ART
METROPOLITAN MUSEUM OF ART, NEW YORK CITY

Photographs by BRIAN BRAKE

POETRY, ORATORY, music, and dance—all are part of the cultural legacy of the Maoris, but the greatest testimony to their mastery of the arts is sculpture. Fashioned from wood, bone, and stone, some pieces have survived nearly a thousand years, from the first centuries after Maoris arrived in New Zealand.

Carving, the Ngati Porou tribe believes, was the invention of the gods, unknown among men until the sea god, Tangaroa, kidnapped the son of the mythical hero Rua. While rescuing the boy, Rua found the god's richly adorned house and, before burning it, stole carvings to copy for his own home. Henceforth, Maoris considered sculpturing a semisacred task through which the gods expressed their will. Thus the objects were redolent of *mana*, the indwelling force that increases from generation to generation through prayers chanted over the pieces and through their association with powerful owners.

Ancestors—a source of tribal strength—were often portrayed by the carver's blade. The Ngati Whakaue, threatened in 1836 by their Waikato enemies, built a huge palisade on Pukeroa, the "long hill" overlooking Lake Rotorua. Each of three gateways was carved from a single slab of timber and crowned with a larger-than-life image of an ancestor. One gate honored Tutanekai, a famed 17th-century chief. Of illegitimate birth, as his irregular facial tattoos show (***right***), he radiates the mana that protected his people and intimidated their foes.

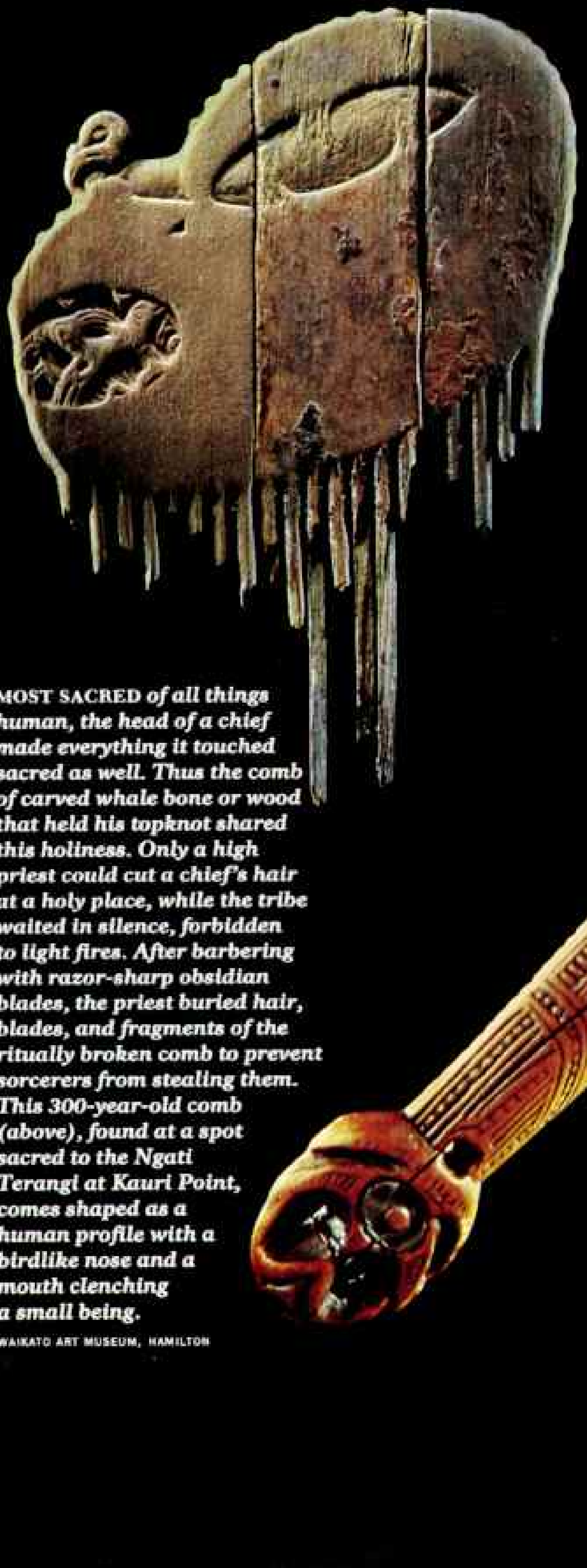
DRAWINGS BY PIERRE MION, AUCKLAND INSTITUTE AND MUSEUM (RIGHT)

Maori sculptures—known as *taonga*, or treasures—form the tangible links between the living, the revered ancestors, and the gods. They keep an electric current of vitality flowing through the ages. Like electricity, the taonga can illuminate people's lives but can also be dangerous unless handled with reverential care. Even when their meaning has been lost, they still have the power to inspire awe.

The objects shown are among 180 masterworks in Te Maori, an exhibition organized by the American Federation of Arts. At the Metropolitan Museum of Art, New York City, through January 6, 1985, the show moves to the St. Louis Art Museum, February 22-May 26, and the M. H. de Young Memorial Museum, San Francisco, July 6-December 1.

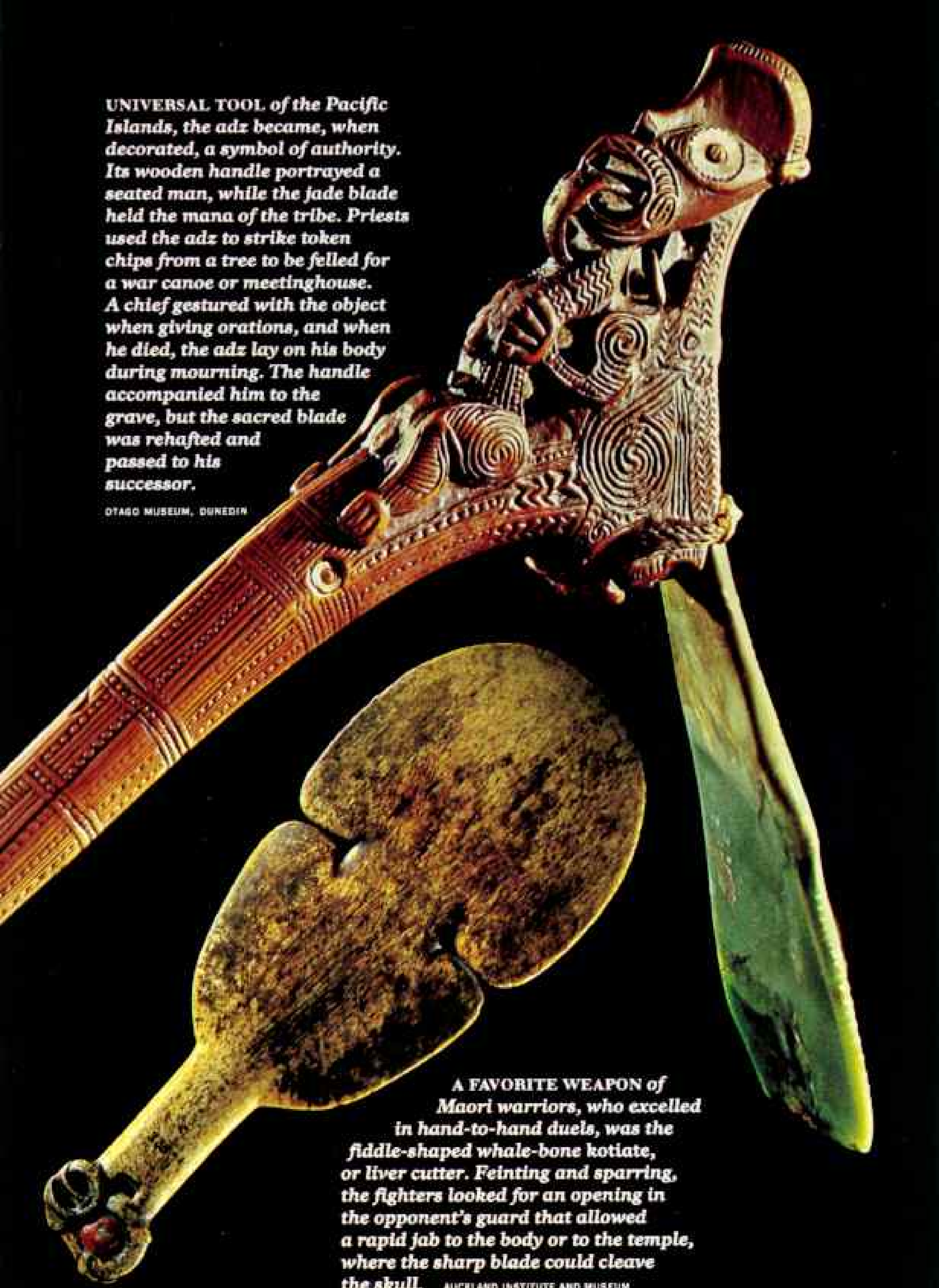
MAORI GODS, *the children of the Sky Father and Earth Mother, lived in 12 heavens and sometimes appeared to men as rainbows, lightning, and meteors. They were willing now and then to take up temporary abode on earth in a god stick decorated with their emblem. When a priest held this god stick (below), carved by the Ngati Ruanui in the 18th century, the god Tangaroa entered the carving and spoke to the people through the priest's voice.*

AUCKLAND INSTITUTE AND MUSEUM



MOST SACRED *of all things human, the head of a chief made everything it touched sacred as well. Thus the comb of carved whale bone or wood that held his topknot shared this holiness. Only a high priest could cut a chief's hair at a holy place, while the tribe waited in silence, forbidden to light fires. After barbering with razor-sharp obsidian blades, the priest buried hair, blades, and fragments of the ritually broken comb to prevent sorcerers from stealing them. This 300-year-old comb (above), found at a spot sacred to the Ngati Terangi at Kauri Point, comes shaped as a human profile with a birdlike nose and a mouth clenching a small being.*

WAIKATO ART MUSEUM, HAMILTON

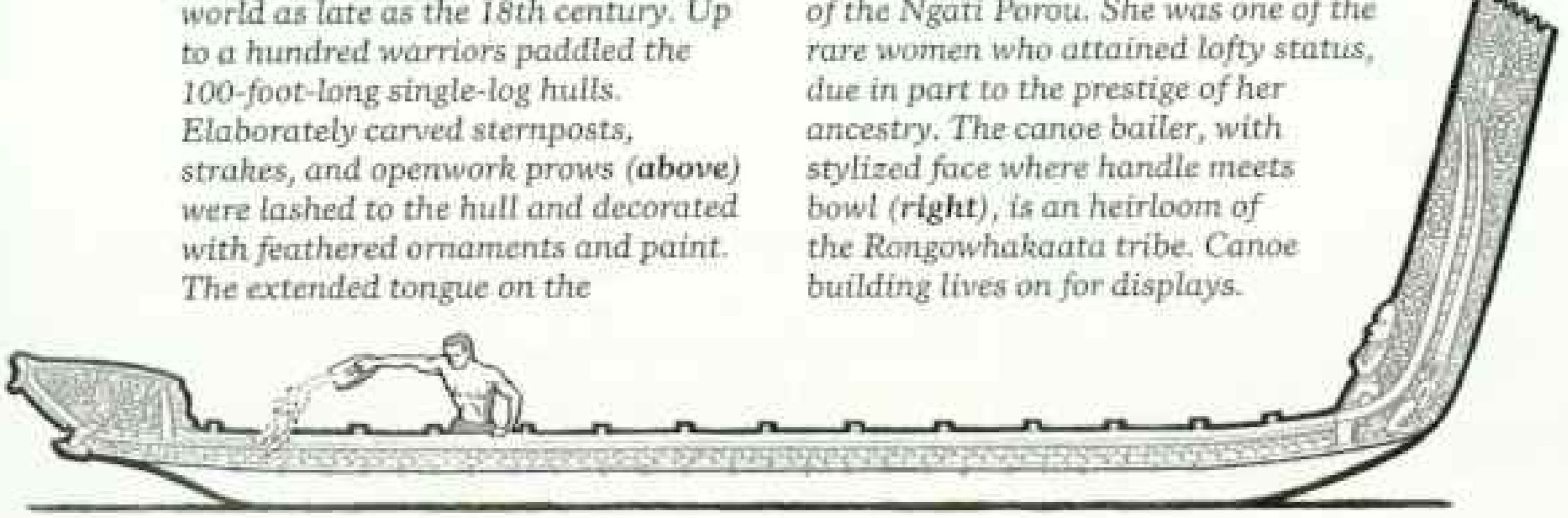


UNIVERSAL TOOL *of the Pacific Islands, the adz became, when decorated, a symbol of authority. Its wooden handle portrayed a seated man, while the jade blade held the mana of the tribe. Priests used the adz to strike token chips from a tree to be felled for a war canoe or meetinghouse. A chief gestured with the object when giving orations, and when he died, the adz lay on his body during mourning. The handle accompanied him to the grave, but the sacred blade was rehafted and passed to his successor.*

OTAGO MUSEUM, DUNEDIN

A FAVORITE WEAPON *of Maori warriors, who excelled in hand-to-hand duels, was the fiddle-shaped whale-bone kotiate, or liver cutter. Feinting and sparring, the fighters looked for an opening in the opponent's guard that allowed a rapid jab to the body or to the temple, where the sharp blade could cleave the skull.* AUCKLAND INSTITUTE AND MUSEUM

HUGE AND SPLENDID, *Maori canoes (**below**) were among the largest watercraft in the world as late as the 18th century. Up to a hundred warriors paddled the 100-foot-long single-log hulls. Elaborately carved sternposts, strakes, and openwork prows (**above**) were lashed to the hull and decorated with feathered ornaments and paint. The extended tongue on the figurehead of this war canoe expressed defiance of the enemies of its owner, Hinematioro, paramount chieftainess of the Ngati Porou. She was one of the rare women who attained lofty status, due in part to the prestige of her ancestry. The canoe bailer, with stylized face where handle meets bowl (**right**), is an heirloom of the Rongowhakaata tribe. Canoe building lives on for displays.*



NATIONAL MUSEUM OF NEW ZEALAND, WELLINGTON (ABOVE); CANTERBURY MUSEUM, CHRISTCHURCH (BELOW)

EARTH AND SKY originated as the goddess Papa and the god Rangi, who lay from the beginning of time in tight embrace. Children born to the pair lived in dark, airless crevices of their parents' bodies until in anger one son forced Rangi away with his legs. Now Rangi lives overhead, his tears raining upon Papa—or earth—who responds by putting forth the plants.

Recalling the legend, this wooden lintel from the meetinghouse

at Patetonga was carved with stone tools by the Ngati Tamatera about 1850. The main figure, Papa, left, appears with tattoo designs that spread to the background.

Her children, lesser gods and creators of mankind, dance before a screen showing the interlocking jaws of spirits.

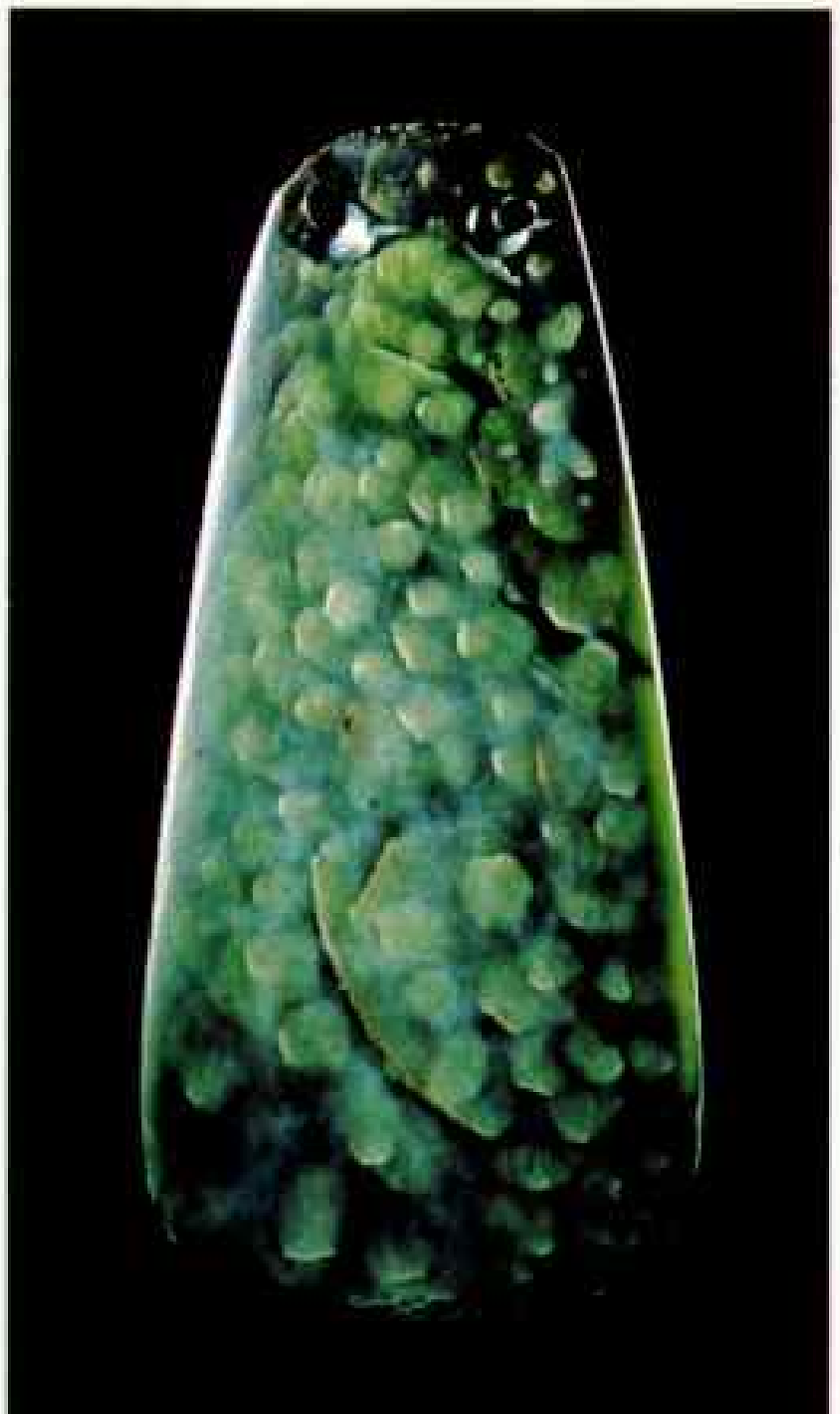
AUCKLAND INSTITUTE AND MUSEUM

HAWKE'S BAY ART GALLERY AND MUSEUM, NAPIER

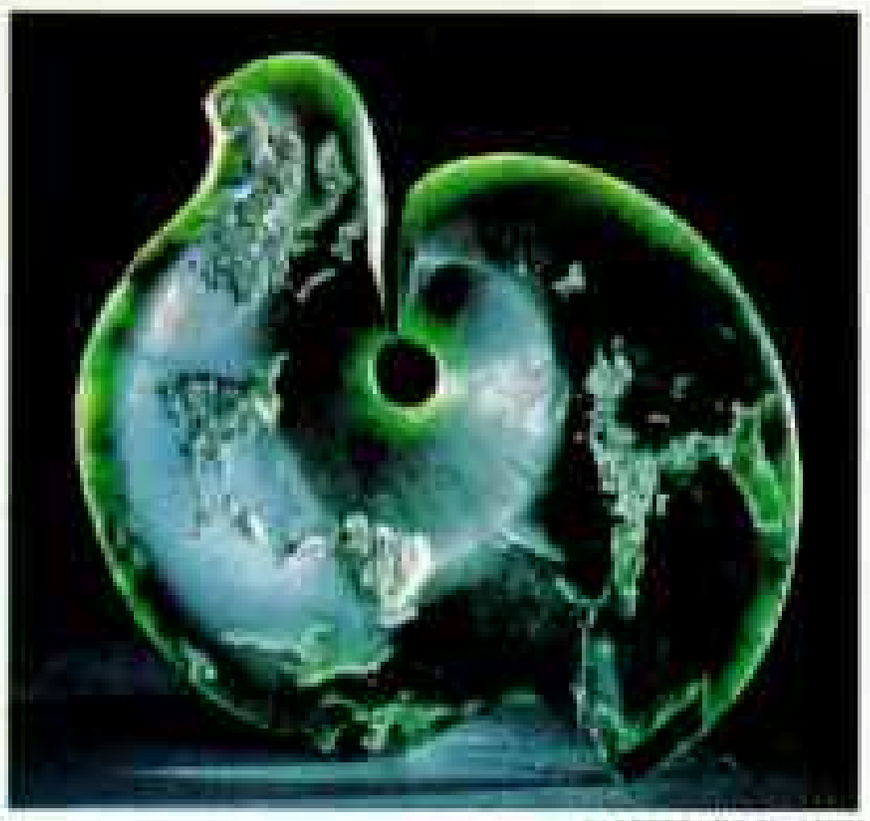
*AMULET and ornament, pendants of stone, ivory, and bone adorned Maori men and women from ancient times. Carved in serpentine perhaps 1,000 years ago, a figure abstracted to torso and limbs dances in welcome or defiance (**facing page**).*

*A few centuries later the Maoris so coveted jade from South Island that they waged wars for control of the source. The grotesque heitiki (**left**), a family heirloom, was greeted by name—Rutateawhenga—at Ngati Porou assemblies.*

*The simple coil (**below**) represents the*



OTAGO MUSEUM (LEFT); AUCKLAND INSTITUTE AND MUSEUM



CANTERBURY MUSEUM

fishhook that the epic hero Maui used to catch the great fish that turned into North Island. Worn or dangled in the water while fishing, the amulet ensured abundant catches.

*A rare variety of jade, called pipiwharauroa after the shining cuckoo, inspired a Ngati Whatua artist to shape it simply, as a flax-fiber scraper (**left**).*

*DEATH was willed by the goddess Hinenuitepo, great lady of the night, who sent the immortal spirit journeying north across the ocean to a pleasant underworld. The physical remains of important chiefs received special treatment from some North Island tribes in the 1700s. The body was exposed or buried until the flesh disappeared. The bones were painted red and placed in a log chest decorated with a figure, such as Hukere, guardian of the dead (**facing page**), whose three-fingered hands splay across his belly.*

*A chest of the Ngati Tahinga (**below left**) shows a virile chief, grimacing in threat. Standing in secret caves, such bone chests terrified any sacrilegious intruders.*

*Often Maoris erected memorials such as this 15th-century post ending in a curled finial with flamelike spikes (**below**); it represents Uenuku, war god of the Waikato tribes.* □

NATIONAL MUSEUM OF NEW ZEALAND (LEFT AND ABOVE)

TE AWAMUTU HISTORICAL SOCIETY

Our Society Opens New Doors

By GILBERT M. GROSVENOR

PRESIDENT, NATIONAL GEOGRAPHIC SOCIETY

"I GUESS you have trouble storing your old NATIONAL GEOGRAPHICs too," quipped President Ronald Reagan as he dedicated our newest building (***above,*** center) on June 19. He also wondered "who's watching the store" as he noted the presence in the audience of so many members of Congress, the judiciary, the administration, and local government.

It was a Washington event in keeping with the long tradition of the Society, founded in this city almost a century ago and committed from that day to this to the growth and progress of our nation's capital.

That commitment prompted the decision by the Board of Trustees to create a building that would enhance the architectural fabric of the city. As critic Benjamin Forgey of the *Washington Post*, our midtown neighbor, put it: "By law, they could have filled this

CLAUDE E. PETRONE, NATIONAL GEOGRAPHIC STAFF

site with a typical Washington box, but they didn't. . . . Instead of saying, 'Look at me!' the new building says, effortlessly, 'Enjoy the spaces I've created.' "

We are proud of Mr. Forgey's assessment that "the new building and its spaces are superb pieces of work by all concerned." Everything rested upon Skidmore, Owings & Merrill architect David Childs's brilliant solution to a difficult problem—how to convert the parking lot between our older buildings on 16th Street N.W. and the landmark Edward Durell Stone building on 17th Street (**above,** right) into a distinctive, functional space that would add to the city and forward the goals of the Society.

The result has been called "a Maya temple," with its sloping balconies planted with yews and a small park of Bradford pear trees at ground level. But it is also chock-full of the latest audiovisual equipment, with the 400-seat Gilbert H. Grosvenor auditorium, photographic labs and studios, specially designed quarters for the Cartographic Division, and our in-house printing center and equipment shops.

Mr. President, rather than needing a space to store our past, we needed a space to house our future.

It is only 16 years to year 2000, and a briefer four years to the beginning of the Geographic's second century. It is our hope that the study and science of geography will make great strides in the decades ahead. We have a major commitment to this goal. The first official function in the auditorium was a meeting of the board of the World Wildlife Fund International, presided over by Prince Philip of Great Britain and attended by Prince Bernhard of the

Netherlands. We have offered facilities and staff support for the 1992 International Geographical Congress, which would be the first held in the United States in 40 years.

The loyalty of our membership has made it possible for us constantly to utilize the latest and best in publishing and broadcasting technology. Our Washington headquarters continues to serve us well as production center for NATIONAL GEOGRAPHIC, WORLD, and TRAVELER, maps and globes, books, television and radio programming, and teaching materials designed for the classroom.

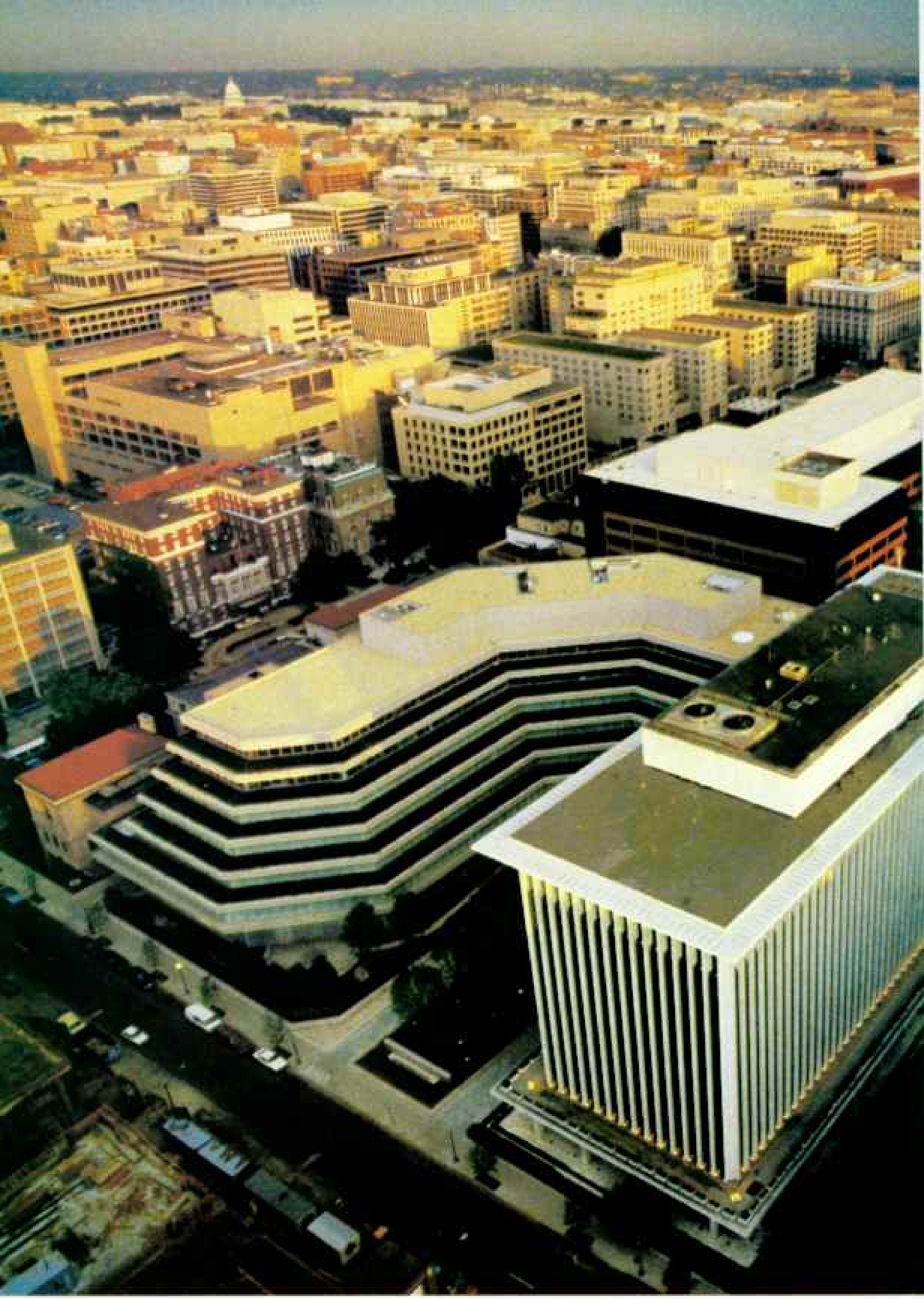
Tradition and innovation *combine in the lobby dome* ***(below)****, displaying the night sky of January 13, 1888, date of the Society's founding. The 34-foot burled elm and walnut table, gift of Dr. Thomas W. McKnew, Advisory Chairman of the Board of Trustees, followed the Board to its refurbished quarters in Hubbard Memorial Hall* ***(right)****, via a 16th Street window.*

PAT LANZA FIELD (LEFT TOP AND BOTTOM); JAMES P. BLAIR, NATIONAL GEOGRAPHIC PHOTOGRAPHER

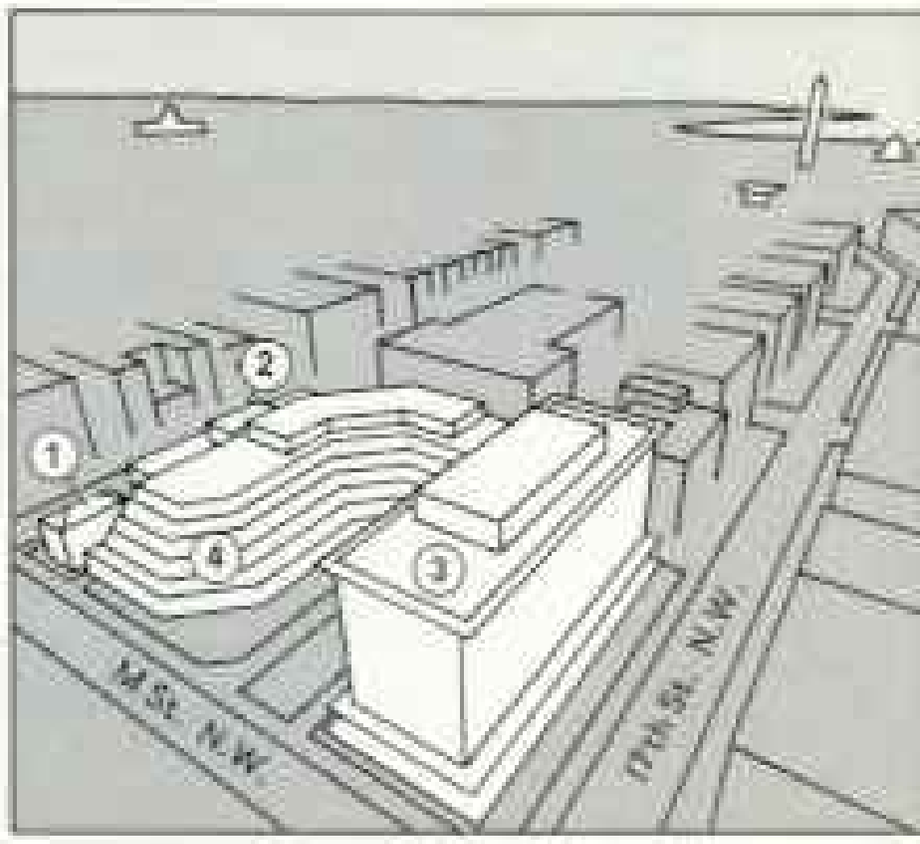
The newest building, 1600 M Street N.W., will enable us to experiment with and develop educational programming utilizing the laser disk, direct broadcasting, cable networks, and technologies not yet developed. We will be able to reach directly into members' homes and classrooms of the world with printed and broadcast material that is distinguished, as in the past, by high interest value and solid educational content.

It is an exciting prospect, and especially so in light of the many challenges, essentially geographic in nature, that confront us—how to obtain clear skies and clear streams, protect wilderness and forests where genetic pools of life are safe, while still making progress in the increase of living standards for a rapidly, in places alarmingly, growing world population.

Starting with the small but elegant Hubbard Memorial Hall (***lower left***) on a corner of our Washington complex, the Society has grown continuously over the years as it responded to the changing world. Now our headquarters is complete, our sails are trimmed, and our course is set with confidence.



STEVE RAYMER, NATIONAL GEOGRAPHIC PHOTOGRAPHER



COMMITMENT to the city of Washington—the Society's birthplace and its home for almost a century—has created a building complex spanning 81 years. Hubbard Memorial Hall, the Society's first permanent home (1), rose on the corner of 16th and M Streets N.W. Within ten short years the staff had overflowed into rented quarters, and a connecting building (2) along 16th Street was completed in 1913, with additions in 1932 and 1949. The present headquarters building (3) at 17th and M Streets N.W. was dedicated by President Lyndon B. Johnson in 1964. Designed by noted architect Edward Durell Stone, the ten-story white marble structure is now known as the Melville Bell Grosvenor Building. Its first-floor Explorers Hall, with permanent and changing exhibits, is a favorite of Washington visitors. The new M Street Building (4) completes this complex in the heart of the nation's capital, only blocks from the White House, Washington Monument, and Jefferson Memorial, upper right, and the Capitol, upper left.

MOW BY STEVE RAYMER

MONUMENTAL BOULDERS of South Dakota granite, natural and polished, accent a reflecting pool to compose an environmental sculpture by the gifted New York artist Elyn Zimmerman in the plaza of the new building (***above***). At its dedication on June 19 President Reagan speaks from the podium of our new auditorium (***below***), which we plan to fill in years to come with a continuous program of lectures, films, and seminars, many by the hundreds of scientists aided financially by the National Geographic Society. In this new service we will add to the intellectual fabric of the nation's capital.

The President honored us with his presence—and with his words about our Society: "In a world that sometimes seems to have grown sated with all it knows, you still discover. You fund expeditions, you help researchers, you encourage impossible dreams—then you share the results with all the Society's members."

We confidently expect that our newly expanded headquarters complex will give us an increasing capability to share with you—and with generations to come. □

NATIONAL GEOGRAPHIC SOCIETY

WASHINGTON, D. C.

Organized "for the increase and diffusion of geographic knowledge"

GILBERT HOVEY GROSVENOR
Editor, 1899-1954; President, 1920-1954
Chairman of the Board, 1954-1966

THE NATIONAL GEOGRAPHIC SOCIETY is chartered in Washington, D. C., in accordance with the laws of the United States, as a nonprofit scientific and educational organization. Since 1890 the Society has supported more than 2,300 explorations and research projects, adding immeasurably to man's knowledge of earth, sea, and sky. It diffuses this knowledge through its monthly journal, NATIONAL GEOGRAPHIC; its books, globes, atlases, filmstrips, and educational films; *National Geographic WORLD*, a magazine for children age 8 and older; information services; technical reports; exhibits in Explorers Hall; and television.

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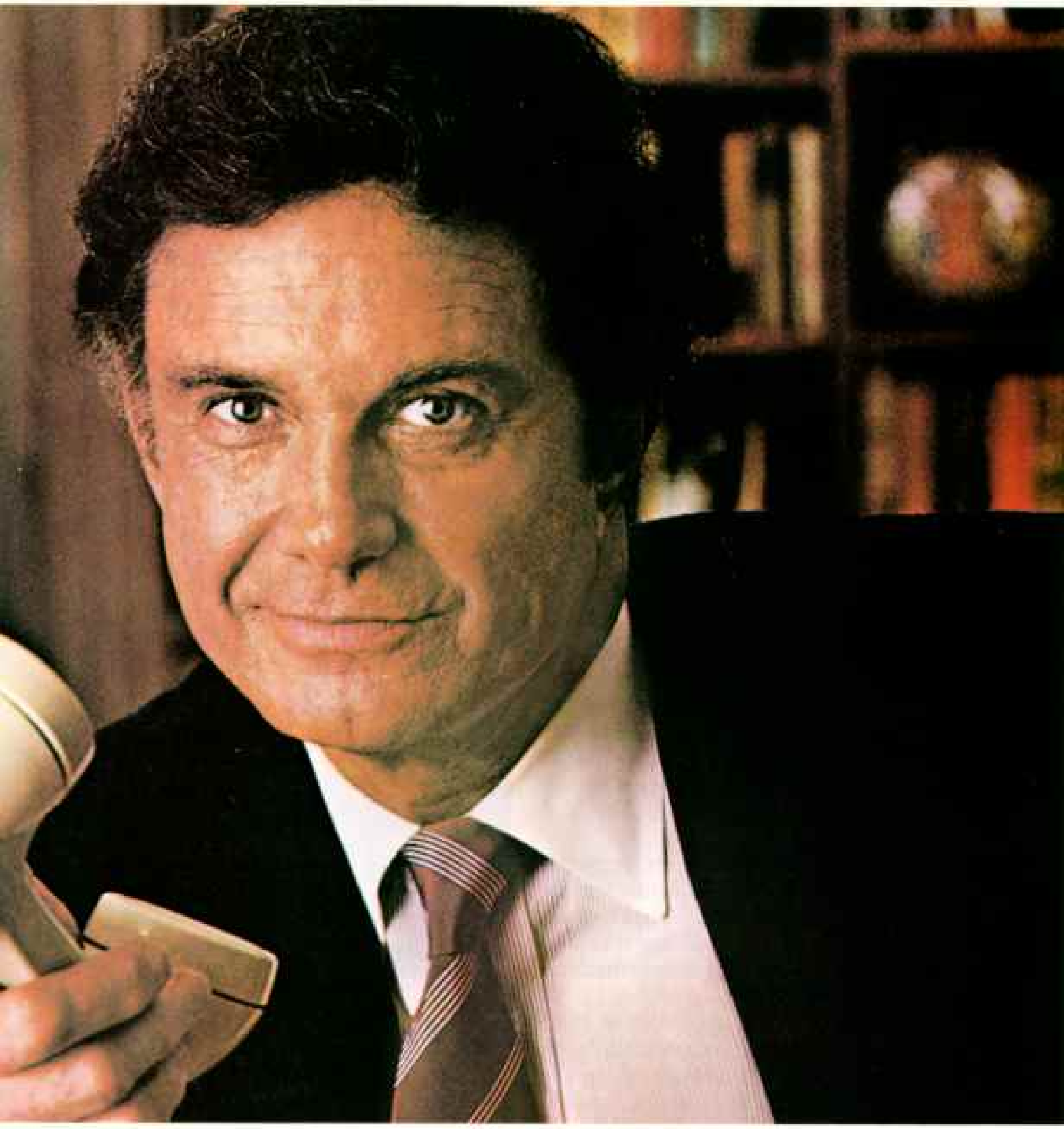


touch someone℠

AT&T

...another, and more personal, bond of continuity

TWO PRESIDENTS, two structures, and twenty years. These were the markers of memory as our new building was dedicated by President Ronald Reagan on June 19 (page 554). The President noted that twenty years earlier President Lyndon B. Johnson had dedicated our then new headquarters. Much has changed in that time. Presidents now travel in more rigorous security; schedules are tighter; new crises rattle the world.

There is also continuity. Both Presidents made complimentary remarks about the Society and its works. Both sounded the theme that knowledge is universal.

President Johnson in 1964: "Common sense dictates that all nations lend their learning to all other nations. And this is a loan in which the science of all nations is the beneficiary and the good of all mankind is advanced."

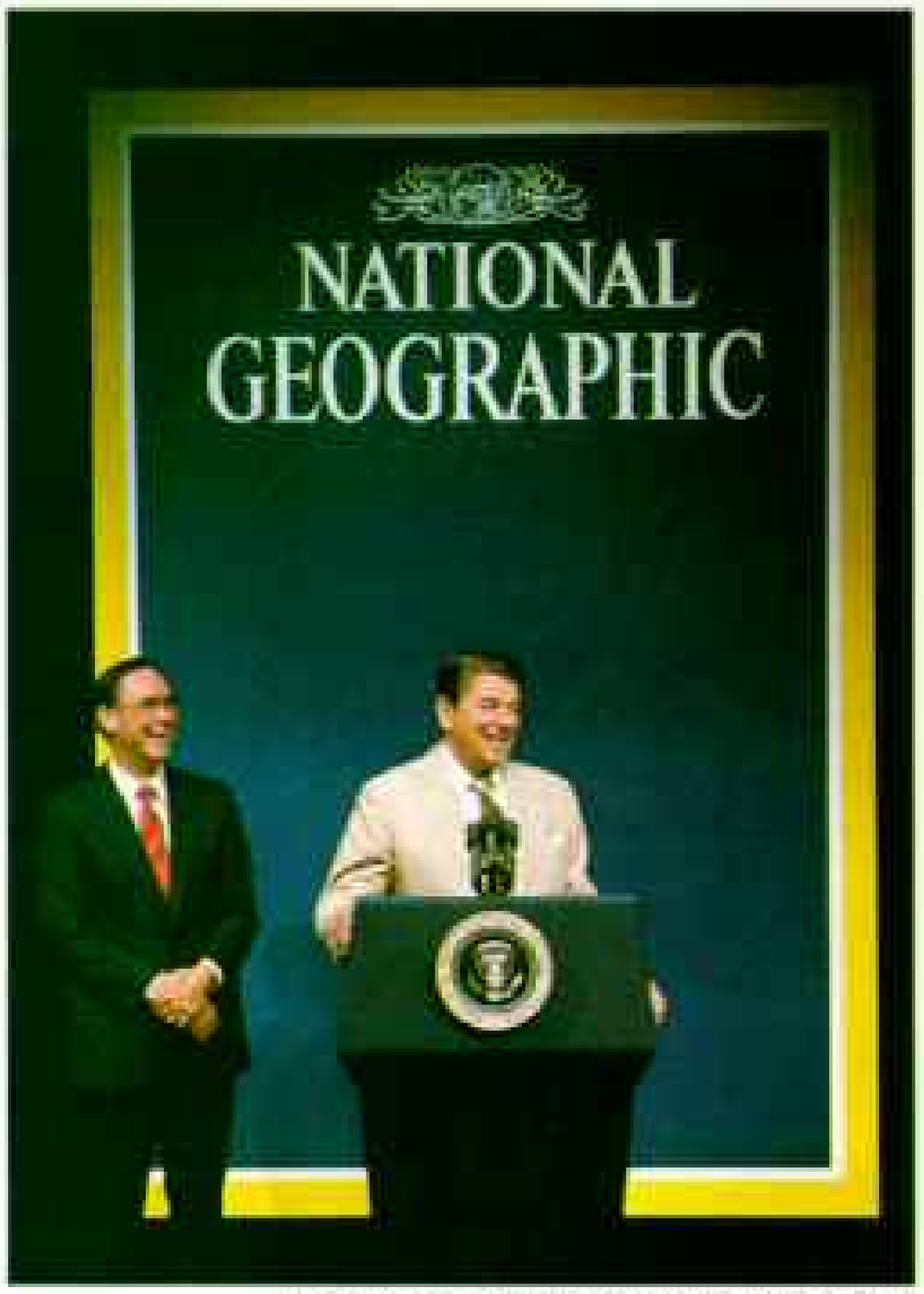
President Reagan in 1984: "Throughout its history, the National Geographic Society has brought home the profound truth that we are, with all our differences, a human family living together on a tiny blue and green planet."

There was another, and more personal, bond of continuity. Before delivering his prepared remarks, President Reagan recognized a member of the audience who had accompanied President Johnson to the dedication twenty years before.

"Lady Bird. . . . You were a great First Lady of this nation, and your beautification program is a lasting improvement on the American landscape. You can't be thanked enough for your great and good work."

That gracious acknowledgement of Mrs. Johnson, a Society trustee and founder of the National Wildflower Research Center, reinforced my feeling that our new building is more than concrete, granite, and glass, more even than the work that goes on inside. In its exterior galleries and its facing plaza it is also an oasis of shrubs, flowers, and trees.

When our new building was first under construction, there was an unavoidable moment we knew was coming—and dreaded. A stand of tall magnolias in our parking lot had to be removed. Each springtime house finches had used those trees for nesting and singing. The magnolias are gone, but in their place are flowering pear trees set within the frame of other greenery.



NATIONAL GEOGRAPHIC PHOTOGRAPHER JAMES P. BLAIR

TWO PRESIDENTS: RONALD REAGAN AND GILBERT M. GROSVENOR SHARE A LAUGH IN FRONT OF A NATIONAL GEOGRAPHIC MAGAZINE COVER AT THE DEDICATION OF THE SOCIETY'S NEW BUILDING.

I am honored for the Society that we have had the company of Presidents to help celebrate significant milestones in our history. And I am eager again for the company of singing finches.

Gilbert M. Grosvenor

PRESIDENT, NATIONAL GEOGRAPHIC SOCIETY

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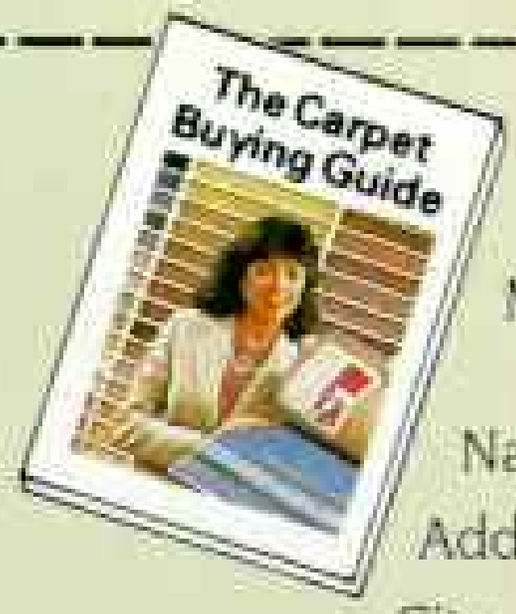

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VALDOCS
2

VALDOCS

WELCOME TO THE INFORMATION AGE

You've been stuck in the "Stone Age" of computers for too long, wrestling with the same problems which have plagued users since the beginning — unnecessary complexity, ponderous and confusing manuals, software which forces you to do things the computer's way instead of making the computer do things your way.

Well, step out of the cave and into the dawn of a new age. *VALDOCS IS DIFFERENT... IT'S EASY TO USE.*

Valdocs was the first integrated software system. As such it marked the way out and other companies began to follow. But there's more to it than that.

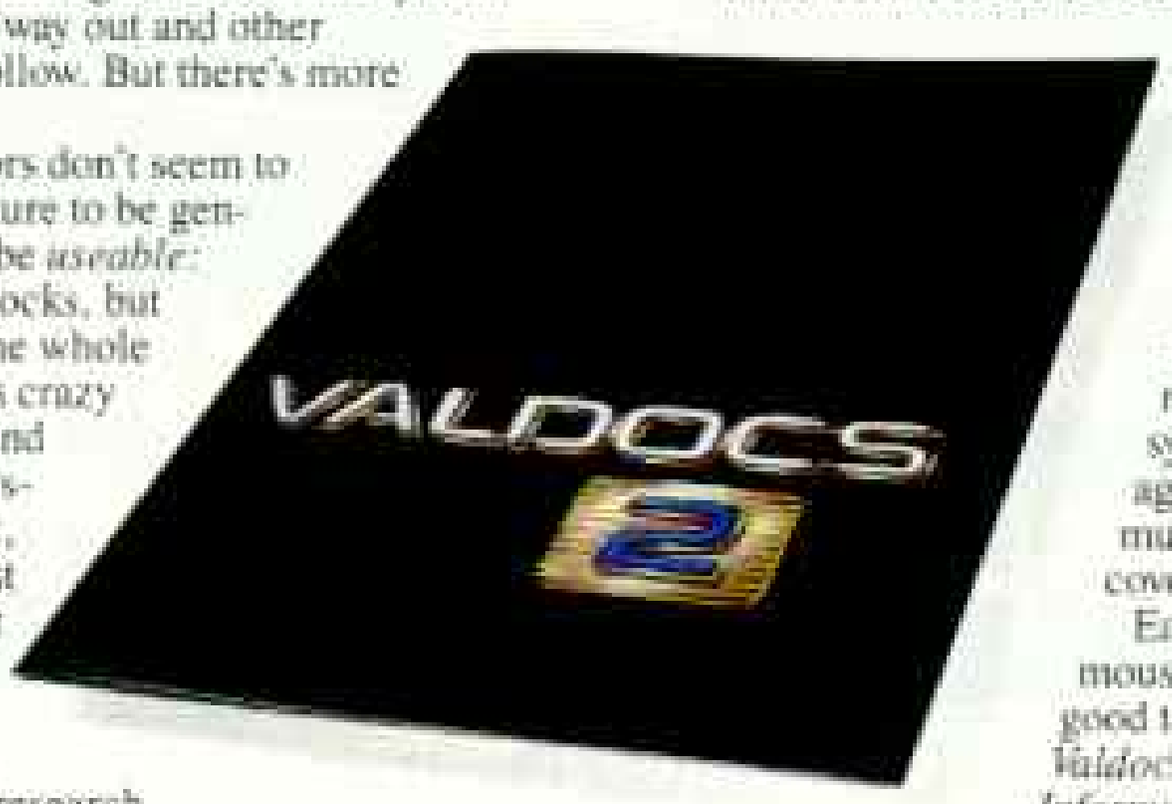
What our competitors don't seem to know is this: for a feature to be genuinely useful, it must be *useable*: not just by computer-jocks, but by anyone. So while the whole software industry goes crazy copying our features and rushing "integrated systems" onto the market, they leave out our most popular and important feature: *Ease of Use.*

MAKING IT EASY WAS THE HARD PART. A lot of research went into the making of Valdocs. We studied people as much as computers, and discovered that the industry thought computers were smart and that people were dumb. Their idea of "User Friendliness" was *Computer-Friendly Users.*

Computers are good at some things, but people are good at others. The tool-like powers of a computer, coupled with the native abilities of a user, strengthen him where native abilities fail: just as a car extends mobility and a TV extends vision. The computer is not a solution: *it's a mind-amplifying tool with which to create solutions.*

In order to be useful a tool must have a handle that fits the user. Valdocs is easy to use because it was designed around just such a handle: its own special keyboard. Anyone can use Valdocs immediately just by reading the labels on that keyboard instead of a complex manual. This isn't just theory; it's been observed in thousands of cases.

NOW THE EASIEST TO USE SYSTEM ALSO HAS THE MOST FEATURES. First we made it easy. Now, after 18 months of development, *no system in the world offers more features than Valdocs 2.*



Just the list of integrated modules is amazing: word-processor, spreadsheet, appointment book, file indexer, mini-database, electronic mail system, business graphics package, optional drawing tools, and much more... far too much to cover in an ad.

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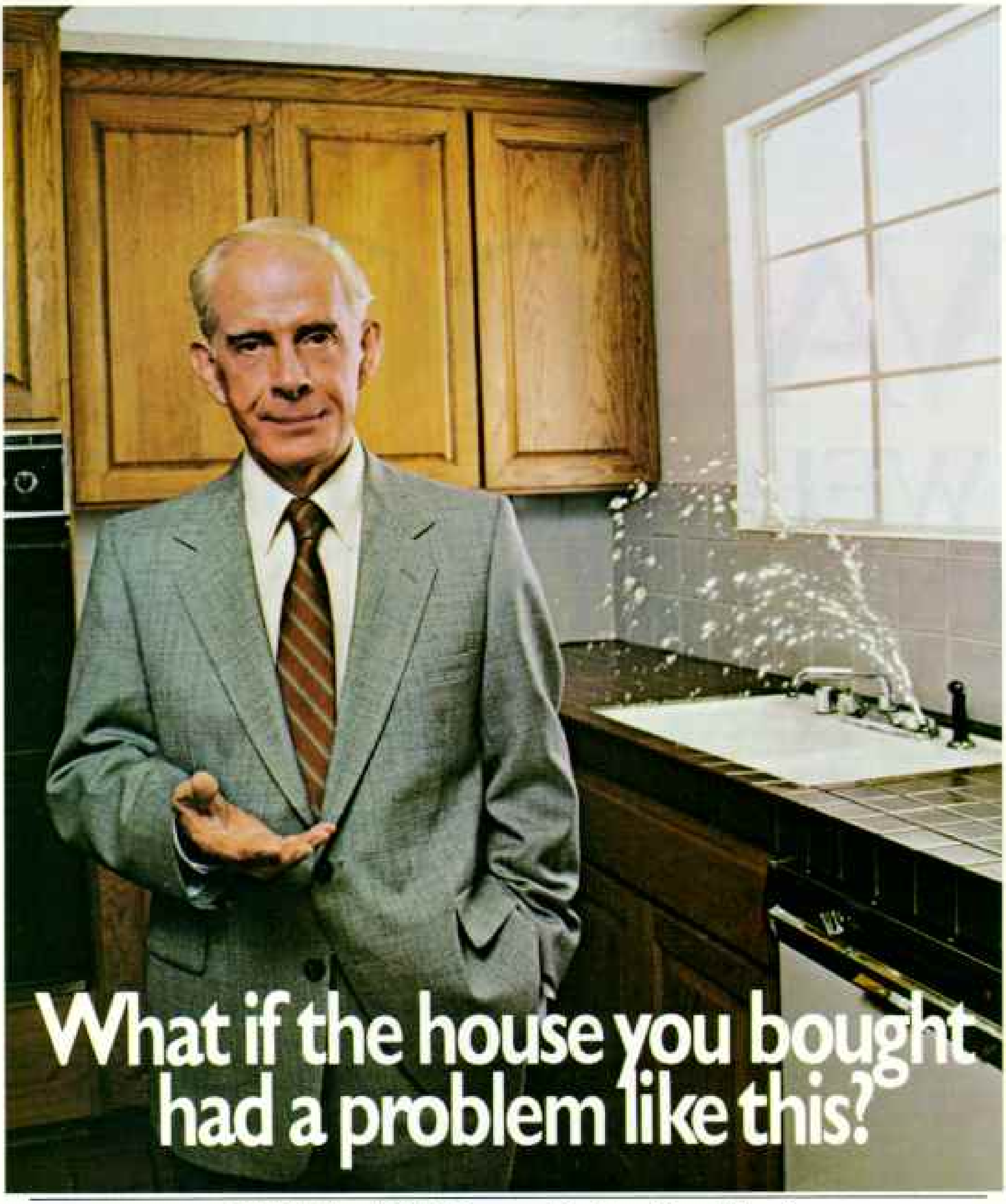

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National Geographic Society membership is sure to please everyone on your gift list . . . relatives, friends, and professional associates. Inexpensive and easy to give, it's also a gift your recipients will open with pleasure each month of the year . . . when NATIONAL GEOGRAPHIC brings the world and all its wonders into their homes.

To give Society membership this Christmas, complete the attached form and mail with dues in the envelope provided. Upon request, a gift card will be sent to each person you list. If the form is missing, write to:

National Geographic Society
Washington, D. C. 20036

Members Forum

Underground Railroad

Thank you for the fascinating "Underground Railroad" (July 1984). I am sorry to note that Massachusetts was not given credit for being first to free its slaves under the Bill of Rights in August 1781 in Great Barrington. There a brave woman named Mum Bet and a fellow slave, Brom, were freed and paid 30 shillings of lawful money damages for their services from the time they were 21 and the cost of the suit.

Jean Stewart Bower
Salisbury, Connecticut

You mentioned New Bedford, Massachusetts, in your article. As a young girl I remember my father taking me down to the cellar of his old barbershop and pulling away boards to reveal a man-made tunnel about three feet wide and four feet high. He told me it ran down to the old section of the waterfront. Dad next took me across the street to his friend's shop, and we went down into the cellar there and found the tunnel again.

Fernande M. Tardif
Cataumet, Massachusetts

Charles L. Blockson has written a marvelous article on the Underground Railroad. Nova Scotia, a small province of Canada with barely 3 percent of its population, has approximately 12 percent of its black population. This is a result of one of the terminals of the Underground Railway being in the County of Guysborough.

S. G. McCulloch
New Glasgow, Nova Scotia

Scotland

In your welcome article "Scotland, Ghosts, and Glory" (July 1984), you picture the celebrated haggis. Indeed "the trembling earth" would "resound to the tread" of anyone eating haggis composed of sheep offal. *Webster's New 20th Century Dictionary* defines "offal" as "waste products; useless leftovers; especially, the entrails, etc., of a butchered animal." Haggis is composed traditionally of the heart, lungs, and liver of a sheep—useful items indeed. Since most people familiar with the word "offal" use it to mean just what Webster's says, your choosing it may well cause readers' stomachs to quiver as violently as the poet's resounding sphere.

Susan T. Woodside
Erieville, New York

The maker of the haggis pictured requested that we use "offal" instead of "innards." Webster's Ninth New Collegiate Dictionary defines offal as "the viscera and trimmings of a butchered animal. . . ." Viscera are the internal organs, especially the heart, liver, or intestine.

Guid God and michty me, tae think ye would hae the nerve tae ca' the tartan a plaid as you did on page 44. Alexander Graham Bell, late of Edinburgh, must be turning over in his grave tae think that any of his descendants might dae sic a thing. The tartan is a particular pattern for each clan and its septs, and a plaid is any pattern of crossed lines. Och weel, I will forgie ye this time.

James B. Pattison
Newington, Connecticut

Robbie Burns forgive us, but we felt "pilgrims of the plaid" had a certain lilt, so we went with the second definition of plaid—"a twilled woolen fabric with a tartan pattern; tartan."

Burma

"Time and Again" (July 1984) is an interesting story about Burma, which I recently visited again. On page 109, shouldn't it be "Buddhist monasteries and shrines almost beyond numbering make *Mandalay* a holy city," instead of Rangoon as printed?

W. Miles Slater
Perkasie, Pennsylvania

We were on the road to the wrong city, and should have said Mandalay.

I awaited your Burma article with great anticipation, since my visit to Pagan closely followed the visit of your team. One evening, as the setting sun turned the parade of temples into the best photographic opportunity I may ever have, the guide proudly led me from site to site, explaining that since Mr. Stanfield had photographed these vistas, then surely all other travelers ought to do the same. The guide exemplified Burma—generous, inquisitive, and gracious.

Mary K. Allyn
South Hadley, Massachusetts

Mount Everest

Bravo to the authors of the Everest articles (July 1984). They have ascended to the apex of literary and photographic adventure. I am, though, rappelled (sic) that they subscribe to the popular notion that Mont Blanc is Europe's highest peak. Mont Blanc ranks fifth, while Mount Elbrus takes the highest honors at 18,481 feet.

Joshua Dee
Great Barrington, Massachusetts

Actually 13 peaks in the Caucasus are higher. Mont Blanc is the highest in Western Europe.

An award-winning American artist creates his first porcelain sculpture

THE GREAT BLACK-BACKED GULL

by Scott Woolever

A new and original work of art portraying the most powerful of all seabirds.

Few wildlife artists have received higher accolades than Scott Woolever. He has won both the Award of Excellence presented by the prestigious Philadelphia Academy of Natural Sciences, and the Medal of Excellence from the Society of Animal Artists—the highest honor that the world's leading organization of wildlife artists can bestow.

Critics, too, consider Woolever to be an artist of exceptional range—combining an unerring eye for detail with a keen understanding of each subject he portrays.

Now, this gifted artist has turned to a medium that collectors have prized for centuries. The result is *The Great Black-Backed Gull*—Scott Woolever's first-ever porcelain sculpture.

For those who love the sea, the Black-Backed gull is the epitome of grace—a fluid, agile creature with powerful arcing wings that often span six feet from tip to tip.

In this impressive new sculpture, Woolever has captured the grace of this magnificent seabird, using the medium of fine bisque to create astonishing effects of form, texture and color.

Woolever portrays the "great black" perched on a wood piling, wings poised—a split second before taking flight. The work is rich with nature's own colorations. The slate-black mantle . . . the delicate underlayers of gray-toned wing-feathers . . . the sharply hooked yellow bill. Every marking, every subtle hue and tone, rendered with true-to-life realism.

Here, then, is a work of fine imported porcelain that will speak eloquently of its owner's taste and judgment for years to come. Not just because it is a major artist's first porcelain sculpture. Not just because it is crafted of the purest bisque and painted entirely by hand. But because it is wildlife art at its very best—*fine* art, of extraordinary beauty and importance.

To acquire the Great Black-Backed Gull by Scott Woolever, you need send no money now. Simply sign and return the accompanying Order Form by November 30, 1984.

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I understand that I need send no money now. I will be notified when my sculpture is ready, and billed at that time for my deposit of $25.* After the work is sent, I will be billed for the same amount in each of four successive months.

*Plus my state sales tax and a total of $2.50 for shipping and handling

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Great Gray Owl

We loved "The Great Gray Owl" (July 1984). We had the good fortune to see a great gray in a field in Hadley, Massachusetts. Its temporary residence for several weeks along the Connecticut River drew bird-watchers day after day. It was perfectly willing to sit among the old cornstalks and be stared at and photographed by a constant gaggle of humans. What was equally remarkable was the power it seemed to have over all of us. I've never seen a more respectful or quiet crowd.

Corinne Demas Bliss
South Hadley, Massachusetts

India's Railroads

Quickly! Hand Mr. Theroux another ticket and rush him down to trainside. Your coverage of Indian Railways (June 1984) is one of the best pieces you have presented in years. How pleasant to know that NATIONAL GEOGRAPHIC has discovered that the railroad is indeed an agent of human destiny and social experience.

Randall H. Larson
Glendale, Arizona

Four years ago I traveled some of the same track from New Delhi through Varanasi onward to Birganj, Nepal. Paul Theroux's recollections, though, bear little resemblance to mine. Where was the part about waiting and shoving with masses of people for a rail ticket, or the ceaseless tug on the sleeve followed by the plea "baksheesh" from the beggars, or having to sleep in shifts in the train to protect your belongings? No, my rail travel in India was not so rosily clad. The photographs chosen suffer the same rosy shade as the prose. India by rail is a powerful experience worth every rupee, but in my estimation is not as benign as Theroux depicts.

John Monahan
Arcata, California

Your articles concerning India brought back memories of my 11 months there in 1944-45 with the Royal Canadian Air Force. I traveled the narrow-gauge train from New Jalpaiguri to Darjeeling. The really interesting part was the descent. A simple mechanical linkage connected the brake shoes to a long transverse lever at the end of each car. A barefoot brakeman stood with one foot on a pad on the car, the other on a pad on the end of the lever, shifting his weight to provide the amount of braking he deemed necessary from moment to moment. Each car was individually braked in this manner. One trusted the individual and collective judgment of the brakemen.

Frederick J. Chambers
San Diego, California

Ants

When I saw the story about ants (June 1984), I said, "What next!" I couldn't believe anyone could be interested in the lowly ant. Well, let me tell you, I stayed up til 2 a.m. reading the story. I was enthralled! I knew next to nothing about ants except that they like picnics, but since then I have been making it a point to investigate the species I have in my yard.

Alice McKinney
Fort Worth, Texas

I have two queries regarding ants. I cannot understand how male ants can come from unfertilized eggs. An unfertilized egg contains only half the complement of genes, and to me this is incompatible with becoming an adult unless a male ant needs only half the genes of a female ant. As a queen can live for many years, how can she maintain the viability of so many sperm for so many years, especially if a colony can be as big as half a million ants?

Barry Segal
Johannesburg, South Africa

Male ants are indeed haploid, needing only one set of chromosomes. This phenomenon also occurs in other insect societies, such as honeybees. The ant queen has a special internal storage sac that preserves viable sperm throughout her life.

Olympic Peninsula

The account of the Olympic Peninsula (May 1984) was superb. When I saw the picture of the U.S.S. *Ohio* I couldn't believe they had named a submarine after a state. I am sure there are many more Navy veterans who wonder what happened to the tradition of naming submarines after fish, battleships after states, cruisers after cities, etc. I thought the old system was a good one. I would hate to see a new battleship named *Flounder* or *Sand Dab*.

Paul R. Nelson
Oshkosh, Wisconsin

Tradition, yes; hard-and-fast rule, no. The Secretary of the Navy, who accepts suggestions for ships' names, makes the final decision. Recently Trident subs, our largest, have been named after states, with the exception of that named for the late Senator Henry (Scoop) Jackson.

Letters should be addressed to **Members Forum**, *National Geographic Magazine, Box 37448, Washington, D.C. 20013, and should include sender's address and telephone number. Not all letters can be used. Those that are will often be edited and excerpted.*

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Having read this much, you might think you're reasonably equipped to recognize your next Magnavox. Sure.

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THE PFIZER HEALTHCARE SERIES

Chest pains that don't rest... even when you do.

Picture the following situations:
You are sitting at home, relaxed, when suddenly there's a painful tightness in your chest. Minutes later the pain is gone. You find that the same pain comes and goes from day to day. Sometimes the pain occurs under the same circumstances, sometimes not. Like on your walk to work in the morning, but not when you walk home in the evening. Some days you feel the pain, other days you don't. It's a worrying, cramp-like discomfort in the chest.

The pain just described could be mixed angina. It's characterized most commonly by the unpredictable nature of the occurrence of pain. Medical researchers have developed a checklist of clinical clues to help diagnose mixed angina.

For instance, if you experienced chest pains:

- *at rest, or even during sleep...*
- *at varying levels of exertion (your ability to perform the same physical tasks changes from day to day)...*
- *at specific times each day, usually in the morning...*
- *upon exposure to cold...*
- *under emotional stress...*

all your symptoms point to mixed angina. A checklist of clues like this could be the most important element in making the diagnosis. Because with mixed angina, it is *when* you feel the pain that is most important. And even if you have already been diagnosed as having angina, you should report any of the above clues to your doctor because treatment can be very different.

What causes the pain of angina?
The pain occurs when the heart muscle does not get enough oxygen-rich blood. In some forms of angina this happens when the heart muscle cannot get all the oxygen it demands because of fatty obstructions that have formed in the coronary arteries, blocking the flow of blood. But mixed angina is different. Because along with fatty obstructions, in a person with mixed angina a temporary squeezing or narrowing of the coronary artery will occur. This narrowing of the vessel wall decreases the flow of blood to the heart muscle causing pain. The medical term for it is *vasoconstriction*. Vasoconstriction blocks the flow of oxygen-rich blood to the heart muscle. The presence of vasoconstriction explains why mixed angina can occur for no apparent reason—at rest, or even during sleep.

What kind of pain is it exactly?
Most people experience anginal pain as a heaviness, pressure, or fullness in the chest, sometimes extending into the left shoulder and arm, even the jaw. Sometimes it's just a feeling of "indigestion," discomfort, or shortness of breath and/or fatigue.

Can mixed angina be treated?
Yes. There are specific types of treatment for this kind of angina. If you were diagnosed as having mixed angina, your physician may suggest that you lose weight, avoid stressful situations and stop smoking. A program of rest and relaxation, together with correct diet and exercise may be helpful. And there are medicines that both effectively improve the blood supply to the heart muscle and reduce the heart's demand for oxygen. But before your doctor can correctly diagnose mixed angina and begin treatment, he or she needs important information from you.

You'd need to carefully describe precisely when, where and how you felt the pain, and what you were doing when it occurred. Details that may seem unimportant to you could be very important to your doctor. Keep a complete list of the occurrences of pain, because it will help you answer questions when you visit your doctor's office. Remember—the variability of time and circumstances of occurrence of your pain provides the key.

Don't forget, only you can provide your doctor with the necessary information. But you also have an important support system to help you manage mixed angina. We call it...

Partners in Healthcare.

You are the most important partner.
Only you can spot the symptoms and report them to your physician. And it's you who must decide to accept the guidance and counseling of your physician, pharmacist and other healthcare professionals. When medicines are prescribed, only you can take them as directed.

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a word about hearing and Miracle-Ear®...

Miracle-Ear® products can help many people overcome problems like hearing only parts of words. . . straining to hear. . . asking others to repeat. . . or becoming confused when spoken to.

Inner Ear™ canal aid is the most recent addition to the Miracle-Ear line. Notice how small it is compared to other instruments you may have seen. But, just because it is so small, almost unnoticeable, Inner Ear will not fit everyone. And, of course, not everyone can be helped by a hearing aid, but many can. Find out if Inner Ear is right for you.

If you hear but don't always understand the words, Miracle-Ear may be your answer.

Let us put you in touch with Miracle-Ear professionals who will help you identify your specific hearing needs.

Miracle-Ear®

from General Chuck Yeager.
"Sometimes, people like myself, who are becoming older have hearing problems. There's no one who really understands how tough it is to be unable to hear high frequencies. I'm impressed with what's been done in electronics and with the hardware which is available today to help people. It's a pleasure to be associated with Miracle-Ear products and Miracle-Ear Centers."

from Captain Wally Schirra.
"As an astronaut and businessman, good hearing has always been important in my life, as I'm sure it has been in yours. People ask me, "what did the space program do for us?" Miniaturization and learning quality control. These are the kind of products that Miracle-Ear is bringing to you through new techniques which I think are quite remarkable. Miracle-Ear products have the right stuff!"

Inner Ear™ canal hearing aid.

- Fits comfortably in the ear
- No cords, tubes, or wires
- Available in Inner Ear canal aid (shown), Modular, and Contour® Miracle-Ear Models.

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Minneapolis, MN 55440

If you've ever found yourself saying "I can hear, I just can't understand some words", then send for more information about

Miracle-Ear®...

Mail this postage-paid card Today!

FOLD HERE

Send for more information today!

Answer these important questions, then get the facts about Miracle-Ear!

1. Are you now or have you ever worked in a noisy place? ☐Yes ☐No
2. Do you hear people speaking, but have difficulty understanding the words? ☐Yes ☐No
3. Do you have difficulty understanding on the phone? ☐Yes ☐No
4. Do you have to turn the radio or television up louder than normal? ☐Yes ☐No
5. Can you hear car horns, sirens, or other warning signals when they occur? ☐Yes ☐No
6. I am now wearing: ☐Cord Type ☐Behind-the-Ear Type ☐Eyeglass Type ☐In-the-Ear Type ☐No Aid

Please tell me more about Inner Ear, the custom-made canal aid without cords, tubes, or wires.

Name (Please Print) _____ Telephone (___) _____

Address _____

City _____ State _____ Zip _____

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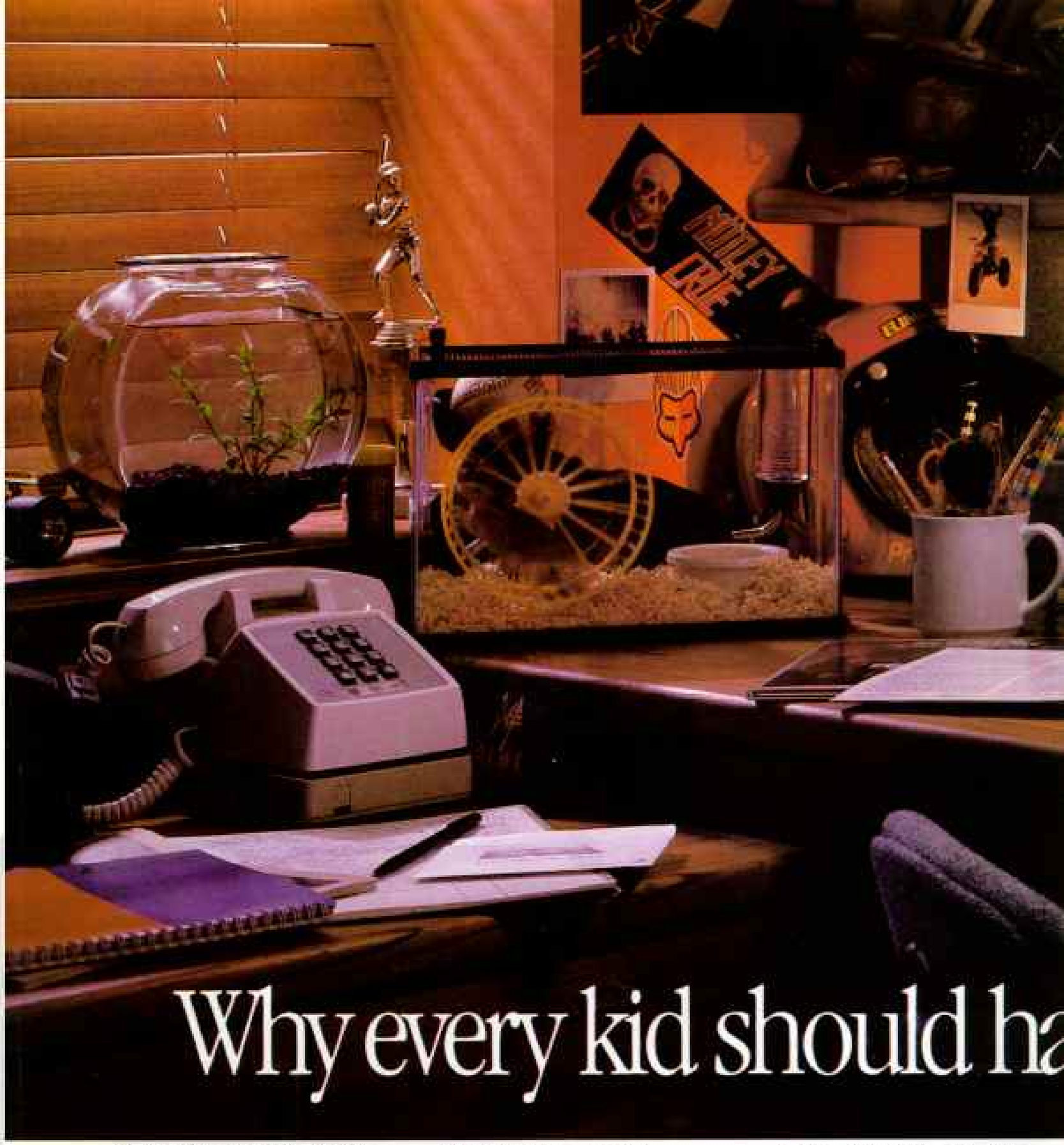
Miracle-Ear®

NG-80



Why every kid should ha

Today, there are more Apples in schools than any other computer.

Unfortunately, there are still more kids in schools than Apples.

So innocent youngsters (like your own) may have to fend off packs of bully nerds to get some time on a computer.

Which is why it makes good sense to buy your kids an Apple® IIc Personal Computer of their very own.

The IIc is just like the leading computer in education, the Apple IIe. Only smaller. About the size of a three-ring notebook, to be exact.

Even the price is small — under $1300*

Of course, since the IIc is the legitimate offspring of the IIe, it can access the world's largest library of educational software. Everything from Stickybear Shapes™ for preschoolers to SAT test preparation programs for college hopefuls.

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Not to mention fun programs

With a IIc, your kid can do something constructive after school. Like learn to write stories. Or learn to fly. Or even learn something slightly more advanced. Like multivariable calculus.

ve an Apple after school.

for the whole family. Like "Genetic Mapping" and "Enzyme Kinetics."

And the Apple IIc comes with everything you need to start computing in one box.

Including a free 4-diskette course to teach you how—when your kids get tired of your questions.

An RF modulator that turns most any TV into a monitor.

As well as a long list of built-in features that would cost about $800 if they weren't.

128K of internal memory—twice the power of the average office computer.

A built-in disk drive that would drive up the price of a less-senior machine.

And built-in electronics for adding accessories like a printer, a modem, an AppleMouse or an extra disk drive when the time comes.

In its optional carrying case, the IIc can even run away from home.

So while your children's shoe sizes and appetites continue to grow at an alarming rate, there's one thing you know can keep up with them. Their Apple IIc.

To learn more about it, visit any authorized Apple dealer. Or talk to your very own computer experts.

As soon as they get home from school.

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The choice for taste is...Taster's Choice.

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TELEVISION

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On Assignment

A TASTE OF POLLEN became almost a steady diet for staff writer ***Cathy Newman*** as she investigated that necessity of nature that is also the bane of hay-fever sufferers. Here she is offered a sample by the late Navajo medicine man Fred Stevens, Jr. (***right***). Sacred to the Navajos, pollen is offered as a blessing to the newborn, to the newly married, and even to each new day. "The promise of providential goodwill was welcomed; the pollen tasted slightly sweet," she recalls. During her coverage, Newman ate pollen—touted as health food—in tablet and bar form, enjoyed a pollen facial, brushed her teeth with pollen-based toothpaste, and sniffed a jar full of ragweed pollen. There were no ill effects, she reports. "Fortunately, I'm not allergic. Yet."

MARTHA COOPER (ABOVE); DIANA CARLSON

FOLLOWING THE TRAIL of Hernán Cortés to Mexico City, anthropologist ***Jeffrey Wilkerson*** (***below,*** second from left), Victoria Velasco, Genaro Domínguez, and photographer ***Guillermo Aldana E.***, right, faced their greatest danger on horseback in city traffic. "I thought it was just a matter of time before one of us would be injured or killed," said Wilkerson. But all escaped unharmed to pose for a triumphant picture in the Zócalo, the central plaza. Aldana, a native of Sinaloa, Mexico, thanked his early experience in California training horses for Hollywood movies. Wilkerson began tracing Cortés's route in 1963, searching through thousands of dusty documents in Seville, Spain. He was startled to find one signed by Cortés himself. "After more than four centuries, there he was talking to me."

AIM HIGH

Now. For the future.

Technology is moving faster than science fiction. And, it's more exciting. But to be part of it — to make it work — we have to learn. We have to grow.

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America and the Air Force of tomorrow are depending on them.

AIR FORCE

A great way of life.

Photographed by Johnny Raymond T. Cabreira. ***Philippine Tarsier:*** *Genus: Tarsius*
Species: *syrichta* ***Adult size:*** *15–18cm head and body; 22–25cm tail* ***Adult weight:*** *113–142g*
Habitat: *Rain forests on the islands of Samar, Leyte, Bohol and Mindanao in the Philippines*
Surviving number: *No estimates; known to be decreasing as its habitat disappears*

Wildlife as Canon sees it: A photographic heritage for all generations.

Known for its ability to cover up to ten feet in a single leap, the Philippine tarsier begins hunting for food at sunset, using its sensitive hearing and unusually large eyes to locate its prey in the darkness of the forest. About the size of a chipmunk, this nocturnal creature hunts for insects, lizards and other small animals almost continuously during its waking hours. Today, the Philippine tarsier is threatened by a loss of habitat.

Nothing could bring the Philippine tarsier back should it vanish completely. And while photography can record it for posterity, more importantly photography can help save it and the rest of wildlife.

Photography is an invaluable research tool that can help scientists learn more about the tarsier's behavior in its natural habitat. Photography can also assist in gathering the information needed to ensure the survival of the Philippine tarsier and help promote a better understanding of this enchanting but little-known primate.

And understanding is perhaps the single most important factor in saving the Philippine tarsier and all of wildlife.