DOUBLE MAP SUPPLEMENT: AZTEC WORLD, MEXICO-CENTRAL AMERICA

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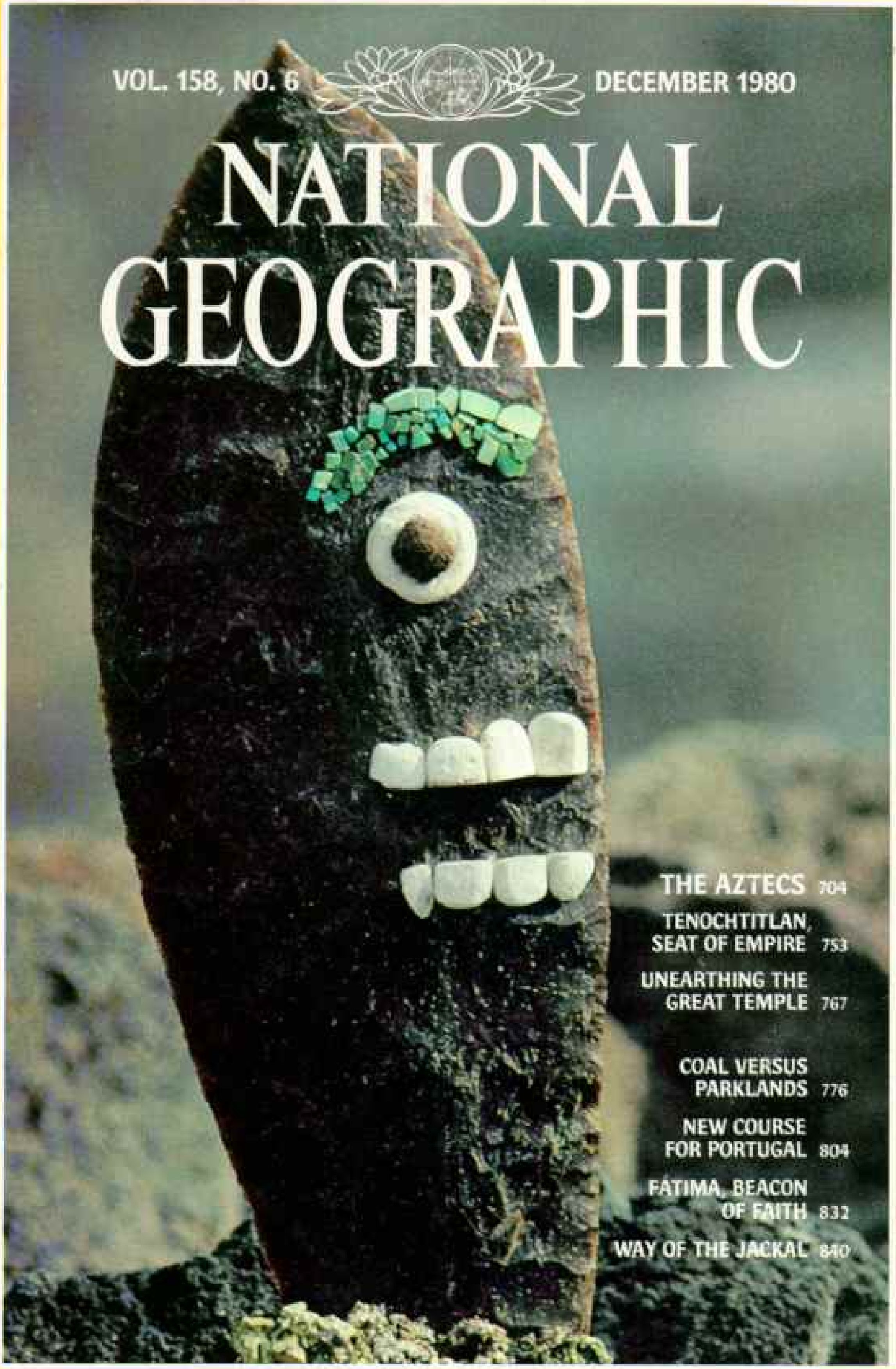
NATIONAL GEOGRAPHIC



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I HAVE HAD the good fortune to spend time under canvas on the African plains and behold with wonder the unforgettable beauty of wildlife living free. So often the pictures that portray the scene fall short, or stop short, of the realities of the life-and-death dramas that enthrall the traveler.

Now I can guarantee you that when the new season of National Geographic TV Specials opens on January 7, you will see African wildlife as it is rarely seen. The first film is titled "Etosha: Place of Dry Water." It was made by the award-winning cinematographers David and Carol Hughes and displays, with both splendor and candor, a year's cycle of birth, death, and survival of animals whose lives center on a sometimes wet, usually dry lake bed in southwestern Africa. Honest and gripping, the documentary results from nearly two years of patient daily observation and filming.

This will be the sixth year our programs have been shown by the Public Broadcasting Service. Once again we are indebted to Gulf Oil Corporation for generous support, and once again our coproducer is station WQED in Pittsburgh, with its fine editing and production facilities in Hollywood.

The second program of the season, on February 11, will be another departure from usual television fare: "Living Treasures of Japan," a loving look at nine extraordinary artists and craftsmen whose work has won them official designation as national cultural treasures.

On March 11, we visit our "National Parks: Playground or Paradise," and inquire whether their vast popularity, if not properly controlled, will eventually spoil the very qualities that make them popular.

The new series concludes on April 8 with "Gorilla," which roams the world from the great ape's mountain homelands of central Africa to the zoos and laboratories where its behavior and intelligence are being closely studied. Harried by poachers and the encroachment of burgeoning human populations, the gorilla is nearing a crisis point in its fight for survival.

This promises to be one of the most exciting of seasons for National Geographic television, which traditionally draws large audiences to quality programming, a fact of special pride and pleasure to our Society.

Gilbert M. Grosvenor
PRESIDENT

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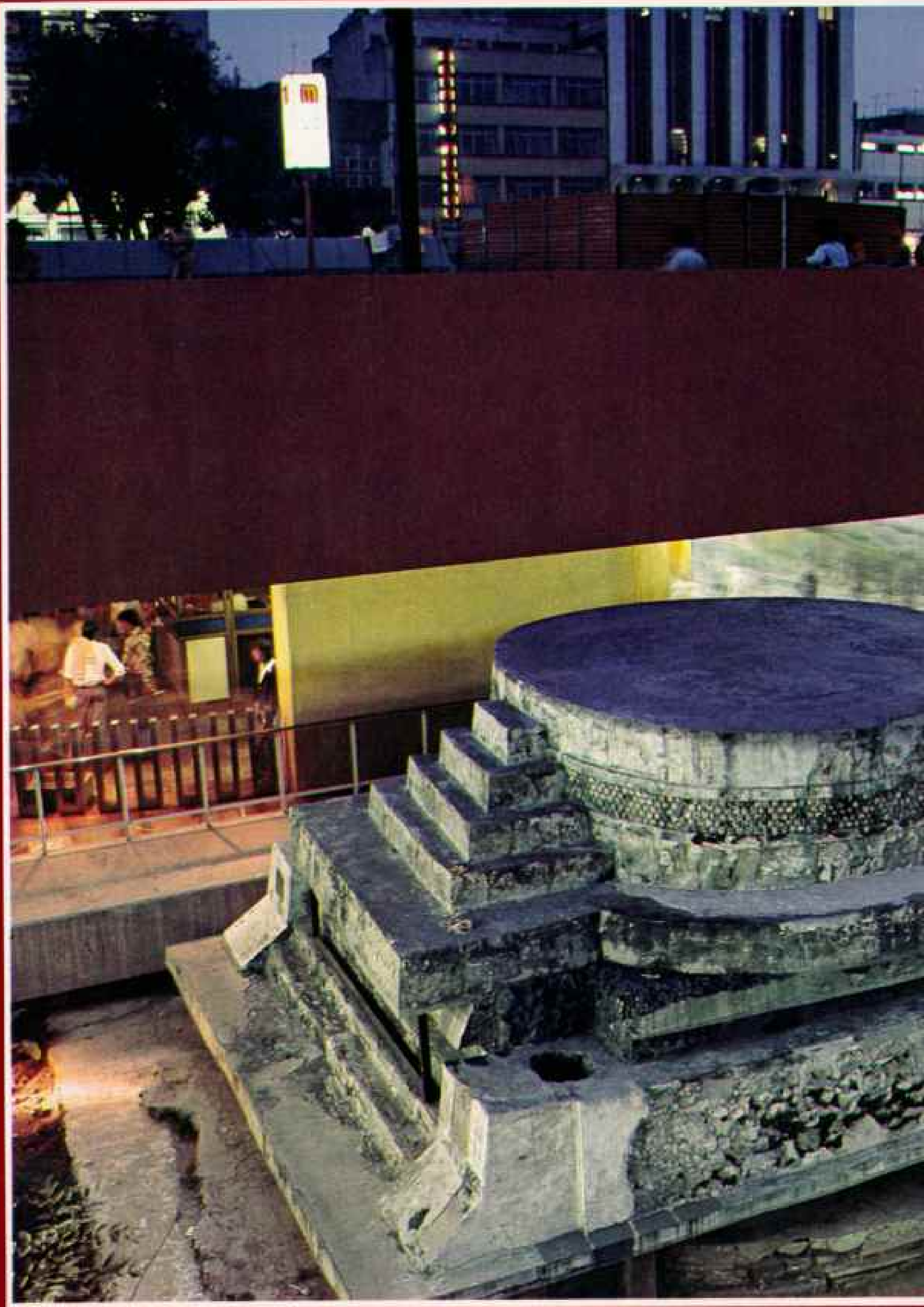
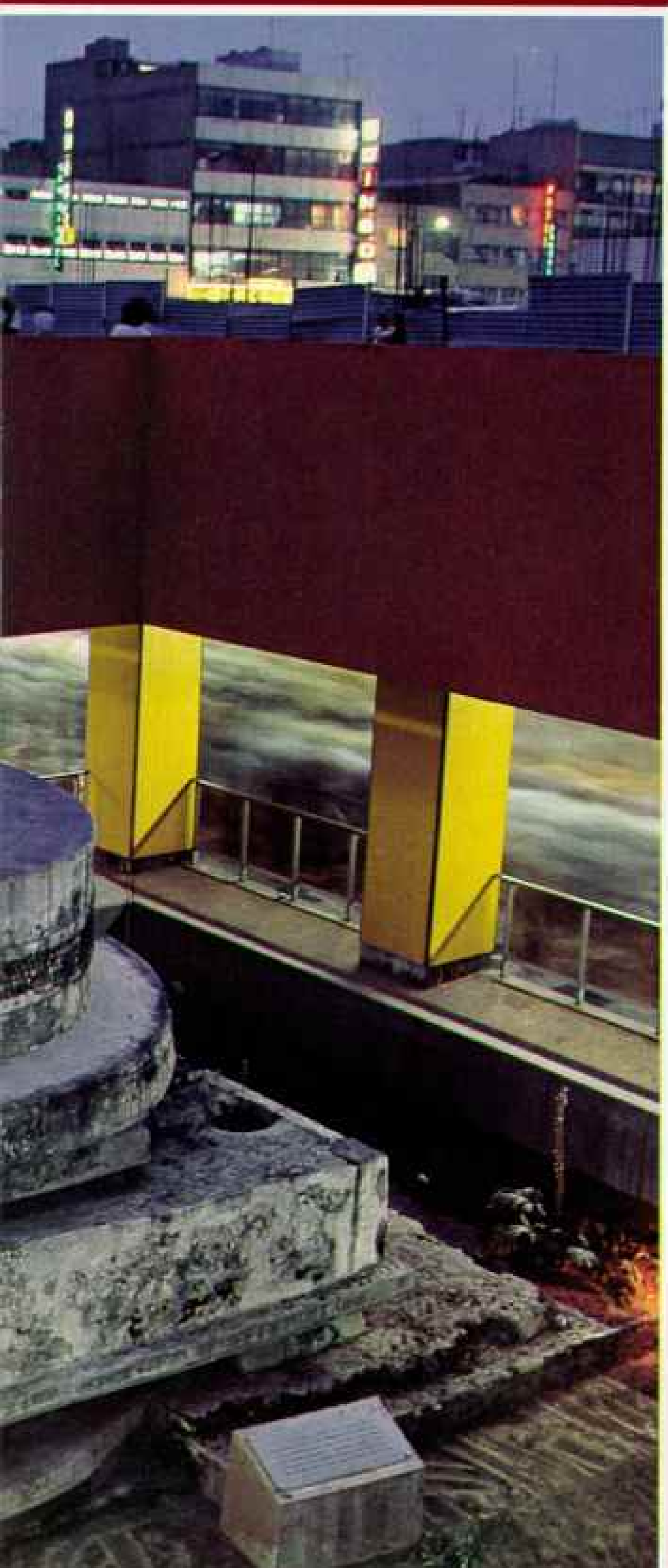
COVER: *Ritual obsidian knife, symbol of those that cut the hearts from Aztec sacrificial victims, grins from a cache unearthed in the Great Temple. Photograph by David Hiser.*

Visages of the rain god Tlaloc mask a recently unearthed pot and a boy dressed as a jaguar. The people of Mexico's last great pre-Hispanic empire welcomed children into the world with poetry and sacrificed them to bring rain. A universe of extremes ruled

The Aztecs

NATIONAL GEOGRAPHIC PHOTOGRAPHER VICTOR R. BOSWELL, JR. (ABOVE)



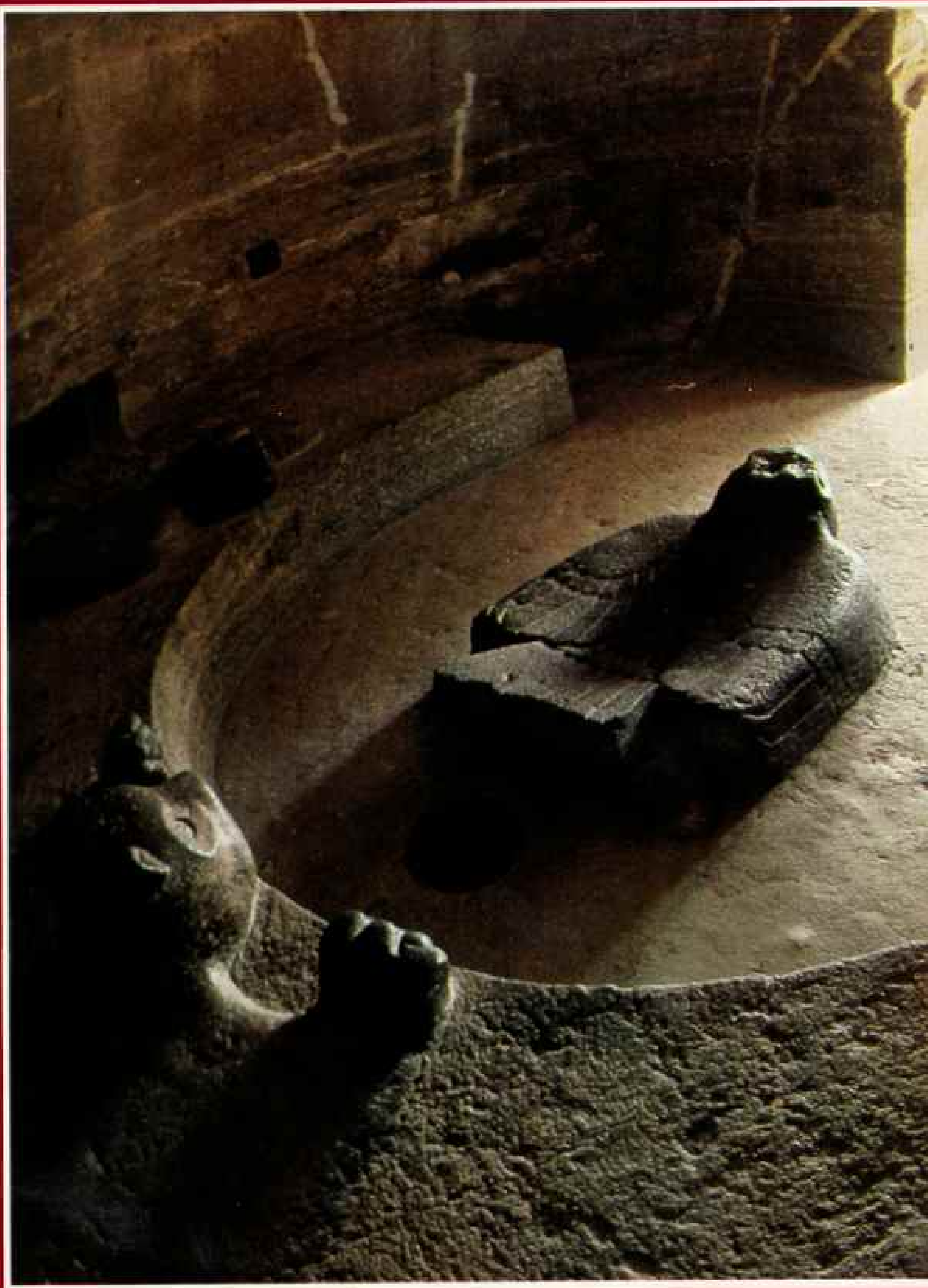


AMANDA PARSONS

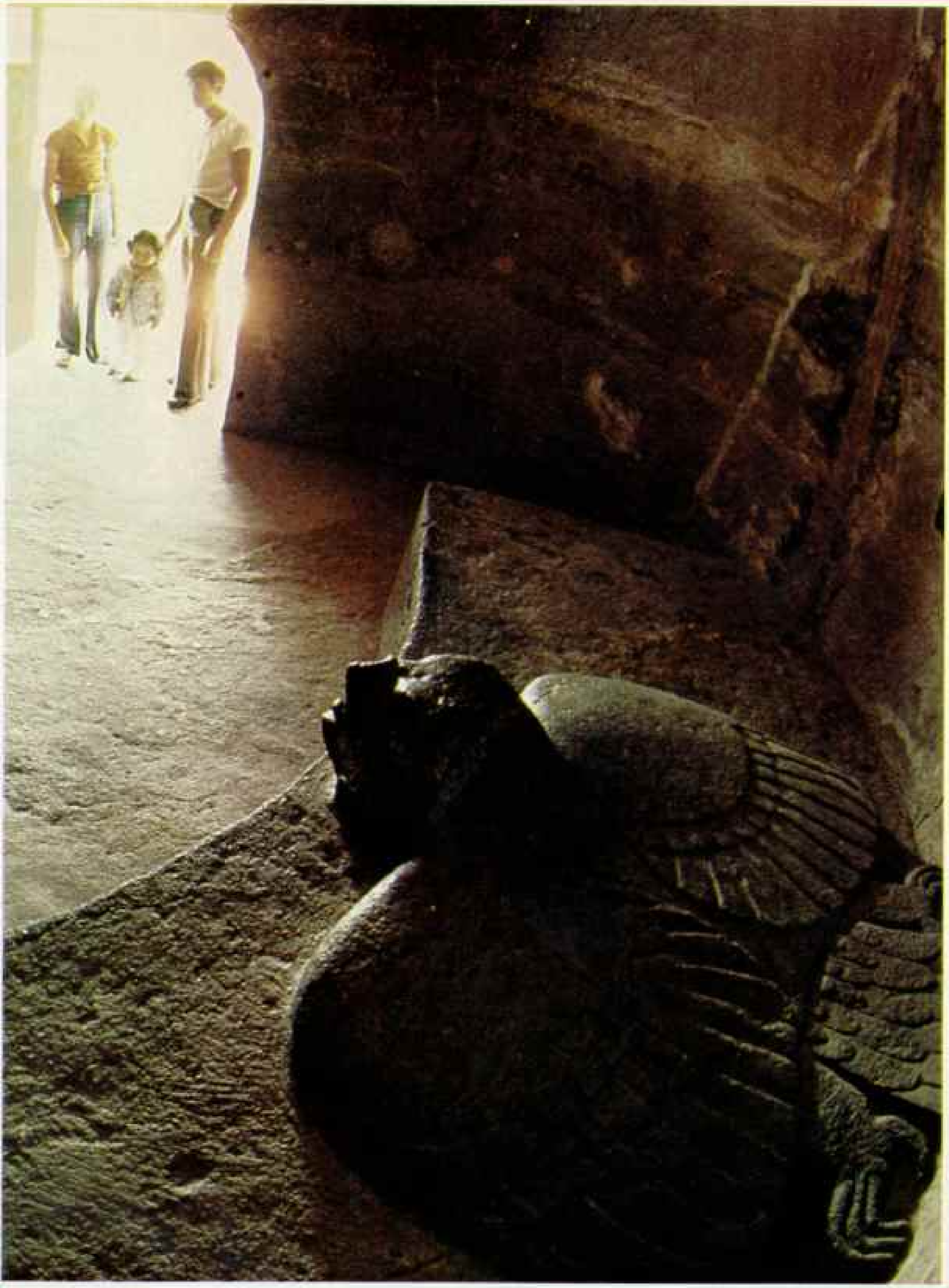
Digging for the future revealed the past—a pyramid—at a Mexico City subway station. The wind god Ehecatl, portrayed as a dancing monkey, graced the temple. His breath started the movement of the Aztec sun.

Crowns evoking quetzal birds sway atop dancers at

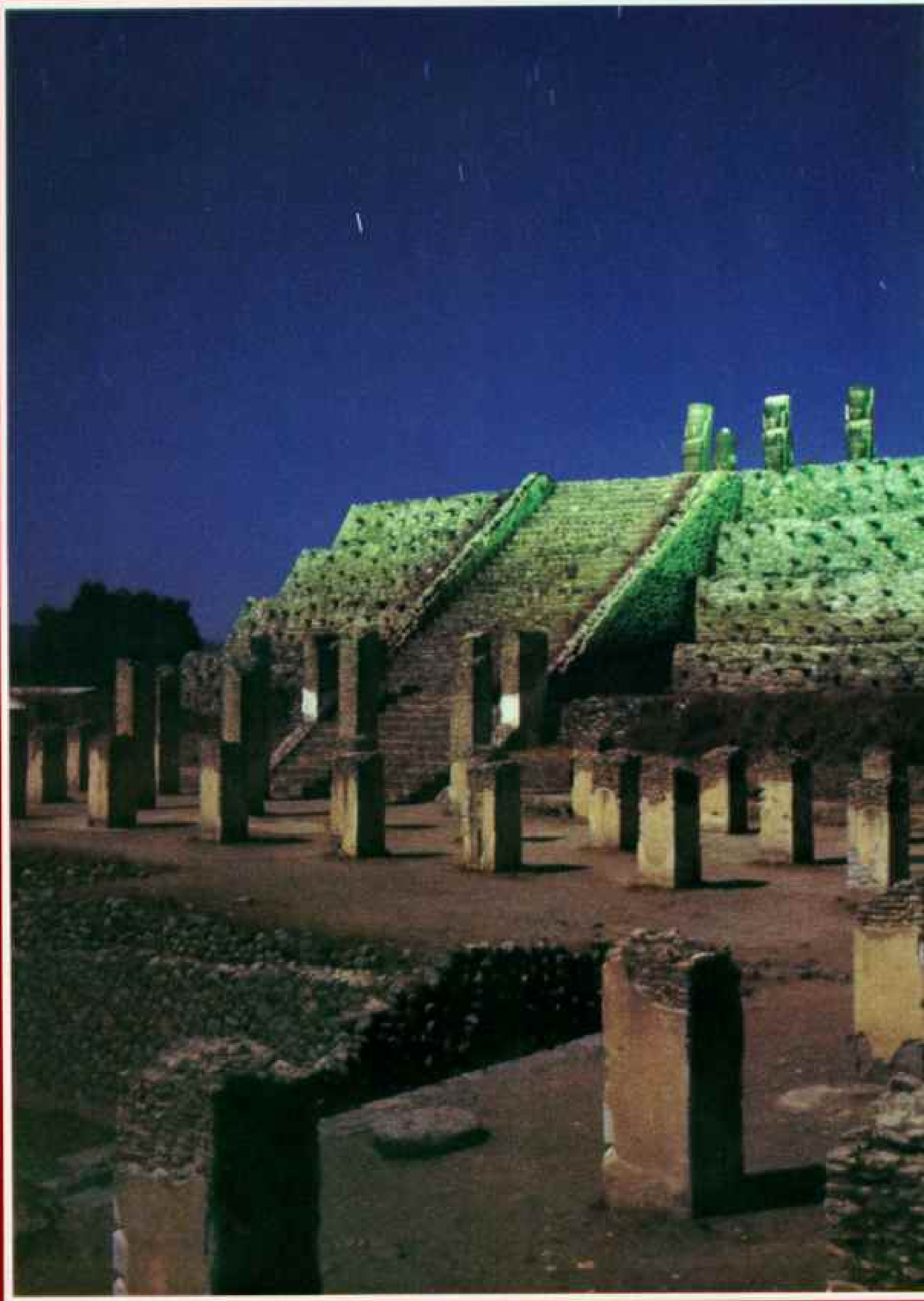
Cuetzalan, Puebla, capturing the spirit of Aztec tradition.



Chiseled from solid rock, eagles and a jaguar in this



chamber at Malinalco witnessed imperial military rites.



Aztecs emulated their predecessors, the powerful Toltecs, who built this pyramid at Tula, where stone warriors still stand beneath a star-streaked sky. Aztec legend said the Toltecs could grow giant ears of corn, and cotton in colors.

Mexican artifacts and sites in this and accompanying articles were photographed with permission of the Mexican National Institute of Anthropology and History.

The Aztecs

By
BART McDOWELL
ASSISTANT EDITOR

Photographs by
DAVID HISER

Paintings by
FELIPE DÁVALOS

I BEGAN TO LIKE the Aztecs—to feel a kind of friendship—the day the sorceress kissed my hand.

Respect was another matter: Who has not felt an awe for Aztec achievements? They mastered millions of people and a domain 200 leagues across. Yet, as we read about the endless Aztec wars, the human sacrifice, the ritual cannibalism, who has not felt a queasy revulsion?

"But they also had a gentle side," my old friend architect Héctor Hinojosa always argued. "You can't understand modern Mexicans without seeing that. The Aztec farmers were patient, hardworking people—close to the soil. Their descendants are the kindest people you can imagine."

Today 1.2 million Mexicans speak Nahuatl (NAH-wahtl), the old Aztec language. Seeking some insights into the Aztec mind, I studied this complex tongue and found it surprisingly rich in poetry. But even after I began visiting Nahuatl-speaking villages, I still considered the Aztec people cruel.

I particularly dreaded the idea of meeting Doña Rufi, the healer, for her neighbors in the Puebla mountains had told me dark things about her: She practiced witchcraft and wore a black necklace as her talisman . . . she cooked dishes of grasshoppers and worms . . . though a Christian, she prayed to the ancient gods—especially to the agricultural deity Tlaloc, who required the blood sacrifice of children. Doña Rufi had survived the "war of the witches," a rural feud of the 1930s fought near her village of San Miguel Tzinacapan with incantations, curses, and perhaps a dozen violent deaths.

"When you compare modern beliefs here with old Aztec concepts," one anthropologist told me, "the similarity is dumbfounding." I expected to meet a monster.

Knocking at her door, I puffed ostentatiously at a cigar; tobacco smoke would keep evil spirits from entering with me—not just a courtesy but "simple decency," as one Tzinacapan villager had instructed me. Doña Rufi's daughter Elena ushered me into the dark, smoky kitchen. A hole in the roof let a bolt of sunshine fall to a well-swept earthen floor. Two chickens pecked idly.

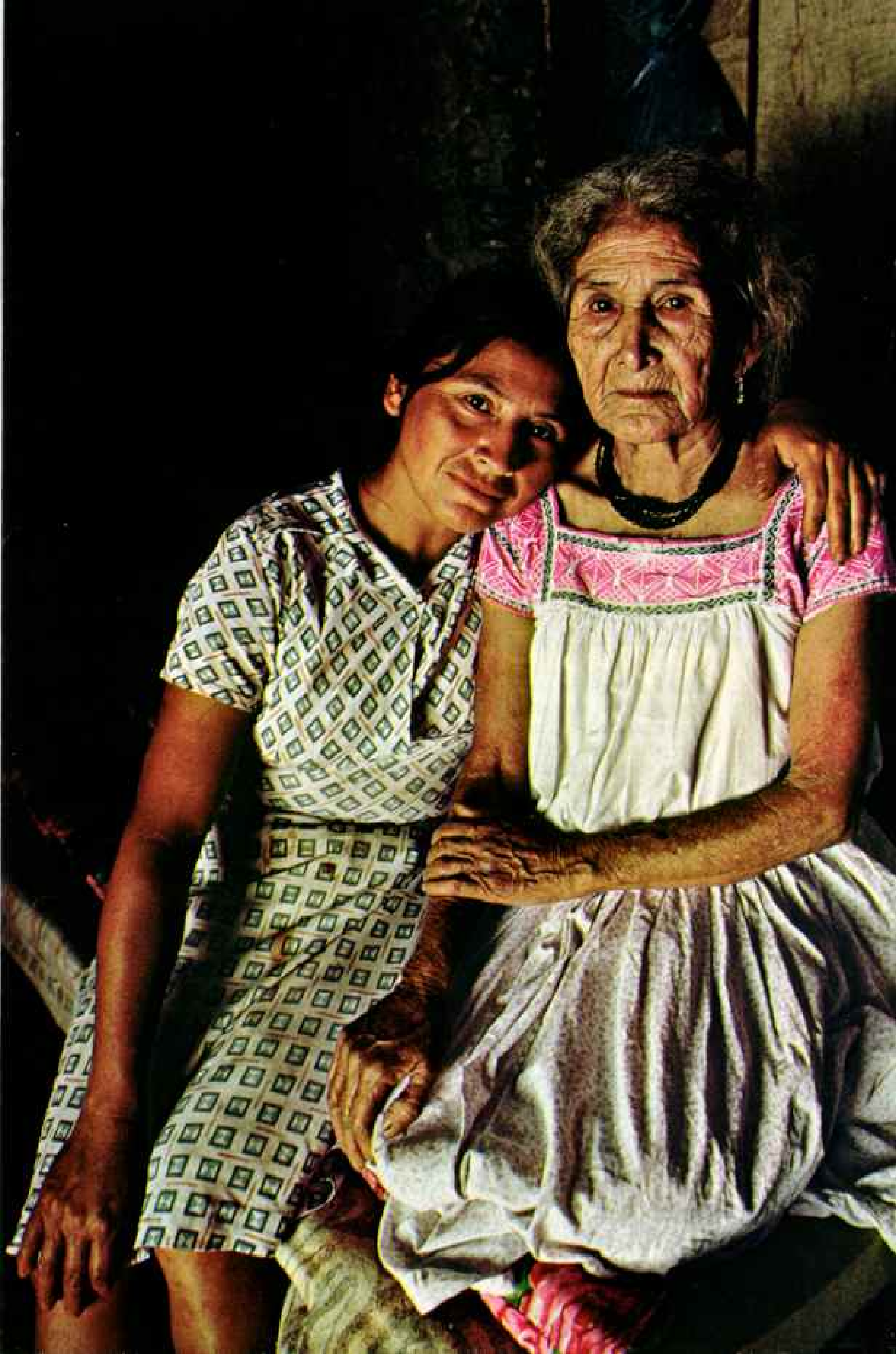
From the dark came a weak whisper greeting me: "*¡Encantada!*—Enchanted!" And I saw Doña Rufi, propped up with pillows on a cot: a fragile gentlewoman with kind eyes and hair of grandmotherly gray. When I extended my hand, she took it between her own and kissed it. "Forgive me for not rising," she said in Spanish.

Doña Rufi had been ill for a month. "Nothing seems to help," she said. "Once I healed such things, but not now." She described her chest pains, but a church bell, summoning villagers to Mass, drowned out the quavering voice. Could her illness be an enemy's curse, I wondered? Doña Rufi shrugged, tightening a woolen rebozo about her shoulders.

The old woman regretted she could not cook me a meal; she talked of "soup so savorous, and fat frijoles, and *huauhtli*," amaranth seeds used in Aztec rites and once outlawed by Spanish colonial authority. She told me about her grandmother's death—how, after the funeral, she cooked tamales, and how a stone moved spontaneously from the doorway and oranges surprisingly fell from their ceiling sack. "But grandmother's spirit only came for the savor—then left us."

Doña Rufi talked on, half audibly, about recipes, about her prayers for the dead, about her work as a midwife. "Many babies have come to my hands dead, and I have brought them to life! Some by placing them in water. Some with air—I fan them with a

Survivor *of the "war of the witches," a 1930s conflict among practitioners, Doña Rufi, at right, prays to ancient gods. Like the Aztec sorceresses, she has a gentle side to her magic: curing illnesses that enter through dreams, fanning life into newborn babies. Too sick and weak to cure herself, Doña Rufi is comforted by her daughter Elena, whose husband will not let her learn the old ways.*



A lake disappears *as a city grows. The Aztecs settled on a marshy island in Lake Texcoco about* A.D. *1325. As their power grew, so did their capital, Tenochtitlan, expanding across fill in the shallow lake. A century after the Spanish conquest of 1521, the city was still an island (***below***), linked to the mainland by causeways. Today only a vestige of the lake remains (***above***), edging a Mexico City suburb.*

1628 PLAN OF THE CITY OF MEXICO BY JUAN GOMEZ DE TRASMONTE

sombrero. I congratulate the child on his life, and say thanks to God. The father then buries the placenta in the earth. He says, 'We are planted here. Man is a plant that grows and branches and flowers on earth.'"

Doña Rufi spoke briefly of Talocan, as she called the home of her Aztec gods in her regional dialect—"but it is too much effort to speak of Talocan now." She was suddenly enfeebled, and I left her home so that she could rest.

In old Aztec tradition, the ideal sorcerer was described as "wise . . . a counselor, a person of trust. . . . keen, careful, helpful; never harms anyone." Even the Spanish missionaries wrote respectfully of Aztec priests: "None . . . were proud; none . . . unruly. . . . a pure life. . . . None then told lies. . . . very devout."

Doña Rufi stood in this kindly tradition. She prayed to a god who was nourished by the blood of children, yet she herself fanned stillborn babies into life. Good people, bad gods: I was learning about Aztecs.

So are others these days. Along with the surging self-confidence brought by oil discoveries, Mexicans generally are exploring their sense of self, their cultural and political origins. New archaeological finds in the heart of Mexico City have ignited the national imagination. Archaeologists sign autographs like television stars, and an Aztec goddess becomes a magazine cover girl.

A DITCHDIGGER named Mario Alberto Espejel Pérez has become a minor celebrity in Mexico City. For ten years Mario has worked for the Central Light and Power Company; in February two years ago, he was wielding a shovel on his night shift downtown. "My shovel hit something hard—a rock," he told me. "I cleaned off some dirt with my glove—like this—and I noticed that the rock was reddish and that it was carved in relief. I called my companion Jorge, and we cleared off more dirt. We did not know what we had found, but we reported to our crew chief and the engineers."

And why did he notify his superiors, I

asked. Mario shrugged. "When the Metro was being constructed, the newspapers told of many discoveries from the Aztec time. And of course in school my teachers spoke much of these things."

As a result, a ditchdigger's awareness led to the most exciting Aztec dig of this century: the Great Temple, ceremonial and religious focal point of the Aztec Empire.

From the summit of that temple, the Aztec ruler Moctezuma took Cortés "by the hand, and pointed out to him the different parts of the city," as chronicler Bernal Díaz del Castillo wrote. Appropriately, the head of current excavations on that site bears the regal name of that ruler, archaeologist Eduardo Matos Moctezuma. (He describes his work on pages 767-75.)

Aztec studies enjoy a rich inheritance from 16th-century observers. True, some missionaries in their zeal to stamp out idolatry also stamped out valuable records of the pre-Columbian past. But not the Franciscan friar Bernardino de Sahagún, born in 1499. He came to Mexico, mastered Nahuatl, and began teaching the sons of Aztec nobles at a Franciscan school. He also organized a major research project to compile an encyclopedia of Aztec culture—hand-embellished manuscripts called codices that detailed customs, gods, ceremonies, prayers, legends. Sahagún interviewed Aztec oldsters, and even used Indian artists to illustrate the work.

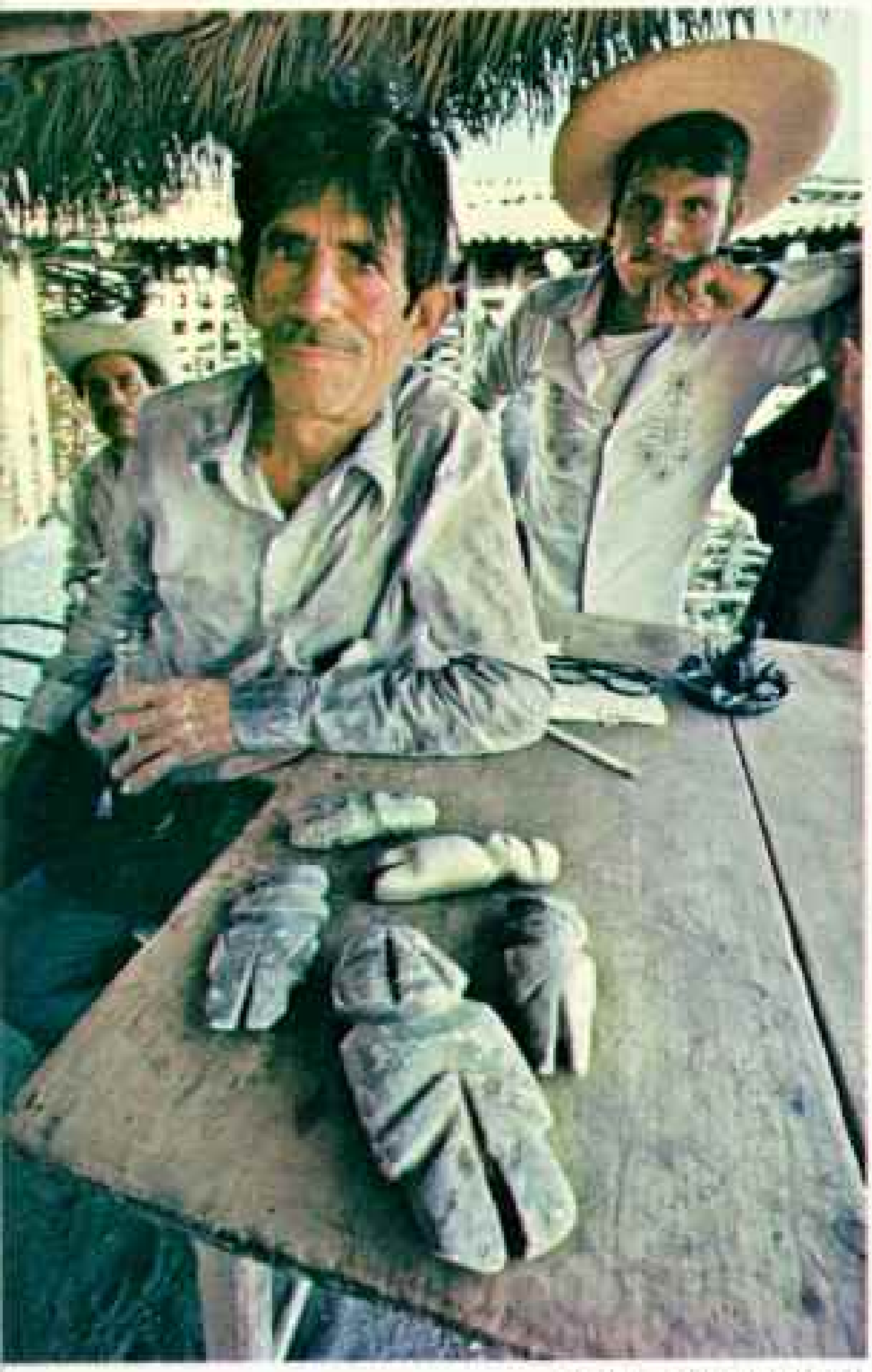
But Spain's King Philip II decreed Sahagún's work "not advisable . . . to be printed." After Sahagún died of grippe at age 91, his 12 books gathered dust for 240 years before publication. Meanwhile, indigenous Mexicans were "often libeled, grotesquely romanticized, or ignored by even their own ashamed descendants," noted editors of a Mexican scholarly journal in 1942.

Generations of scholars have now dug into manuscripts, into the treasure-filled earth, and into the minds of living Mexicans. Questioning and following those scholars, I found Aztec customs, ceremonies, and outlook very much alive. On backroads and mountain trails my companions were anthropologist Amanda Parsons, who had studied and lived among Mexican villagers for years, and veteran photographer David Hiser.

Sculpturing the past *in triplicate, a craftsman (**right**) re-creates a jaguar once used to hold the hearts of victims sacrificed to the Aztec gods. The original now stands guard at the Mexica Hall in the National Museum of Anthropology in Mexico City. These figures will greet travelers in a new bus station.*

*A serpent's head, probably torn from the sacred precinct of Tenochtitlan, bears the weight of the 18th-century mansion that houses the Museum of Mexico City (**below**). Nearby the Spanish conqueror Hernán Cortés first met Moctezuma II.*


CALLE
PINO SUAREZ
AV. REPUBLICA DE EL SALVADOR



VICTOR R. BOSWELL, JR. (RIGHT)

Prized figurines *found by Marcelino Sosa* ***(above)*** *near his Mezcala home would sell for thousands of dollars if exported illegally. Marcelino is keeping his—for the heritage of his town. "The best carvings were sent to Tenochtitlan," he says.*

Monumental sculpture of Coatlicue ***(facing page)*** *is admired by Felipe Solís, a curator at the Museum of Anthropology, and by anthropologist Amanda Parsons. The goddess, serpent-skirted mother of the war god, bears a double rattlesnake visage and wears a necklace of hands and hearts with a skull pendant. To entice men to their deaths, she could transform herself into a ravishing beauty.*

WE SENSED the origin of Aztecs and their gods on the mountain road from the western state of Jalisco into the neighboring state of Nayarit. The dialects spoken by Cora and Huichol Indians here are closely related to the Nahuatl spoken by Aztecs. Westward, near the Pacific coast, the low and swampy terrain seems to match Aztec folklore describing their original home, the "place of the herons," or Aztlan, source of the word Aztec, "people of heron place."

Driving west from Mexico City and Guadalajara, we followed serpentine roads subject to landslides during tremors and earthquakes. We crossed one massive spill of black lava, a legacy of the volcano Ceboruco. Near the Pacific coast we passed a village once leveled by a tornado.

Nature here has its sudden dangers. No wonder, then, that early Aztecs regarded their god of darkness as a willful tyrant. An old Aztec poem describes him with existential resignation:

He mocks us.
As he wishes, so he wills.
He places us in the palm of his hand,
He rolls us about;
Like pebbles we roll, we spin. . . .
We make him laugh,
He mocks us.

According to Aztec lore, the universe had been destroyed four times; to create the sun and moon for this fifth epoch, two gods committed suicide, hurling themselves into a fire. Now, to keep the sun moving and the whole cosmos working, all the gods needed a diet of human hearts and blood—thus explaining the Aztec necessity for wars, prisoners, and human sacrifice. Every detail of Aztec life centered on their religion. Church and state were one.

No one can be sure of the precise Aztlan location, though Professor Wigberto Jiménez Moreno suggests it is a spot some 450 miles northwest of Mexico City, an island-village on Nayarit's San Pedro River delta now inhabited by fisherfolk. Mexcaltitán has been called the Venice of Mexico, since in rainy season its streets flood so deep that residents move about by canoe.*

*W. E. Garrett described "Mexico's Little Venice" in the June 1968 NATIONAL GEOGRAPHIC.

In dry season I found no resemblance. A forlorn cantina named El Taconazo (The Stomping Heel) offered cold beer and a plaza-side vantage. There a waitress hopelessly swept a floor misused by piglets. The town boasts a street still named for the pre-revolution President Porfirio Diaz, but no archaeological mementos of old Aztlan.

Yet the mangrove swamps southward toward San Blas at least offer some timeless atmospherics. Consider flawless clean sunlight and sky of cobalt blue. A canoe powered by an outboard motor takes sightseers through dark tunnels of swamp vegetation. We duck low branches with perching birds, bright epiphytic orchids, ferns, and—sometimes—lazy green snakes. A white-breasted hawk wheels overhead, tempted, perhaps, by downy ducklings afloat with their mother.

Everywhere long-legged wading birds watch us, eyes round and cautious but without fear. Dark ones with yellow beaks, white ones—Mexico has at least 15 such Ardeidae, many of them at the moment within touching distance of our canoe. It was, indeed, a place of herons.

Nature could be as beautiful as it was harsh, so that pre-Columbian Aztec poetry shimmers with lovely metaphors of nature:

The gold and black butterfly
Is sipping the nectar.
The flower bursts into bloom:
Ah, my friends, it is my heart.
I send down a shower of white
frangipani flowers.

A Japanesque sense of aesthetics never left the Aztecs. "Imagine those Aztec warriors," says Dr. Ignacio Bernal, dean of pre-Columbian Mexican archaeologists. "So fierce, so brave. But as they walked their streets, they carried bouquets of flowers!"

Their stern hummingbird god, Huitzilopochtli (weets-ee-loh-POCHE-tlee), ordered them out of their Eden. He was the special tribal deity of Aztecs, "a warlord, an instigator of war." He merged with the sun god and other divinities as time went by.

ON THEIR EPIC, centuries-long journey in search of a home, Aztec priests carried the idol of Huitzilopochtli on their backs the way

*"**The good weaver** teaches others." The words of Guadalupe Vdsquez of Cuetzalan (**left**) echo a painting in the Mendoza Codex, ordered by the first viceroy of New Spain to depict Aztec life. A woman (**below**) instructs a 14-year-old girl in the art of weaving the colorful fabrics at which the Spanish marveled.*

BODLEIAN LIBRARY, OXFORD UNIVERSITY

mothers carried their babies. Through his priests the hummingbird god gave orders to his impoverished people in the dry lands north of the Valley of Mexico. The hummingbird god even gave them a new identity: "Your names will no longer be Azteca. You are Mexica [meh-SHEE-kah]." The name would mystify scholars and eventually identify a great modern nation.

"If you dry the flesh of a hummingbird until it is powder," a man in Santiago Ixcuintla told me, "and put it into the drink of a woman, she will see only you. I've had six wives, all caught with hummingbird meat."

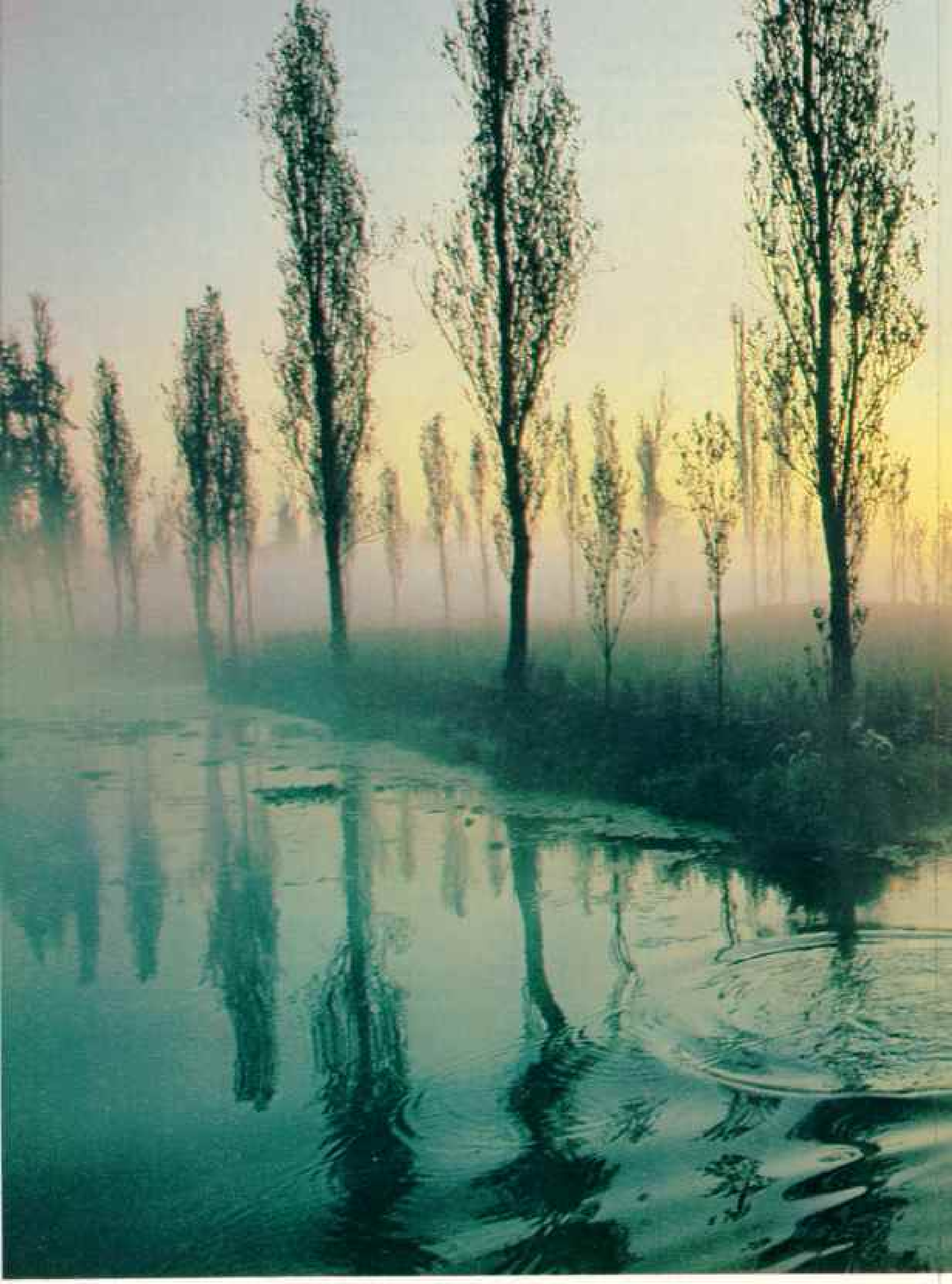
Under godly orders, the tribe moved on to the area of Tula, once capital of the great Toltec Empire. Before long their god ordered them off again, toward the Valley of Mexico. There the ambitious newcomers picked up what they could of Toltec civilization from Toltec descendants in the valley, adding gods to their pantheon, increasing their knowledge of the calendar, learning new crafts. Their word for artisan remained *toltecatl*. The Aztec parvenus even began to boast of their descent from Toltec royalty.

Dr. Bernal refers to the 13th-century invasion by northern tribes as "an avalanche thundering down from the steppes." * But the Aztecs came as refugees rather than as conquerors. Professor Miguel León-Portilla remarks that the "only heritage they brought with them, besides the Nahuatl tongue, was an indomitable will."

No wonder that settled Indians disdainfully assigned the Mexica to a rocky "dwelling place of many snakes," as their own historians wrote. But the hungry newcomers "were overjoyed when they saw the snakes. They . . . roasted them over the fire, and ate them. . . ."

After sacrificing and skinning the daughter of a Culhua ruler in the valley, the devout Aztecs were driven into the swamps of Lake Texcoco (tesh-KOH-koh), where their hummingbird god then ordered them to look

*Numerous Aztec scholars assisted in the preparation of this and the two accompanying articles, as well as the enclosed supplement map, **Visitor's Guide to the Aztec World.** Among those not mentioned elsewhere, NATIONAL GEOGRAPHIC especially wishes to thank Henry B. Nicholson of the University of California, Los Angeles; David Carrasco of the University of Colorado; and officials and staff of the Texcoco, Mexico, Historical Society.—The Editor



Hazy dawn of another time *haunts the "floating gardens" of Xochimilco outside Mexico City. Made of mud and aquatic vegetation, layered onto woven frames and*

anchored by stakes and trees, these agricultural islands, called chinampas, once fed Tenochtitlan. The fertility of the plots freed manpower to conquer an empire.

among the reeds and rushes: "Go, go and look at the cactus, and on it . . . you shall see an eagle." It would be eating a snake and warming itself in the sun.

In the marshes of the lake they found their eagle and snake (modern Mexico's national emblem). Here they founded their capital and named it Tenochtitlan (teh-noche-TEE-tlahn), or "place of the prickly-pear cactus." They boasted, "We shall confront all who surround us and . . . vanquish them all. . . ."

The year was A.D. 1325, according to Aztec chroniclers. During the next 194 years the Aztecs made good their boast. Wars brought them new lands—from the Gulf to the Pacific and south to Guatemala (the name of that land comes from the Nahuatl). From their new subjects the conquerors exacted tributes of food, firewood, precious metals, cloth, rare feathers, and cacao beans to be used as money. On bark paper they kept records with their glyphs, a kind of cartoon way to jog the memory. Their three-city alliance—Tenochtitlan, Texcoco, and Tlacopan (now called Tacuba)—created a prosperous urban society without parallel in Mesoamerica.

War also gave the Aztecs prisoners for religious sacrifice. Other Mesoamericans

had practiced human sacrifice before them, but the urban Aztecs of Tenochtitlan brought the custom to its most elaborate excesses. Dedicating their Great Temple in 1487, they sacrificed between 10,600 and 80,400 people, depending on different sources; at least we know that the ritual killings continued without pause, four at a time, from sunup to sundown for four days. The whole city stank.

Grisly business. But also surrealistically humane. One scholar has said that the Aztecs were "amateurs at human sacrifice since they had no concept of torture." At the foot of the temple, priests even prayed for the

AMANDA PARSONS (BOTTOM)

Giant abstract snail *spreads across land-locked Lake Texcoco* ***(left)****. These dikes separate waters for production of salt, other minerals, and aquatic foods. Moctezuma I and Nezahualcoyotl, king of Texcoco—a city-state allied to Tenochtitlan—built a nine-mile-long dam to separate saltwater from fresh. Aztec aquaculture harvested spirolina* ***(top)****, high-protein algae carried as rations by warriors. Today Mexico exports 700 tons a year to Japan as a condiment. Aztec gourmands relished water-fly eggs* ***(center)****, still eaten in caviar-tasting patties. Duck soup* ***(bottom)*** *remains a local favorite.*

Luxuries flowed *to the great market at Tlatelolco, center of commerce for the empire. Cortés reported a crowd of 60,000 bartering for goods: turkeys, armadillos, rabbits, cotton bolls, gourds, bolts of the finest cloth, quills filled with gold dust, straw mats,*

corn, pottery, and feathers for lavish adornment. When disputes arose, they were settled by a judge, who sat under a special awning, right rear, and gave on-the-spot verdicts. Dress identifies region or occupation—a high-ranking warrior appears resplendent in feathers and cape.

victim: "May he savor the fragrance, the sweetness of death by the obsidian blade."

As wielded by the priests, that blade was mercifully swift. Sometimes the victim was even sedated.

Afterward, noted chronicler Sahagún, the priests "cooked each one a bowl of a stew of dried maize, called *tlacatlaolli*, which they set before each, and in each was a piece of the flesh of the captive." The feast was itself a sacrament, a means of participating in the divine grace of the victim.

"A drink to bring gladness to man," *Aztec myth describes pulque, liquor made from the milky juice of the maguey cactus. Here a gatherer fills barrels bound for fermenting vats. Only Aztecs of advanced age were allowed to overindulge, since drunkenness was considered the root of every evil.*

Scholars remain fascinated and puzzled by Aztec cannibalism. One author insists that all cannibal stories were propaganda; another says that the practice was a dietary necessity to provide protein. But the mainstream of scholarship rejects both notions: Aztecs ate human flesh strictly as a religious rite. Their regard for the human body was entirely respectful.

The Aztec metaphor for blood can be translated "flower." Dead warriors, having spilled their flowery blood to feed the gods, were called eagle men and ascended into the heavenly company of the sun. Victors, vanquished, captives, and captors all served as ethereal acolytes. Formal "flowery wars" were organized among related Nahuatl-speaking peoples—those most acceptable to the gods—solely to provide victims for sacrifice. Oftentimes captives welcomed their fate. The captor addressed his prisoner as "beloved son," who in turn called the victor "my beloved father."

Women in childbirth held the same high status as soldiers; if a woman died in labor ("a captive in her womb"), she was immediately deified and joined her sister women-warriors carrying the sun from midday to sundown. Thus a fiercely sacrificial spirit brought glory to the growing Aztec capital of Tenochtitlan.

ONLY IN IMAGINATION can we see the watery splendor of the old city that Aztec priests described in chants for returning rulers:

"Welcome to the court-city, Mexico-Tenochtitlan, in the eddyless water where the eagle cried and the serpent hissed, where fish leap. . . ."

Today the fastest growing metropolis on earth stands upon the site of the old capital. Mexico City, with its 13 million people, covers much of onetime Lake Texcoco, its islands, and some of the mainland beyond.

Seeking the people instead of buildings, I looked in the lively heart of Mexico City, especially in the animated neighborhood of the Merced Market. The docks for cargo canoes once stood on this site, so even the scents of food, baskets, leather, and herbal medicines are themselves historical aromas.

People here are strongly Indian in appearance and as varied in physical type as Aztec

vassals. The braided hairstyles of the women and the homespun vests of the men (*xicolli*, in Nahuatl) come straight from pre-Columbian times.

An acrid smell and swinging doors proclaim a neighborhood *pulquería*, a small bar serving the beerlike drink that Aztecs made from the sap of maguey cactus, or agave. Classical Nahuatl orations characterized pulque as "a whirlwind, a cyclone that covers everything with evil." Since pulque was the only alcoholic drink of the Aztecs, this mild form of firewater apparently created a problem for the straitlaced rulers. Paradoxically, Aztec priests cataloged 400 gods of pulque; "divine pulque" was part of many religious rites. And old people who had survived disease, war, and catastrophe could drink as much as they liked.

If no longer thought divine, pulque is still highly regarded by working-class heirs of the Aztecs. And lately the government's Maguey Foundation has promoted the export of pulque along with a more fashionable domestic image. "We call our maguey cactus the 'tree of marvels,' " says a pulque promotion man, Marco A. González Pineda. He cites statistics: "One million liters a day consumed in the 1,109 pulquerías of Mexico City! Each has its altar to the Virgin or to a patron saint. The men respectfully remove their hats."

I removed my hat in a number of those establishments. One, named the Glories of Cuauhtemoc, had a bar moated by a canal for spitting and a spigot for flushing. Another, called the Illusions, had humbler plumbing but more customers, whom I divided into two large groups: the hospitable and sober ones who tried to buy me a drink, and the drunks who asked me to buy them one. One man urged me "to sit here with us poor ones. We are pure Indian," he said. "Our hearts are open."

"Pulque makes you strong," another man insisted, making a big biceps. I sampled the product, of course, and could appreciate the reason that the Aztecs prescribed a four-cup-a-day limit.

Old Tenochtitlan had perhaps a quarter of a million people, and such "excellence and grandeur . . . that in Spain there is nothing to compare." So said Cortés.

I sense the grandeur best, perhaps, in my favorite of all the world's museums, the National Museum of Anthropology. Its Mexica Hall displays the monumental quality of Aztec art, terrifying statues of gods, racks of leering human skulls, menacing serpents coiled to strike, the intricate relief of the so-called calendar stone with its abstract view of time and the cosmos (pages 757-9). For sheer power, Aztecs must rank among the most gifted sculptors in history. They carved basalt and other igneous rock with stone knives, applying the perspective of theologians and the patience of geologists.

Would Aztec smiths have eventually fashioned tools and weapons of bronze? And would architects have perfected the arch? They already had a wheel, but used it only for children's toys. Left to develop without a Spanish conquest, what would these people have accomplished?

Perhaps nothing. Their city's need for firewood was already denuding the Valley of Mexico of trees. An epic famine about the year 1-Rabbit (1454) decimated the Mexica people. Their empire might well have fallen before they could have employed the arch, the wheel, or bronze.

WHATEVER their level of technical skills, their use of language shows the Aztecs as a highly civilized people. I took lessons in classical Nahuatl from a great translator of the old codices, Thelma Sullivan of the University of Mexico. (She is the source of most of the Nahuatl translations in these articles.)

Nahuatl at first can be as fearsome as Aztec gods; consider the agglutinative word *notlazohtiachcauhtzitzihuane*, which means "O my beloved elder brothers." Once words are broken apart, Nahuatl is logical, clean, and brilliantly prismatic. Its repetitions work like incantations. Sometimes Nahuatl is even merciful: It has no verb for "to be," no articles, and only animate beings can have a plural form.

But Nahuatl also offers insights and surprises. In that seemingly macho society of warriors, the word for wife was "one who is owner of a man." Children, in turn, were always called "beloved children." To say they resided in a place, Aztecs used a verb akin to "walk," a reminder that they employed neither the wheel nor a beast of burden.

Nahuatl has given the world words such as chocolate, tomato, tamale, and chili. Nahuatl poetry is even more delicious. In fact, for my valedictory, Thelma Sullivan gave me this simple poem to translate:

Like gold that I cast,
Like jade that I pierce,
Like beads that I string,
That is my song.

This poem is attributed to Nezahualcoyotl (ness-ah-wall-COH-yohtl), who was the philosopher-king of the city-state of Texcoco. And to learn more about him—and about Aztec edibles—we spent some days in modern Texcoco as guests of the local Society of Historic Studies. Our hosts were professional people—schoolmasters, a local artist, a retired general, an architect—who meet with proper formality over coffee and cookies once a month. For us, they had about 300 suggestions—for that was the number of dishes prepared each day for the royal choice of Moctezuma. We edited the menu quickly. Grasshoppers and snake were out of season. Dog meat was too expensive, for kennel clubs and breeders have brought purebred Chihuahua-like *itzcuintli* dogs to about $200 a pound.

Professor Alejandro Contla found us some water-fly eggs, or *ahuautli*, cooked into cakes and with a taste like corn bread and caviar (page 727).

But the professor also introduced us to a family living near Lake Texcoco, now shrunk to a large stagnant puddle.

"Our home is simple," Señora López apologized, "but perhaps you would eat with us." The pleasure was ours.

We sat in the sunlight of the López patio-barnyard with friendly relatives, suspicious dogs, burros, and a strutting turkey gobbler. Señora López was preparing fruit from a kind of prickly pear. "It will have no thorns," she reassured us, "after I boil it with onion, cilantro [coriander], and garlic."

The seasoning was perhaps Spanish; otherwise this recipe was pre-Columbian. Aztec chefs boiled or roasted most foods, since their few domesticated animals—turkeys, dogs—supplied little fat.

A horseman rode up over the cobbles. ("A loud noise . . . stones raining on the earth," as old Aztecs described their first hoofbeats.)

Sahagún records first Aztec history

PICTURE ENCYCLOPEDIA of Aztec culture, compiled by Friar Bernardino de Sahagún, is the most complete chronicle of preconquest life. Working with converts at Tlatelolco, he questioned elders and interpreted native books to document Aztec religion, literature, arts, medical practices, jobs, skills, botany, zoology, and mineralogy. The 12-book "General History of the Things of New Spain" even gives the Aztec account of the Spanish conquest.

What began as a compendium to arm Roman Catholics with knowledge for converting Indians became a labor of respect. His work aroused the hostility of some in his Franciscan order who accused him of preserving paganism, and so was not published until more than two centuries after his death. Although he believed the Aztec period was the reign of Satan, he saw in the Indians "more signs of virtue and Christianity than are found in many in our own nation."

Dates in the Aztec chronology below are estimated from historical sources.

12th century A.D. *Aztecs leave mythical Aztlan and start their wanderings.*

1325 *Founding of the capital of Tenochtitlan in Lake Texcoco.*

1428 *Aztecs and allies seize control of the valley—birth of the empire.*

1434 *Establishment of three-city Aztec alliance.*

1440 *Moctezuma I begins 28-year reign in Tenochtitlan.*

1487 *Major dedication of the Great Temple of Tenochtitlan.*

1519 *Cortés lands at Vera Cruz April 21, enters Tenochtitlan November 8.*

1520 *Moctezuma II dies. War and plague. Cuauhtemoc installed as ruler.*

1521 *Siege of Tenochtitlan, defeat of Cuauhtemoc by Spanish.*

Son José opened the gate, pressed money on the man, and brought into the patio a bulky supply of fresh-killed ducks.

In a blizzard of feathers, Señora López began to pluck the birds. "The flavor is better when you do not scald," she explained. "They are still warm from life."

While Señora López cooked, Amanda Parsons and I visited some salt makers near a village called Ixtapan, a word meaning "place of the salt." The old Aztec capital once used 300 sacks of salt a day from this area. Ignacio Casareal and his brother Manuel still prepare salt here in the old way.

"We are the last," said Ignacio. "We dig this earth from old lake bottom. Taste it." It was like brine. "Then we mix it with water in these earthen pots." Filtering, settling, and evaporating finally produced sand-colored salt crystals.

"Very healthy, with natural minerals," said Ignacio, and to wash the salty taste from my mouth, he offered a cup of pulque. "Yes, Ignacio and I are the only salt makers left on the lake," said Manuel. "The process is very laborious. We have other jobs and work here only two days a week."

We took some salt back to Señora López and found our dinner ready: duck soup. The flavor was unusual and delicious, but the appearance was unsettling; duck cadavers were boiled whole so that beaks lolled open, webbed feet sagged limply, and eyes stared up at us mournfully from the broth. A side

Niños de Dios, *images of the Christ child, receive the blessing of a priest at a church in Xochimilco. The Day of Candles, February 2, when suppliants also bring seeds to be blessed, replaced the planting and renewal celebrations of the Aztecs. A visiting priest once objected to blessing the figures, believing that the people treated them too much "like idols of ancient religions."*

dish of duck intestines, highly regarded as a delicacy in this region, had been deep fried in post-Aztec oil. Tortillas and chili sauce, antique staples, completed the tasty meal.

Later that evening I tried chocolate, Aztec style: made with water (Aztecs had no cows) and sweetened with natural honey. This was a drink reserved for royalty and indeed fit for a king.

WELL BEFORE the Spaniards came, the Aztecs had organized a formal class system. The rulers were always members of the *pipiltin,* the class of nobles, who could own land in their own name. Their children attended special schools to learn the reading and writing of glyphs, as well as religion and Toltecan cultural arts. Ordinary citizens, the *macehualtin,* got a trade-school course in farming (for communal lands) and warfare; a few, though, became artisans and merchants. Below the ordinary citizens were the serflike *mayeques* and the slaves. Below the noble ranks, Aztecs exercised some class mobility: An outstanding soldier could attain special rank, a lowborn woman might marry a noble, or a luckless merchant could sell himself or his child into slavery, either temporarily or permanently.

Except when they were off fighting wars, the lordly pipiltin managed to live in true grandeur. In old Texcoco the genius king Nezahualcoyotl built a palace with 300 rooms, including chambers for storing the vast amount of treasure collected in tribute. In his council hall he presided on a throne of turquoise-encrusted gold. Around his royal patio, philosophers and historians taught in a university atmosphere.

An idealized recent statue of Nezahualcoyotl stands by the highway into Texcoco. But its inscription reveals little of his long life as ruler, jurist, diviner of the future, master builder, or family man: his 40 wives gave him 60 sons and 57 daughters.

Wars and progress have long erased Nezahualcoyotl's great palace. But his pleasure gardens on the nearby hill of Texcotzingo offer curious traces from the past. The hill once stood within view of the lake, and though the water has retreated, the view remains imperial. Here in the 1430s Nezahualcoyotl collected a zoo of strange animals—perhaps the first in the New World—and a garden of unusual plants. He built canals for both irrigation and bathing and carved elaborate stairways in rock.

Sitting in Nezahualcoyotl's stone throne on the hilltop, I admired his royal vantage.

ARTIFACTS PHOTOGRAPHED
BY VICTOR R. BOSWELL, JR.

Fit for the

***TURQUOISE** was fashioned into exquisite objects by skilled craftsmen. These masterpieces may have formed part of the treasure sent by Moctezuma II to appease Cortés's lust for wealth. They were taken to Europe as booty after the conquest.*

The dual-headed serpent was

BRITISH MUSEUM, LONDON
(ABOVE AND TOP)

gods

probably a pectoral. Mosaic mask may depict Chalchiuhtlicue – Jade-skirted Lady. The goddess of water wears snake-plaited hair and a nose pendant denoting high rank. Sacrificial knife portrays a ritual performer with a bird helmet.

MUSEO NAZIONALE PREISTORICO ED ETNOGRAFICO LUIGI PIGORINI, ROME

The king must have watched the traffic of the fishing boats below him, though now the lake has given way to farms, as he listened to the sounds of crowing roosters and birdsong. Perhaps in this very stone seat the king wrote these lines:

I love the song of the centzontle,
Bird of four hundred voices.
I love the countryside.
But I love most my brother man.

Iconoclasts now question whether the king himself wrote all the poems ascribed to him. They quibble. Could there be in any culture a more civilized and courtly ornament than the ghostwriter or royal editor?

Almost certainly from this hilltop, Nezahualcoyotl pondered the hydrodynamics of Lake Texcoco, for he designed a great flood-control project: a massive dam, built of stone, stretching nine miles across the lake to hold back floodwaters.

Other Aztec water systems survive today at Xochimilco (show-chee-MEEL-koh), which in Nahuatl means "place of the fields of flowers." Tourists know the gaudily garnished boats of Xochimilco's so-called floating gardens. But off the tourist waterways, farmers at some of the quieter plots produce foodstuffs and spices in the labor-intensive style of the Aztecs.

A resident expert is one Pedro Flores, age 59 and gray bearded; his very name means flowers. Aboard his new $300 boat, a flat-bottomed craft about four feet wide and gracefully curved, I toured the maze of canals, where water farmers tend the plots called *chinampas*. Once Xochimilco boasted 15,000 productive chinampas; today only 900 are cultivated.

"Now Xochimilco is sad," Don Pedro sighed. His thick arms missed not a stroke with the pole, propelling us past willowy ahuehuete trees and cultivated plots on the bank. "Pollution! My Uncle Mateo once earned his living as a fisherman here. Now—no fish. And I get skin infections from bad water." We passed other chinampa gardeners standing thigh deep in water, scooping mud onto their gardens.

FOR MEXICAN FARMERS the key to survival has always been water, and thus water was and is a thing of religious reverence. Take, for example, the hill town of Huejutla, in the state of Hidalgo. There I watched Holy Week ceremonies as colorful as any in Christendom. Thousands of Nahuatl-speaking Indian women wearing brilliantly embroidered blouses brought new pottery jugs filled with water and flowers on Easter Day. In front of the 16th-century stone cathedral they formed a long corridor of color. In miter and robes, the bishop himself proceeded with all assisting clergy, blessing the jugs of water. "Of course, this ceremony is related to the Aztec love of water," Father Gaspar Bautista explained to me. "Our early Catholic missionaries regarded this custom as a catechism for baptism."

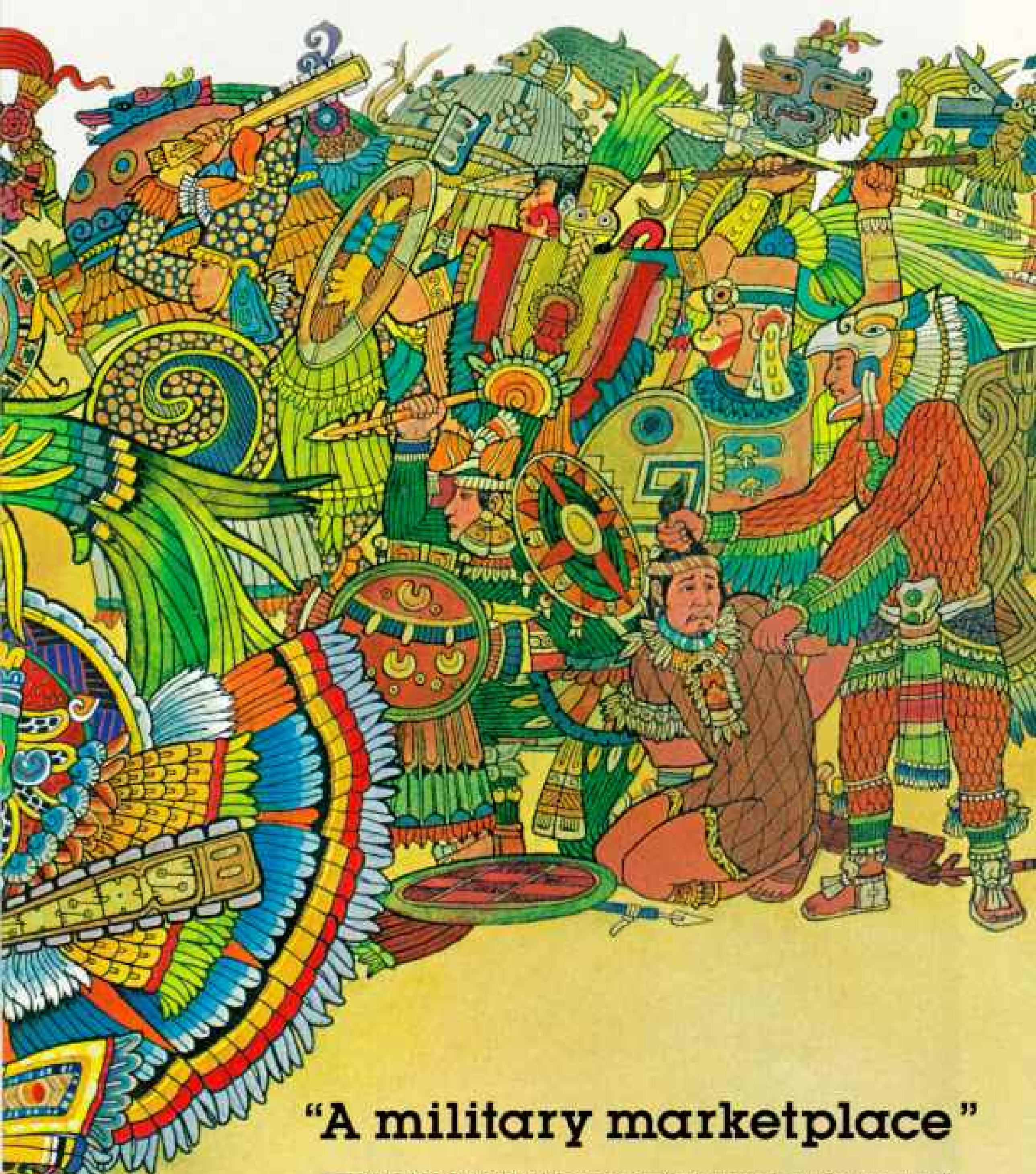
Scholars like Britain's Neville Stiles find the Huejutla area a cultural museum. New ceramic pots for the blessing of water? The Aztec New Fire Ceremony required the smashing of old pots and the replacing of them with new. Ceramic designs are heavy with symbols from Aztec mythology.

We asked the white-bearded sacristan at the cathedral, Don Margarito Sarmientos, whether these special vessels were deliberately broken. His cataract-dimmed eyes widened: "Pots have their time. Some are broken as a luxury. Like an old man. Like *me!* One day I'll break—like a luxury."

I asked an old woman what she would do with her holy water. "Keep it," she said, "to protect us against storms, to prevent family quarrels and curses, to heal the sick and honor the dead. . . ."

A local artist and teacher, Ildefonso Maya Hernández explained the designs for the blouses of village women in Huejutla—children with tiny *(Continued on page 745)*

Skin of a sacrificial victim *shrouds Xipe Totec, the god of spring. The human pelt dangles from his wrists, masks his head, and is knotted at the nape like a bun. The Aztecs greeted spring by sacrificing impersonators of this god; their skins were donned by penitents. The rite recalled the husk of corn about to ripen, the earth about to renew itself with vegetation.* MUSEUM FÜR VÖLKERKUNDE, BASEL, SWITZERLAND



"A military marketplace"

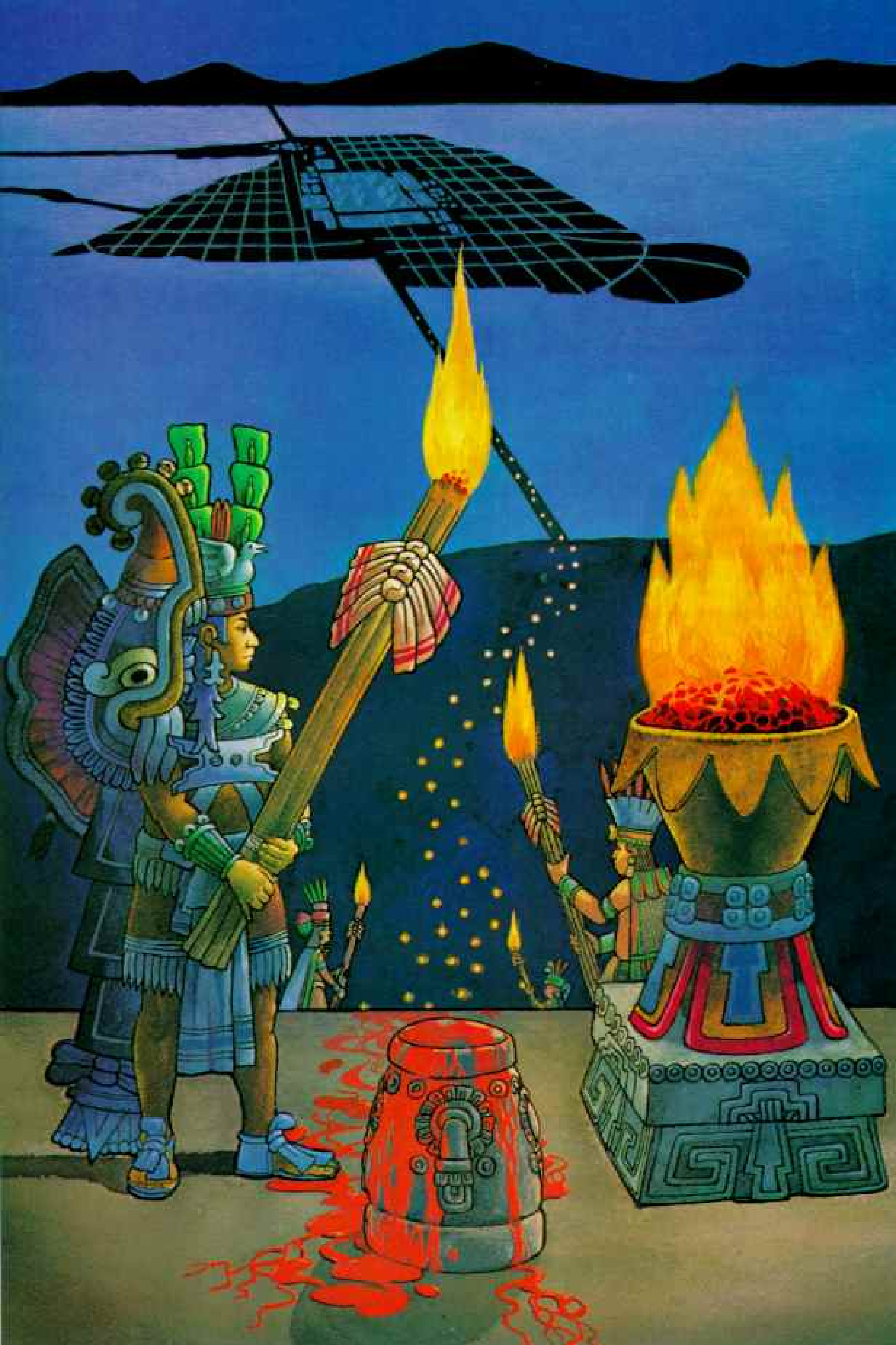
THUS MOCTEZUMA I called the Xochiyaoyotl, or "flowery wars." Combatants dressed in finery earned from past glories—many-colored shields, feather headdresses, ear and nose plugs, intricately woven and embroidered regalia—fought ritual battles with stone-edged clubs. Wagering their lives, warriors either won honor by taking captives or, if captured, gave their hearts to the famished gods. These prearranged skirmishes between Tenochtitlan and selected adversaries created perpetual war and supplied sacrifices that the Aztecs said were not "hard, tasteless savages," but those who came "like warm breads, soft, tasty, straight from the fire" to please heavenly palates. All flowery war victims entered the paradise of the sun.

Symbol of sacred war *and a sign for water spew from the mouth of a knife-tongued coyote (**right**). Ornamented with gold, the lavishly feathered shield formed part of the treasure that fueled the Spanish conquest.*

*Water and ritual battles remain intertwined in the state of Guerrero, where annual jaguar fights "for rain, nothing more" are held in the towns of Acatlán and Zitlala. Today's ceremonies combine religions. "We are Catholics and we are not Catholics," said one participant. "It is all the same." Each May, on the Catholic Day of Santa Cruz, in what was the Aztec month of Huey Tozoztli, men don spotted jaguar costumes and heavy leather masks (**left**) to fight each other with whips (**right**)—a penance, they say, to bring rain. "If we do not do this," one explained, "God will not see the necessity to send the sacred waters."*

The best fighters achieve fame in their community. One warrior, his mask battered by blows that could have smashed his skull, is known for having fought seven men in sequence. Several years ago his father was accidentally killed in a jaguar fight, but the fights are now well policed. "Even if others do not know of us," said a man sitting in front of the Zitlala church, whose steeples shadow the battle ring, "we must fight to save all the world."

VICTOR R. BOSWELL, JR., MUSEUM FÜR VÖLKERKUNDE, VIENNA, AUSTRIA



(Continued from page 738) flowers, matrons with large flowers, widows all in red, prostitutes with the colors maroon and green. The oldest women wear the simplest adornment: a geometric pattern of a single red thread "like a spiderweb." The design comes from Aztec tradition, said Professor Maya. "If at the time of death one owns possessions that required much labor from other people, the dead person must work to pay for those things in the next world. The simple blouse needs less labor in the afterlife."

Next day in the market I paid attention to blouse patterns and read the status of shoppers. The market at Huejutla ranks among the best in Mexico for its textiles and pottery. Like the markets described by the first Spanish chroniclers ("we were astonished at the crowds . . . and the regularity which prevailed," wrote Bernal Díaz), this market has the same regularity, buzzing with voices—not loud but incessant—in the clipped, pleasant accents of Nahuatl, bargaining, haggling, exchanging the news of a largely illiterate rural society.

I watched the Huejutla market as it lived out a daily cycle, from the high hopes of morning to the listless heat of midday when produce wilted and customers straggled away. It died in the oranging, horizontal sunlight. Vendors tugged down their tents; mothers pulled tired toddlers homeward. Alone, a bent, white-haired woman made her way across the souring, littered square. She was carrying a jar decorated with antique serpent symbols of life; and I noticed her blouse with its ascetic spiderweb design, her simplified Aztec afterlife hanging by a single red thread.

With such simplicity, Nahuatl Indians have always faced the constant presence of death. The same attitudes live on in the mountains of Guerrero—an area that Professor Fernando Horcasitas calls "one of the least known parts of the New World." Anthropologist Amanda Parsons had lived in these mountains studying the people; she was our guide to a Nahuatl village called Zitlala when we arrived on a 100°F day. The place had a fevered animation. Women in their best clothing were moving in and out of one house. "A death in the family," a local woman explained to Amanda.

Strong fumes of incense could not entirely mask the scent of death, for at the age of 85, Señora María Varsiana Xicumetl had died from "the illnesses of old people" a full 24 hours earlier.

The dead woman's middle-aged son invited us inside and announced with more formality than grief, "My mother is in *miccatzintli*—the state of death."

The woman lay in state upon a table, surrounded by candles and offerings to take on her journey: food, drink, 12 black beans and 12 kernels of corn "if she needs to plant a field and a fire fan to maintain her cooking fire." Her afterlife would be full of work.

"Grandmother must go out of the world with the most simple things," a young woman said. "These palm sandals will protect her feet from maguey thorns on her way to the other side, to heaven" (page 747).

MARIGOLDS STREWED our path to the cemetery, but tears were few. "It was sad to be old and alone," a niece observed. The casket was lowered into its grave, and men with gnarled hands scratched up fistfuls of dust to cover it.

In Zitlala no one expects an easy life, and

New century, new fire

EVERY 52 YEARS, as the stars of the Pleiades reached their zenith over Cerro de la Estrella, "hill of the star," priests celebrated the most important milestone in the Aztec world—a new century in their calendar cycle. All fires in the realm were extinguished; idols and pots were broken. Priests dressed in the garb of gods placed a distinguished captive on the sacrificial stone. With apprehension they kindled a fire on his chest, for "if a fire could not be drawn," chronicles report, "then the sun would be destroyed forever." At the first spark, the heart was cut from his chest and cast into the brazier. As the corpse was cremated at the foot of the temple, a relay of torches took the new fire to the Great Temple to be distributed through the land.

*"**It rains, it rains,** the woman goes about weeping," chants José Colasillo in Nahuatl, the language of the Aztecs. He is a "huehuete," a shaman who practices the old rituals and songs. Climbing a mountain named Ehecatl Cihuatl—"wind woman"—he leads a goat **(left)** toward a dawn sacrifice to the evil serpent who twists fate.*

*At the summit he prepares an altar to St. Mark, who will give life to the crops. Beneath a flower-draped cross **(right)** stretches a painting of the migration of his people from Tenochtitlan. Offerings of food and liquor, candles and cigarettes are for the mountain spirits.*

*Another spirit—a departed one—concerns relatives at an Indian funeral **(below)**. Children and grandchildren dressed the woman in the handwoven, embroidered costume of her village of Zitlala. They placed palm sandals on her feet to help her along the cactus-strewn path to the other side of the sky, and provided food and miniature household utensils to ease her journey. Extra food and white ribbon will assure acceptance by her late husband's first wife.*

now, at the end of the dry season, as fields grew more parched and water holes shrank, a tension was growing. We saw a mother cuff her child angrily, and watched a man viciously kick a skinny dog until it bled.

"We wait for rain," a man in the plaza remarked. "And for this we need the ceremonies of our tiger [jaguar] fights."

Amanda had told us about the tiger fights —stylized battles fought with whips as a cultural vestige of the Aztec wars and human sacrifice (pages 742-3). On the Day of the Holy Cross each May, teams from three Zitlala barrios, or districts, fight each other with whips as "a sacrifice for rain—as a promise to God," in the words of José Colasillo, the *huehuete*, or shaman elder.

Today the villagers try to prevent serious injuries, "though one man was killed a few years ago," a local official recalled. "Now the son of that dead man is the strongest and bravest of all the tiger fighters. He can defeat seven men in sequence."

"Without our tiger fights," one Zitlala man told us in utter sincerity, "the sun might not rise, and the rains might not come. We must sacrifice with all our hearts."

His Aztec metaphor weighed heavily the day we gathered with a large crowd of rural people in the central plaza of Zitlala. Town

Grinning at death, *plastic-skulled taxi drivers, football players, and other playful talismans* ***(left)*** *herald the Day of the Dead, or All Souls' Day, November 2. The joyful family holiday, the Mexican Halloween, is celebrated by graveside picnics with clay skeletons baked in special "dead man's bread." The Aztecs also celebrated death days with a molded bread, "flesh of the deities."*

Crystal skull ***(below)*** *is attributed to the Aztecs, but its origins are unknown. It appeared in Europe in the 19th century.*

VICTOR R. BOSWELL, JR., MUSÉE DE L'HOMME, PARIS, FRANCE

officials inspected the gear. Whips could have no metal barbs to inflict severe injury; masks should be fashioned of strong leather. Even so, the masks seemed sinister: painted yellow or green, with sneering oval lips and mirror spots like the goggle-eyes of the rain god Tlaloc.

A group of fighters from the San Mateo barrio warmed up, cracking whips, making sounds in their throats like growling. "No, we are not enemies," a San Mateo man assured us. "Afterward we work together. We fight only to bring rain. We must be careful—whips can break a man's skull."

Other teams arrived, whooping and cracking more whips. The participants were paired one-on-one, the fights began, and the plaza crowd tightened its circle like a noose. Armed policemen commanded, "Give them room!" The town president pleaded, "Don't kill each other."

Whips drew blood and shattered some of the mirrors on the tiger masks. One helmet broke, but its owner shrugged and put on another. A bleeding tiger, pulled out of action, begged to return. Then after hours of watching, two drunks in the crowd started a fight, and others joined in; but before a brawl could begin, the town president stepped forward. "We are stopping these

LAURENTIAN LIBRARY, FLORENCE

Swift and sure *was the death of a sacrifice. Directed by Friar Sahagún, Indian artists painted the tearful victim waiting, a priest and attendant cutting open his chest to remove the still-beating heart, and finally the cooking of the sacrifice. Bernal Díaz, a chronicler with Cortés, told how the people of Cholula threatened to kill and eat the Spanish and "had already prepared the pots with peppers and tomatoes." Experts debate Aztec cannibalism: One says it never occurred, others that it was a major source of protein, most that it was a religious experience in a culture suffused with ritual.*

tiger fights for lack of discipline," he announced firmly.

One tiger fighter, his eyelid sliced nastily, wiped away both blood and worry: "It really doesn't hurt much—just give me a drink at the bar. The conflict? Everything is for the rain."

And next morning the sun would rise once more.

The tiger fights of Zitlala recall the grandeur of old Malinalco, a ceremonial center for Aztec knights of the orders of the jaguar and eagle. Today the ruins of Malinalco rank among the handsomest—and least visited—of Aztec ruins. Some three hours from Mexico City, the sanctuary perches atop a steep stone hill. Visitors climb 423 steps to visit its Sun Temple, a building sculptured entirely from the solid rock. The sanctuary stands silent except for the rustle of scurrying lizards and the sound of wind on rock—still a spot fit for eagles.

THE AZTEC VENERATION of eagles endures in a hundred ways throughout Mexico. In Huauchinango, Puebla, I questioned the Eagle Troupe of five aerial performers known as *voladores*, or fliers.* At fairs and celebrations, five aerialists climb a tall pole. One, who plays a flute and drum, remains at the summit "like the sun," as one of the fliers told me; the other performers fasten ropes to their feet, and descend to earth, headfirst, flying in 13 great circles about the pole.

The custom itself comes swirling down through the mist of time, possibly related to the knights of the eagle. But proud as these voladores were of their traditions, they refused to speak of a colleague who had fallen to his death six years before. A taboo.

Yet I talked with one flier in San Miguel Tzinacapan who had himself survived a fall. "It is our gift to God," said Jorge Valdezar. "We ask for no money—not for our costumes, not even for our deer-hide drum." Jorge had begun his work as a volador 12 years before, when he was ten years old. "Five of us fly in this group. We are careful to do our work in the old way. For the love of the Virgin. We fly only from a wooden post. The day before my accident, it had rained.

*This thousand-year-old aerial ritual was photographed by David Hiser for the August 1980 issue.

The post and cables were wet. Halfway to the top, I slipped and fell. My spine was injured, my eyes bloody. I was 15 days in the hospital, but the Virgin aided me. No, when I flew again, I felt no fear."

He smiled. "Actually, the fall increased my fame!"

Jorge told me how the volador pole is raised in a plaza:

Men dig a great posthole and ceremoniously hurl offerings into the pit—food, drink, and a turkey that is fresh-killed just before the pole is slipped into place. This blood offering is important, so the tree will not claim the life of a flier.

As late as the 1960s, two voladores were killed in an accident in Coahuila, and the leader of the group blamed the deaths on a faulty ceremony: "The tree should be sprinkled with the blood of a hen . . . but they could not get a hen."

The Aztec attitude toward blood and death permeates modern customs, none more than the Day of the Dead, November 2. The Catholic Church blesses it as All Souls' Day. Superficially the holiday resembles a U. S. Halloween; markets bloom with skeleton decorations and candy skulls.

But below the surface and away from cities, the Day of the Dead retains a strong Aztec atmosphere. "It changed my attitude toward death," Amanda admitted to me. "It's a friendly family holiday for all the dead relatives. You'll see."

I did, at the village of San Gabriel Chilac near Tehuacán. The celebration began at the cemetery in the sunny early morning as families arrived, bringing armloads of flowers—marigolds, asters, daisies, gladioli—and earthen pots of food.

We watched fathers build bamboo arbors over family plots while mothers plaited garlands to adorn the graves. Old people and youngsters arranged banquets of fruit, meats, and *pan de muerto*, decorated loaves of raisin-filled bread.

Some brought bottles of wine, beer, and jalapeño peppers. On the ground beside a child's grave one mother had placed chocolate bars and a toy automobile. The sunshine got hot help from a thousand brown candles and sticks of incense. A blue haze hung over the cemetery.

"You see it is not a sad day," an old man assured me. "A *friendly* day." He fanned himself in the wispy shade of a huisache tree. "We do not fear our Little Dead Ones." He used the affectionate diminutive form in Spanish, a Mexican custom derived from the honorific form in Nahuatl.

"No, the dead do not *eat* the food," a woman explained. "They only take the flavor and spirit of the food. Our family eats everything afterward." Nothing wasted.

"I now live in Mexico City," a man told Amanda, "and did not return to Chilac to honor my mother's grave. Then I dreamed of her—she called sadly to me. Every year since, I have returned."

"Do the Dead Ones return? Of course!" an old man insisted. "I feel the Little Dead Ones very close even now."

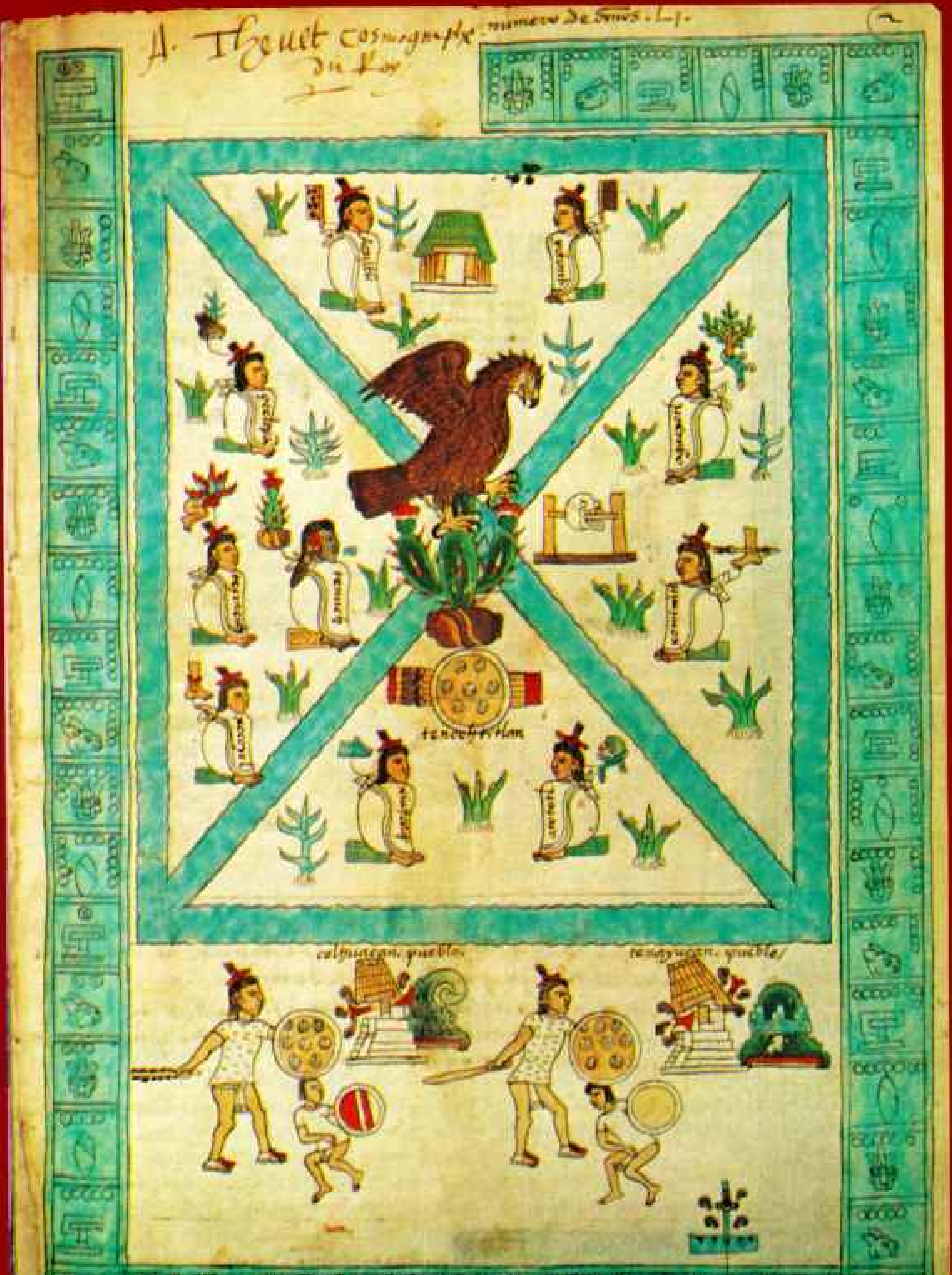
IN MEXICO today few of the Nahuatl-speaking Indians remain unbaptized; all are at least nominally Christian. But the duality of their beliefs—their syncretism—is compelling. Standing among them in a cemetery, I also feel the presence of Little Dead Ones—and not just the recent dead. I wonder about old warriors and fallen voladores . . . and also the fragments of a dying culture, the words vanishing from Nahuatl, the work of salt makers dwindling like the waters of Lake Texcoco, and old men who will one day break like a luxury.

I think, too, of Doña Rufi, the sorceress. Tim Knab, an anthropological linguist, has translated 50 of Rufi's old prayers for a scholarly journal, but his news is sad.

"Rufi has had a stroke," he said. "Her left side is paralyzed." Worse (perhaps an ethnic omen?), Rufi has suffered a loss of memory. She lives, but not far from miccatzintli, the Aztec state of death.

Yet among her people, miccatzintli is never far from life. For with Aztecs and their heirs—those brilliant, brave, fear-ridden, driven folk—contrasts are twinned: life and death, good and bad, ornate ritual and austere simplicity. Always they are close to nature with its cruelties and kindnesses. They sang of it in an old Nahuatl poem:

Be indomitable,
O my heart. . . .
Will there be nothing of my fame on earth?
At most songs, at most flowers. . . . □



A. Theuet cosmographe du Roy
numero de años
tenochtitlan
colhuacan. pueblo
tenayucan. pueblo

The Building of Tenochtitlan

By AUGUSTO F. MOLINA MONTES

Paintings by FELIPE DÁVALOS

THE AZTECS, like Athenians or Romans, proudly identified themselves with their capital, as Tenochcas—people of Tenochtitlan. They had reason for pride; beginning on a marshy island with only a small temple and a few huts of thatch and mud, these hardworking people had built a beautiful cosmopolitan metropolis visited by traders, kings, and chieftains from afar.

A Nahuatl poet wrote: "The city is a great domed tree, precious as jade. . . . Beneath it the lords are sheltered."

By the time the Spaniards arrived in 1519, the island-city covered about ten square kilometers. The soldier-chronicler Bernal Díaz del Castillo described his view from atop the Great Temple: "Here we had a clear prospect of the three causeways by which Mexico communicated with land, and of the aqueduct of Chapultepec, which supplied the city with the finest water. We were struck with the numbers of canoes, passing to and from the mainland, loaded with provisions and merchandise, and we could now perceive that . . . the houses stood separate from each other, communicating only by small drawbridges, and by boats, and that they were built with terraced tops. We observed also the temples . . . of the adjacent cities, built in the form of towers . . . wonderfully brilliant . . . and those who had been at Rome and Constantinople said, that for convenience, regularity, and population, they had never seen the like."

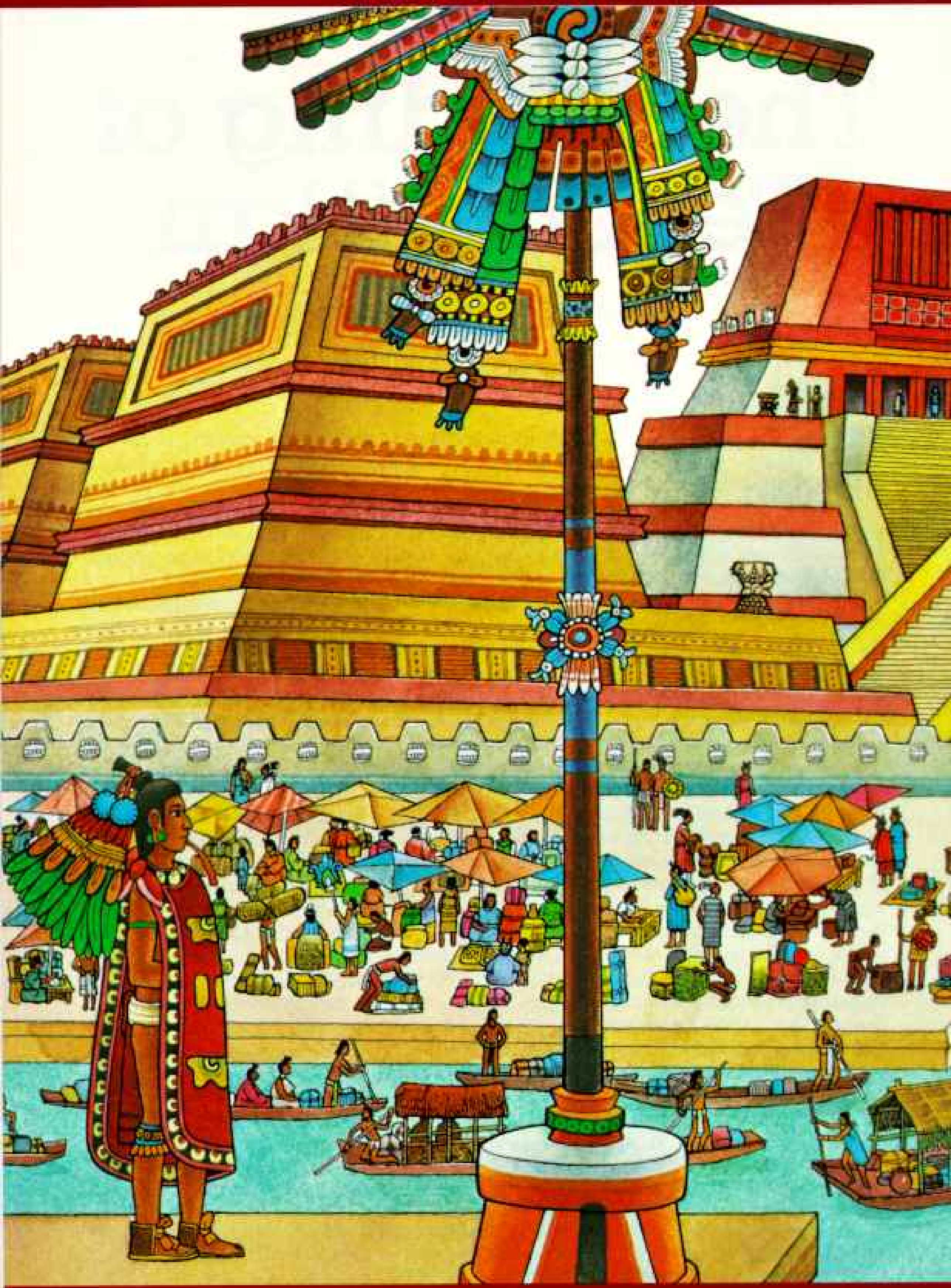
As a professor at the National School of Anthropology, I have often had to remind my students that when Bernal Díaz wrote "wonderfully brilliant," he meant polychrome—red, green, turquoise, yellow. We are so accustomed to seeing excavated ruins devoid of plaster that we forget that the Aztecs used color as a formal aspect of their architecture (foldout, following pages).

What a rich sight the city must have been! And it was no easy feat to construct such a metropolis. Consider, for example, the scarcity of both raw materials and labor. No building materials were to be found on the island itself, so everything had to be brought in from the mainland in barges and canoes.

As one historian noted, "they sold and they bought" fish and birds for stone and wood, "all very small." Even after Aztec armies subdued their mainland neighbors and built causeways *(Continued on page 760)*

Divine prophecy *directed the Aztecs to settle where they saw an eagle perched on a cactus—"his wings stretched out toward the rays of the sun." Indian artists portrayed Tenochtitlan as a microcosm of the Aztec world and placed the eagle at the lakebound city's axis, surrounded by nobles and the founding ruler, Tenoch, to the left of the cactus; below it, shield and spears denoted the authority of the Aztec lords; to its right is a skull rack used for sacrificial victims. Warriors, at bottom, began conquests by toppling temples of rival towns.*

BODLEIAN LIBRARY, OXFORD UNIVERSITY



City of myth and dreams

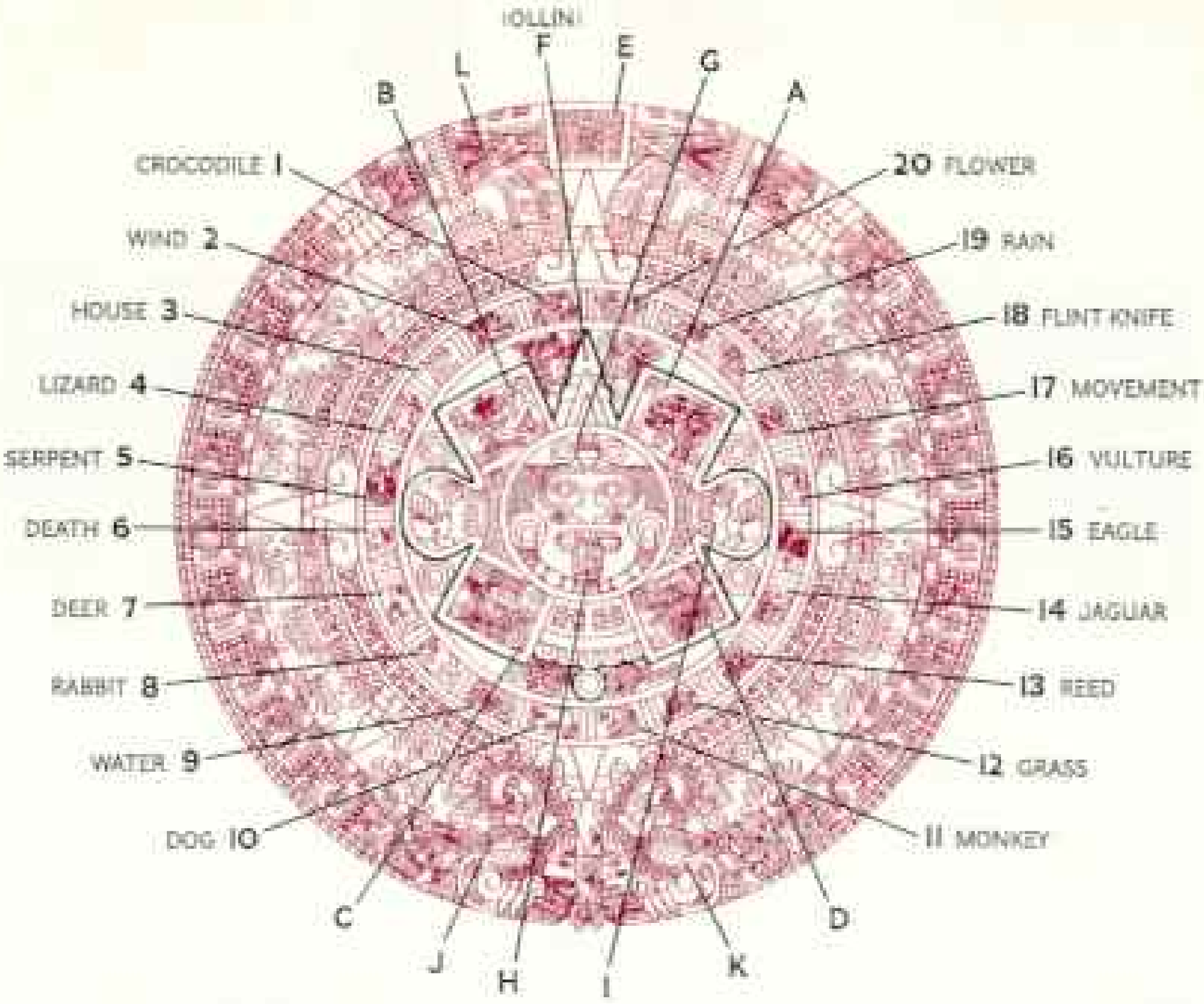
"ENCHANTED VISION" to a conquistador, Tenochtitlan rose from Lake Texcoco to cover an island marsh of roughly 2,500 acres.

Construction required thousands of craftsmen, drilling, grinding, stuccoing, and painting until the jewel of the Aztec Empire shone in brilliant colors.

This artist's impression of their creation unfolds a marvel of giant temples, palaces, feathered banners, and a treasure-filled mini-market. Canal-borne canoes brought fresh water and rich bounty to the gates and serpent-studded walls of the sacred precinct. The city was an awesome symbol of strength and power even to the nobles, such as the one at far left.

The Great Temple, shown here with its dual shrines—blue for the rain god and blood red for the god of war—was the hub of Aztec religious life. During certain celebrations, priests worked shifts at the summit, offering human hearts to the gods.

Other temples—to the sun, to conquered peoples, to the god of music, to the paramount deity Tezcatlipoca—aggrandized the Aztecs' "supreme capital."



Stone of the Fifth Sun

*MISLEADINGLY called the calendar stone because of the day-signs encircling its center (**1-20**), this massive carving had much greater significance—a depiction of the Aztec cosmos. Its complex symbolism, the meaning of which is still debated by scholars, was crucial to the people of Tenochtitlan, who believed their continuance on earth depended on correct interpretation of their gods' demands.*

The basaltic disk, 3.6 meters (12 feet) in diameter and weighing 24 metric tons, was uncovered in 1790 in what had been Tenochtitlan's main square, now Mexico City's Zócalo. The intricacy of its carving demonstrated Aztec accomplishments in art and mathematics and their ability to carve stone.

*First embedded for viewing in the base of Mexico City's cathedral, the stone is now the centerpiece of the National Museum of Anthropology. Artist Felipe Dávalos has added its likely colors (**left**), long worn away.*

Some suggest that the disk was never finished because the back portion was cracked, an imperfection intolerable to the priests who would honor their gods with it. Spanish chronicles describe similar stones, one being dragged along a causeway into the city during the reign of Moctezuma II, the ruler conquered by Cortés. Most agree that placement of such stones would have been horizontal, perhaps to receive the hearts of sacrificial victims.

*The iconography relates when the Aztec world began, how it would continue, and when it would reach its inevitable end. The Aztecs believed they were living in the fifth and last creation of the world. They called each creation a sun, because movement of the sun maintained human life. On the stone, reliefs in square panels around the center represent the dates the four previous suns perished—destroyed successively by jaguars (**A**), wind (**B**), fiery rain (**C**), and water (**D**). The fifth sun, that of the Aztecs, was created by the gods on the ritual date 13-Reed (**E**), or A.D. 1011. The predicted date of destruction was 4-Movement, its abstract motif, called "ollin," outlining the central figures of the stone (**F**). The date recurred every 52 years, but sacrifices forestalled catastrophe.*

*The deity in the center (**G**) is interpreted as either the sun god, Tonatiuh, or the earth god, Tlaltecuhtli. A sacrificial knife (**H**) protrudes from his mouth like a tongue tasting the blood of its victims. On either side of the god are claws holding human hearts (**I**). Two fire serpents (**J, K**) encircle the stone, their tails (**L**) meeting at the creation date.*

The Aztec world did meet its doom, but from an unexpected source—the arrival of the Spanish conquerors during a cycle of 4-Movement.

BORBONICUS CODEX, BOURBON PALACE, PARIS

First human couple *of Aztec myth cast corn-kernel lots to determine fates within a sacred enclosure, perhaps a cave. Animal-like figures, possibly prayer sticks, mark the chamber's entrance, and water beaded with shells and droplets flows out below. The 260-day divinatory calendar the couple invented was consulted for rituals and omens—and even foretold the coming of the Spanish.*

(Continued from page 753) to connect their island with the lakeshore, they still used water transport for freight such as wood, stone, and lime.

Manpower could not have been abundant either, especially in the early days when the Aztecs still had hostile neighbors. Since the Aztecs were not a very large group, they had to devote much of their available manpower to warfare and to the trading of produce from the lake. Later, as they acquired wealth and power, a large number of specialized craftsmen immigrated to Tenochtitlan, where their skills were in great demand. Unskilled laborers, necessary in great numbers for large-scale building projects, came as "volunteers" from vassal cities or as captives taken in battle.

Who designed the temples, palaces, and the civic monuments of Tenochtitlan, and who directed their construction? We do not know their names, for Aztec architects, like their artists, remain anonymous. We do not know the name of a single sculptor, though art historians rank their work with the finest the world has ever seen.

WHOEVER DESIGNED the work faced major construction problems. One was unstable ground—the soft, spongy subsoil of Tenochtitlan. Excavations today show dramatically the way in which buildings sank into the soft earth. In the custom of almost all Mesoamerican peoples, the Aztecs periodically built a new structure to cover an older temple, and each new covering shows how the previous construction had sunk to a level

several feet below the rest of the city.

The buildings, moreover, settled unevenly; the heavier parts or those on a softer footing sank faster. The problem of settling has persisted to the present time and requires sophisticated foundation systems.

The Aztecs attempted several solutions to this problem. The first was the use of *tezontle*, a very light, porous volcanic rock that they employed to reduce the weight of the structure. The outer walls, stairways, and facades were made of basalt and similar hard stone, but the cores of walls and platforms consisted of lightweight tezontle, which had the added advantage of being easily quarried from volcanic cones that emerged from the valley nearby.

In later times the Aztecs learned to cut tezontle into well-shaped thin slabs. Excavations for the Metro, just a few meters behind the cathedral, unearthed a small platform whose walls were faced with tezontle slabs, perfectly cut and assembled with no mortar at the joints.

This system of wall facing, used in late Aztec buildings, was adopted by the Spaniards. We can see the red velvety stone today in the Sagrario Church next to the cathedral, the National Palace, and a large number of old mansions.

Another system that Aztec builders used was foundation piling: They drove large wooden stakes closely together as footings for walls of buildings and temple platforms. The stakes were usually eight to ten centimeters in diameter and no longer than ten meters (33 feet). Later the Spaniards adopted this technique; in several excavations within Mexico City we have uncovered both Aztec and Spanish piling stakes. We can tell them apart because the points of the Spanish stakes were sharpened with metal tools, while Aztec stakes were cut by stone.

That Aztec craftsmen could shape wood, and even building stone, solely with stone tools should not surprise us. Centuries earlier other Mesoamerican peoples had learned to make axes, chisels, hammers, scrapers, and other tools from obsidian, basalt, diorite, jadeite, and similar hard and resistant stone. Drilling, grinding, and polishing were accomplished by the use of hard pumice and similar stone or quartz sand used along with their wooden drills and scrapers.

The Aztecs also inherited from previous Mesoamerican peoples their techniques for quarrying and moving large blocks of stone. They preferred to build with stone from a quarry in Tenayuca, in the northwest of the valley. This stone yields fairly thin slabs with at least one smooth face—ideal for most of their architecture. But stones used for other details and sculpture came from quarries all over the valley. That Aztecs could transport blocks of very large dimension is attested by such huge sculptures as the so-called calendar stone, a basalt disk 3.6 meters in diameter and 72 centimeters thick with a weight of 24 metric tons. Workers quarried such monoliths with stone hammers and chisels, inserting wooden wedges into cleavage planes in the rock. Mainly, though, the pre-Columbian stonecutters relied on their knowledge of various rocks, chiseling and chipping on all the sides and ends to isolate a block from the bedrock until it could be pried loose with levers.

LABORERS MOVED blocks of stone long distances, over rough terrain, with rollers made from tree trunks, sleds, levers, and ropes. But chiefly they used raw human force and ingenuity.

Years ago, as a young architect supervising construction work, I found that untrained laborers recently arrived in the capital from remote villages could actually carry more earth from excavations with a *chundi*—a large cone-shaped basket carried on the back and supported by a forehead strap—than with a wheelbarrow. Perhaps the Aztecs lifted their heavy stones and sculptures with similar efficiency, probably using earthen ramps for sliding the great stones. Once the heavy sculptures or building stones were properly positioned, the ramp was taken down.

Today visitors to Mexico City see few examples of Aztec construction. Cortés, for reasons of policy and symbolism, scavenged the old temples deliberately to build his own capital upon the ruin of Tenochtitlan. But in Santa Cecilia, a short drive north of the city, stands a reconstructed pyramid in the Aztec style. A wall of stone skulls and 28 knee-high steps lead to a platform summit where a small temple perches. The Great Temple itself was built in just this style.

Deities both kind and cruel

PANTHEON OF GODS—so intertwined that their complexities must have dazzled even the high priests—pervaded all Aztec life: at least 1,600 deities, according to myth, but their forms were so intricate as to be countless.

Gods and goddesses of agriculture and fertility abounded, and of crops and flowers, fire, rain, and the underworld. Women who died in childbirth were transformed into the "cihuateteo," spirits who accompanied the sun on its downward path. Each community had its god; craftsmen had their gods. Sometimes deities assumed multiple guises to confuse their enemies or to expand influence.

The Borbonicus Codex, a colorful pictographic religious document that may be the only authentic Aztec book in existence, gives us representations of many of the gods in full regalia; six of them are shown at right. Others were described in detail to Friar Diego Durán for his "Book of the Gods and Rites and the Ancient Calendar."

The rites were lavish with processions, music and drums, sacred amaranth cakes, idol representations of the gods, and so many "torches that the night turned into day." Rulers attended, paying homage. The priests arrived, dressed as the gods they honored, ready to intercede with the supernatural on behalf of the "macehualtin," the common people. Since the gods had created the world, they could also destroy it at their whim. To appease the fickle demands of the masters of human fate, rituals ranged from flower offerings to human sacrifices.

Tezcatlipoca (tess-kah-tlee-POH-kah)—supreme god and patron of the rulers—was formed with the creation. He is related to others in various ways, but genealogies of the Aztec gods are loosely defined. Versions vary; family ties change or disappear.

The powerful Quetzalcoatl—adopted, as were many other deities, from earlier Mesoamerican cultures—bridged the gap between history and mythology. A human ruler of the Toltec capital of Tula, he merged with an earlier plumed serpent god, who created civilization through agriculture and writing. Quetzalcoatl left Tula in disgrace because of drunkenness, tradition held, but was expected to return someday from the east. He did, some Aztecs believed, as Hernán Cortés.

Ehecatl
God of the wind, road sweeper of the rain gods, he is one of Quetzalcoatl's many manifestations.

Tonatiuh
Sun god and patron of warriors, the "eagle that soars" rewarded those who died in his service with eternal joyful life.

Xipe Totec
Carrying a shield embedded with gold, this patron of smiths and god of spring and renewal wears the skin of sacrificial victims.

Huitzilopochtli
A deified earthly leader from the Aztec days of wandering, this patron of Tenochtitlan was the god of war.

Tlaloc
He who "showered down the rain" appears in multiple form. He also relished the sacrifice of children.

Chalchiuhtlicue
Goddess of water from springs and seas, also associated with earth, salt, and maize, she was a consort of Tlaloc.

In the center of old Mexico City, Aztec construction can be found beneath the modern pavement. A contractor once told me how he accidentally dug up an Aztec war canoe. Rather than face the delays of an archaeological study, he told me, "I just paved over the whole thing." We can only guess at the number of other treasures still lying beneath the concrete.

OUR METRO subway construction brought more pre-Columbian artifacts than our scholars could handle. Carefully labeled crates still await study. But below ground level at the Pino Suárez station stands a charming little Aztec pyramid dedicated to Ehecatl-Quetzalcoatl. When it was unearthed, Metro designers made an underground display area for commuters. On the street level above, at the corner of El Salvador and Pino Suárez, stands a colonial church with a plaque on its outer wall identifying the place of the meeting of the "Lord of Mexico," Moctezuma, and Hernán Cortés on November 8, 1519.

Inside the same church another plaque identifies a crypt and famous bones: "Hernán Cortés 1485–1547."

We find layers of history in other parts of Mexico City—none more vividly alive than the Plaza of the Three Cultures. As an archaeology student years ago, I literally dug into the past here, for this was Tlatelolco, a twin city to the Aztec capital and home of the great merchant traders. These men, dressed in deceptively shabby clothes, traveled widely through the empire, served as agents and spies in foreign domains, and stealthily brought great riches home in their cargo canoes, arranging to arrive at night. The Tlatelolco temple and market rivaled those of Tenochtitlan. The Aztec army's last battle of resistance against the Spaniards was fought on the steps of the Tlatelolco temple.

At the center of the plaza we see the red-brown igneous rock of the old temple steps. A modern inscription repeats the words President López Mateos used to dedicate the site in 1964: "On 13 August, 1521, Tlatelolco, heroically defended by Cuauhtemoc, fell into the power of Hernán Cortés. It was neither a triumph nor a defeat, but the painful birth of the mestizo people that is the Mexico of today." □

Island of history *surrounded by the glow of urban Mexico City, the Plaza of the Three Cultures combines Aztec*

DAVID HIGER

heritage, colonial splendor, and modern prosperity. A Spanish church and monastery overlook the remains of the stacked pyramid of Tlatelolco, sister city of Tenochtitlan, center of the empire's commerce, and site of the final Aztec defeat.

New Finds in The Great Temple

By EDUARDO MATOS MOCTEZUMA
GENERAL COORDINATOR, GREAT TEMPLE PROJECT

Photographs by DAVID HISER

NEAR DAYBREAK on a February day in 1978, a group of laborers from the utility company were digging ditches for an electric cable at the corner of Guatemala and Argentina Streets in Mexico City. One man hit something hard, saw that the object was a stone decorated in relief, and immediately the work was stopped. The salvage department of the National Institute of Anthropology and History was notified. Two days later excavation began that uncovered an extraordinary monument: a circular stone showing the dismembered body of Coyolxauhqui (koh-yohl-SHAU-kee), sister of Huitzilopochtli, the Aztec god of war.

The workmen had uncovered significant remains of the Great Temple of Tenochtitlan, liturgical center of the Aztec Empire.

In Mexico fortuitous archaeological finds are nothing new. In 1790, about 200 meters from the Coyolxauhqui stone, Aztec

***Tissue butterflies** monitor movement of a crack in the carving of the goddess Coyolxauhqui. Her legendary dismemberment was at the hand of her brother, the war god Huitzilopochtli. A ditchdigger's 1978 discovery of the monument led to excavation of Tenochtitlan's Great Temple—and unexpected insights into the grandeur of the empire.*

Crown of Tenochtitlan

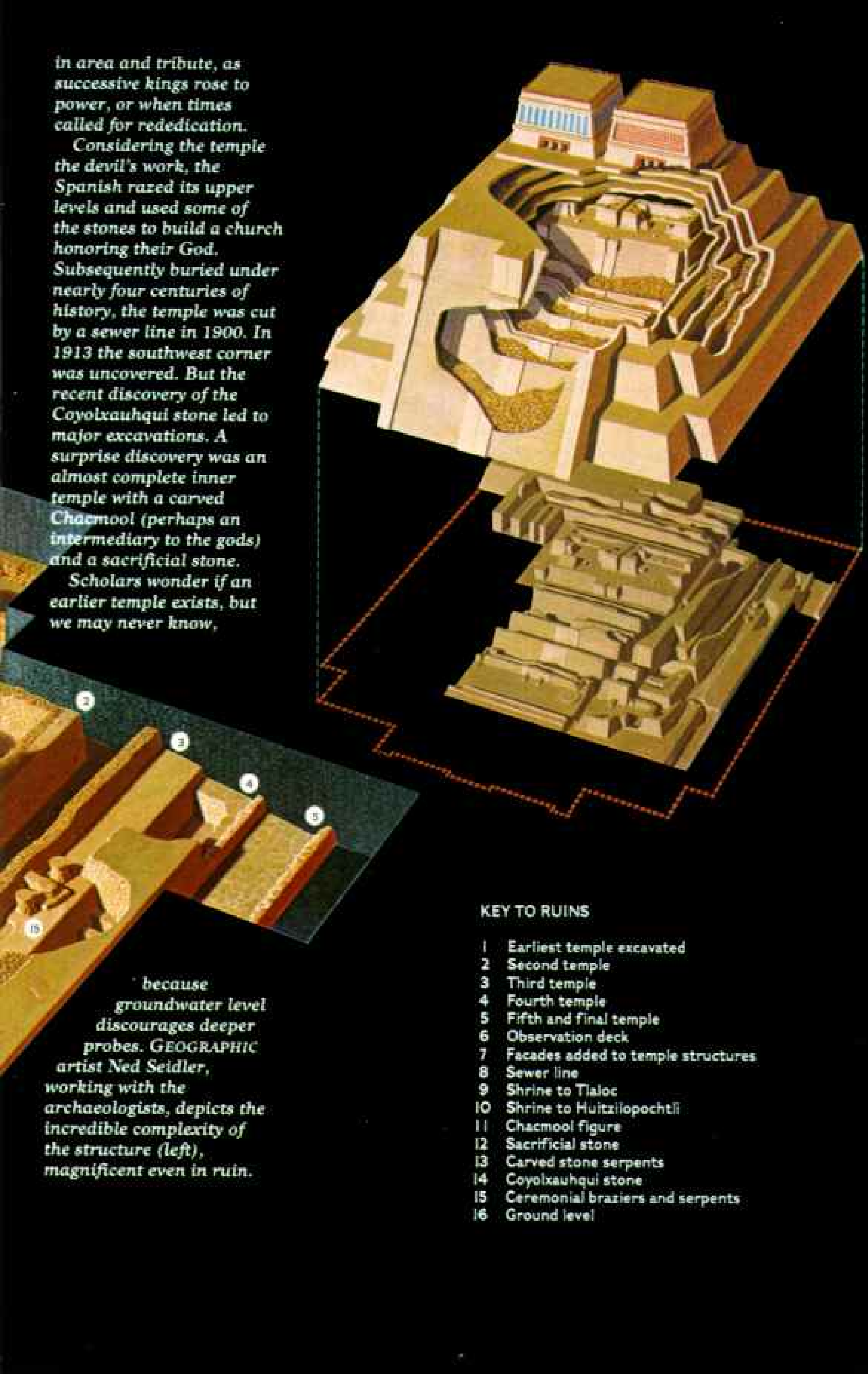
MONUMENT to the deities of war and rain, the Great Temple, or Templo Mayor, was a symbol of Aztec accomplishments and a warning to would-be enemies of their power. Facing west, the temple rose perhaps 60 meters (200 feet). A dual staircase climbed to double shrines: Huitzilopochtli's to the right, Tlaloc's to the left.

The Spanish little dreamed that the pyramid they marveled at was but a shell. The stone-and-mortar walls covered at least four complete structures (cutaway at right), stacked like nested boxes, and several additional facades. These layers of increasing greatness had been added as the Aztec realm waxed

in area and tribute, as successive kings rose to power, or when times called for rededication.

Considering the temple the devil's work, the Spanish razed its upper levels and used some of the stones to build a church honoring their God. Subsequently buried under nearly four centuries of history, the temple was cut by a sewer line in 1900. In 1913 the southwest corner was uncovered. But the recent discovery of the Coyolxauhqui stone led to major excavations. A surprise discovery was an almost complete inner temple with a carved Chacmool (perhaps an intermediary to the gods) and a sacrificial stone.

Scholars wonder if an earlier temple exists, but we may never know, because groundwater level discourages deeper probes. GEOGRAPHIC artist Ned Seidler, working with the archaeologists, depicts the incredible complexity of the structure (left), magnificent even in ruin.



KEY TO RUINS

1 Earliest temple excavated
2 Second temple
3 Third temple
4 Fourth temple
5 Fifth and final temple
6 Observation deck
7 Facades added to temple structures
8 Sewer line
9 Shrine to Tlaloc
10 Shrine to Huitzilopochtli
11 Chacmool figure
12 Sacrificial stone
13 Carved stone serpents
14 Coyolxauhqui stone
15 Ceremonial braziers and serpents
16 Ground level

remains were found when Spanish Viceroy Revillagigedo ordered work done on the Plaza de Armas (today's Zócalo). Excavators found two of the most famous monoliths: the mother goddess Coatlicue (kwah-TLEE-kway) and the Stone of the Fifth Sun, popularly called the calendar stone.

In 1900 a sewer was installed crossing under the streets of Santa Teresa and Escalerillas (today's Guatemala Street). The digging destroyed part of an old stairway; in fact, the ditch cut a cross section through different periods of construction of the Great Temple.

In 1913 other public works unearthed the southwest corner of the Great Temple. And much later, around 1967, during the digging for Mexico City's Metro system, great quantities of Aztec artifacts were uncovered.

But what did the 1978 discovery of Coyolxauhqui bring about?

FIRST, it began a project that had been planned several years earlier: the excavation of the Great Temple. Second, it helped us set some precedents in Mexican archaeology—for example, not to reconstruct a building if its destruction is historical fact. But this discovery also helped us in our search for answers to still unsolved questions, for the Great Temple was symbolically the seat of Aztec power. The presence of Tlaloc and Huitzilopochtli, gods of rain and war, at the top of the temple shows us the economic base of the empire: water for agricultural production, and war as a means of obtaining tribute from subject territories. War also supplied captives to offer in sacrifice to the gods.

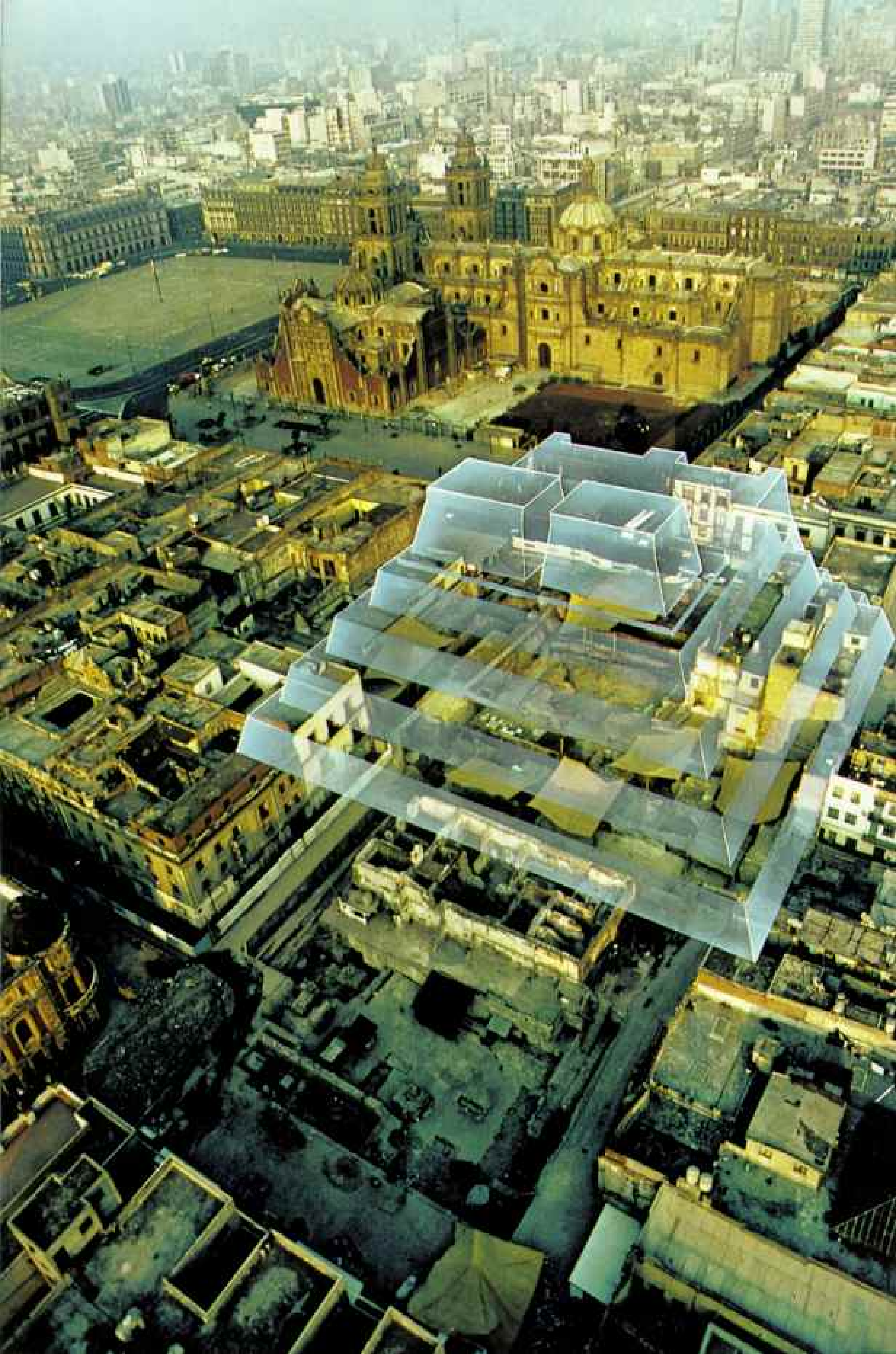
Yet beyond that significance, the temple represents one of the most important Aztec myths: the birth and battles of the tribal god Huitzilopochtli.

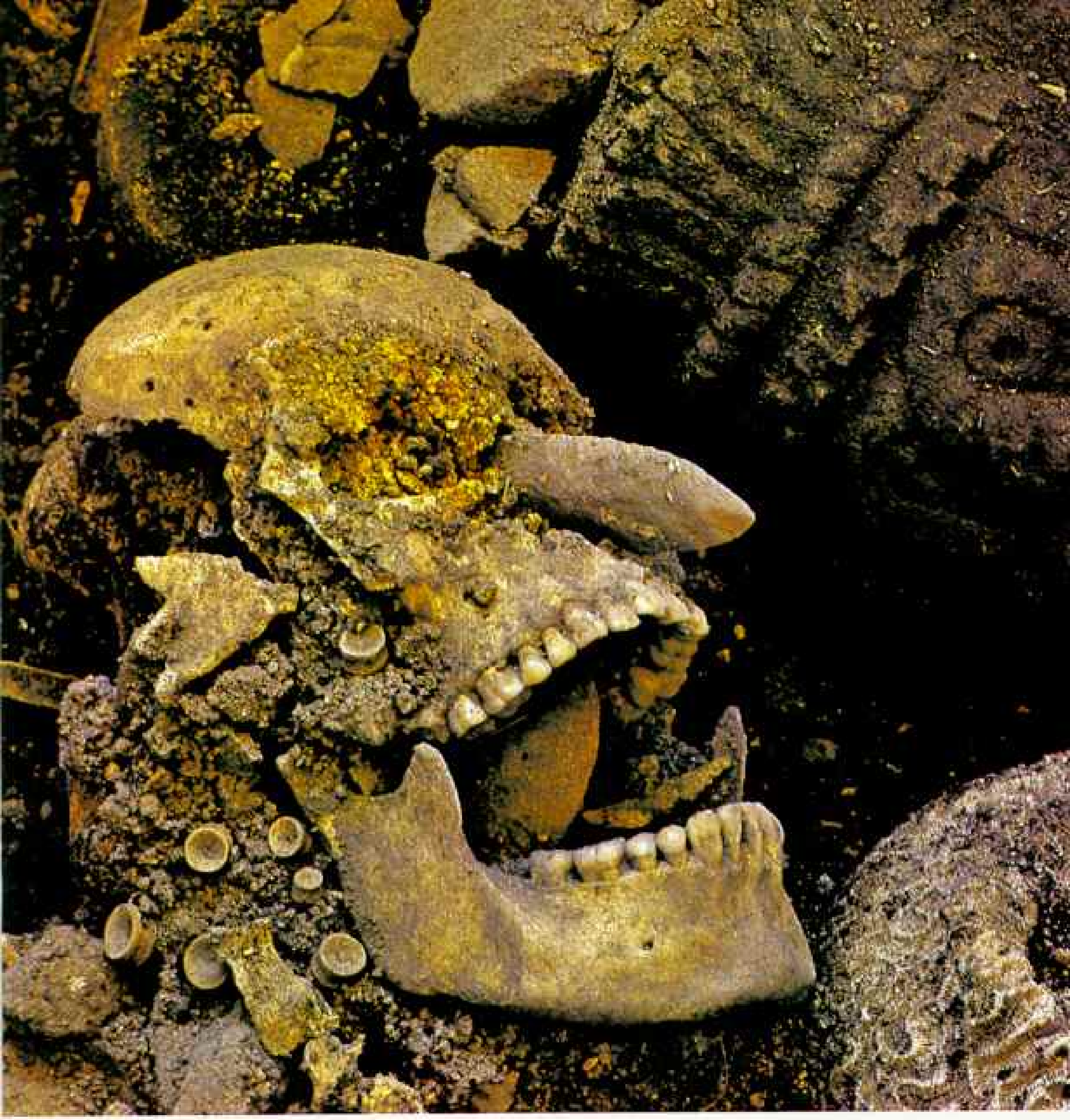
The myth of a battle between Huitzilopochtli and his sister Coyolxauhqui probably springs from an actual event. Nahuatl literature recounts how Huitzilopochtli incited his people to leave their Aztlan homeland under his leadership. A quarrel between two groups occurred at Coatepec, or "serpent hill": One group was headed by Huitzilopochtli, the other by his many brothers, collectively called the Huitznahua (weets-NAH-wah), and his sister Coyolxauhqui. In the ensuing power struggle, Huitzilopochtli prevailed.

It is significant that one of the barrios of the Aztec capital, Tenochtitlan, later bore the name of the Huitznahua, which indicates that despite their defeat in that squabble, the group still had exalted status within tribal society.

The myth took various forms. The grandson of Moctezuma II, in one version, gave a description of the way that the god arrayed himself ("he painted his face the color of a child's excrement, he made circles around

Ghost of the past, *a drawing of the Great Temple looms over its ruins in an aerial photograph of downtown Mexico City (**right**). Beyond sprawls the cathedral and the vast square of the Zócalo. To the rear of the temple, foreground, excavations reveal the foundations of smaller pyramids. Archaeologists razed stores, rooming houses, and a city street to bare the Great Temple site. The Chacmool (**left**), a figure originally associated with the Toltec culture, was unearthed in the oldest structure found. An archaeologist measures the crude carving, the first found with its original color.*





his eyes, and he took up his shield") to battle his kinsmen. Because his sister, who "spoke to all the centipedes and spiders and transformed herself into a sorceress . . . was a very evil woman," she deserved the beheading and dismemberment that followed.

Myths often evolve into rites. Many of us feel that the Aztec rite of human sacrifice reenacted this mythical battle. Enemy prisoners on their way to be sacrificed passed by the Coyolxauhqui stone—representative of the dead and defeated people—as they ascended the hill-shaped pyramid.

At the summit stood the blood-smeared statue of the deified Huitzilopochtli. There, upon the sacrificial stone, priests took each victim "by the arms and legs to draw him taut. Thereupon they gashed his breast open . . . seized his heart . . . then rolled . . . his body over, cast it hence, bounced it down." So the Spanish chronicler Bernardino de Sahagún described the ritual. The mutilated bodies of the sacrificial victims fell to the spot where we find the Coyolxauhqui stone today.

We started excavations at the base of the

Gaping face of death *greeted excavators who uncovered numerous offering caches in the platform levels of the Great Temple. Stone knives were embedded in the nose and mouth and incense filled the eye sockets of the skull, entombed with a carving of the god Tlaloc* ***(left)****. Untold thousands gave their lives to the temple dedication; accounts relate that some danced up the steps, honored to give themselves to ensure the movement of the sun. The finest tribute pieces of the empire lay stacked like cordwood in the caches. One of the finds, a figure of serpentine jade, is held by author Eduardo Matos Moctezuma, general coordinator of the Great Temple dig.*

Great Temple on March 20, 1978, beginning with the three facades on the north, south, and east. A parking lot and a city street covered much of the area, so we did not at first need to demolish existing structures. Later other structures were removed, but none of great historical value.

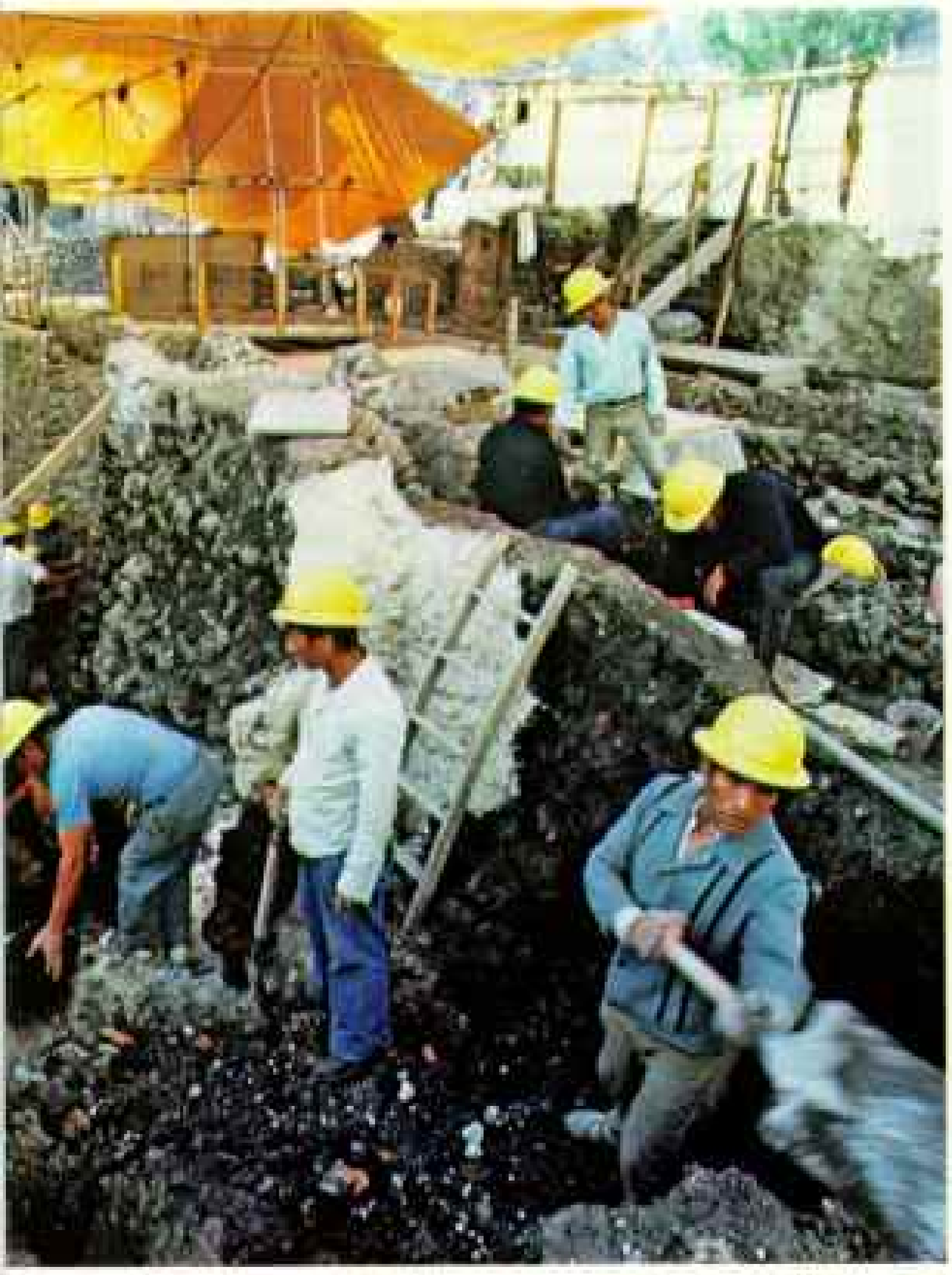
City traffic often slowed our work, but in other ways the urban location of this archaeological dig served us well. Specialists of all sorts were available to us on short notice: city planners and architects, soil scientists to study layers of sediment, ethnohistorians to advise us on iconography, ornithologists and ichthyologists to identify the bones of birds and fishes. Students in great numbers volunteered to help us, and we were honored by frequent visits from dignitaries, for the Great Temple dig is located only a few meters from the National Palace.

Work has necessarily been careful and slow. By the end of last summer, we had found 53 offerings, containers filled with gifts to propitiate the gods. Each of these offerings provided an abundance of artifacts. They included skulls and deities, shells,

coral, copal (incense), and artifacts of many sorts from all over Mesoamerica. Typically, one contained 200 objects in addition to 2,000 stone beads and required five weeks to excavate with a spoon and brush, and to sketch and classify.

Scholars will be analyzing these objects for years to come. Some enthusiasts have even suggested that a new museum should be built just to display the rich discoveries of the Great Temple.

In the meantime, the temple itself has documented a wide array of information. Each Aztec ruler wanted to leave his mark upon the city. Each expanded and repaired the temple during his reign. Floods and the settling of a soft lake bottom made repairs necessary. As a result, we have found eleven different facades on the front of the Great Temple, though only five of those structures represented enlargements of the building on all sides (pages 768-9).



Fluid artistry *of a stone conch shell* ***(facing page)*** *could grace a modern art museum, its rhythm a flowing contrast to the traditionally rigid Aztec style. A symbol of life's eternal forces—of movement, rain, the sea, fertility—it was buried behind the main temple under several colonial and late Aztec strata. Men worked like ants to build the sacred structures. Now scores meticulously uncover their remains* ***(above)****, giving new substance to the dramatic history of the Aztecs.*

THE OLDEST CONSTRUCTION uncovered thus far has enabled us to understand the temple from an archaeological viewpoint. At the top of the structure, facing the entrance to the sanctuary on the Huitzilopochtli side, the sacrificial stone itself was discovered. This was the same simple tezontle stone on which so many of the Aztecs' victims died. The dimensions of the stone coincide with those given by Sahagún in his chronicles: "three handbreadths in height, perhaps a bit more, and about two across."

In fact, this stone was found in situ, perfectly built into the floor just two meters from the stairway. It measures 50 by 45 centimeters.

A 16th-century Dominican friar clearly describes the position of the sacrificial block when he says: ". . . in front of these two rooms where these Gods were, there was a patio of 40 square feet, much whitened with limestone and simple, in the center of which there was a somewhat pointed green stone . . . over which a man was tossed on his back and forced to bend his body over this stone used to sacrifice men."

On the Tlaloc side, in the same position as the stone in front of the other sanctuary, we found a multicolored Chacmool, a divine messenger, the familiar Mesoamerican reclining figure who is thought to represent a symbolic intermediary between the priest and the god.

At the entrance of the Tlaloc sanctuary stand two stone pillars decorated on the outside with designs of the water god's eyes and stripes of red, blue, black, and white. Inside, the pillars depict standing figures, handsomely decorated in color.

The interior of the worship area seems to comprise two sections. In one of them we found a long bench. Chronicles tell us that

the god stood upon this bench. Priests probably used the other section.

In both sanctuaries we found wooden remains of the pillars; these objects must have been ornate, since several chroniclers reported in great detail the richly ornamented woodwork.

How old is this, the oldest part of the Great Temple? Judging from the size and materials, these sanctuaries may have been built before A.D. 1428, the year the Aztecs completely established their independence from the other peoples in the great valley.

Archaeologists, of course, are never satisfied. We can ponder the words Cortés wrote his king: "The most important of these idols . . . I had taken from their places and thrown down the steps . . . which caused Mutezuma and other natives some sorrow."

The deposed statue of Huitzilopochtli, large as it was, disappeared. Was it buried like other important pieces near this very site? The answer must await the work of future archaeologists—or ditchdiggers. □

A NATION'S QUANDARY Coal vs.

By FRANÇOIS LEYDET

Parklands

Photographs by DEWITT JONES

***Exquisite forms** of stream-carved sandstone are seen from a canyon floor near the Utah-Arizona border. Will exploitation of the region's mineral resources threaten such beauty?*

Since the cancellation of a Kaiparowits power project in 1976, coal companies have eyed other ventures—building coal-gasification plants or a railroad to ship coal to the West coast and foreign markets.

DIXIE NATIONAL FOREST

CEDAR BREAKS NATIONAL MONUMENT

Cedar City

Kolob Terrace

ZION NATIONAL PARK

TO HOOVER DAM POWER PLANT

Allen Wash P.

St. George

WARNER VALLEY POWER PLANT

COAL-SLURRY PIPELINE

Proposed coal-slurry pipeline and power plants near Las Vegas and in Warner Valley would send most of the electricity produced to California.

Kanab Cr.

Orderville

Vermilion Cliffs

Kanab

Johnson Canyon

BRYCE CANYON NATIONAL PARK

Paunsaugunt Plateau

Yellow Jk.

Alton

COAL STRIP MINE AND PROCESSING PLANT

Bryce Canyon

DIXIE NATIONAL FOREST

FISHLAKE NATIONAL FOREST

Escalante R.

Escalante

Boulder

CAPITOL REEF NATIONAL PARK

Gulliver Creek

Dirty Devil R.

Henry Mts.

Trachyte Mesa

Teasdale

GLEN CANYON NATIONAL RECREATION AREA

Kaiparowits Plateau

Fiftymile Mountain

Glen Canyon Dam

Lake Powell

NAVAJO POWER PLANT

Page

Navajo Mountain

RAINBOW BRIDGE NAT. MONUMENT

NATURAL BRIDGES NAT. MONUMENT

Monument Mesa

San Juan

GRAND CANYON NATIONAL PARK

Mt. Trumbull

Kaibab Plateau

Grand Canyon

KAIBAB NATIONAL FOREST

Colorado

Colorado R.

UTAH

ARIZONA

110°

111°

112°

113°

37°

36°

The Navajo sandstone (gray) is interlaced with mineral-rich formations and fossil-fuel deposits found at varying levels beneath the surface.

KOLOB COALFIELD

The Kolob and Alton coalfields lie adjacent to Zion and Bryce National Parks. Utah's coal deposits comprise 4 percent of the nation's reserves.

ALTON COALFIELD

LIMIT OF NAVAJO SANDSTONE

Cattle ranchers fear that water drawn from the Navajo sandstone aquifer (gray) for the slurry pipeline would reduce flows from their wells and nearby streams.

KAIPAROWITS PLATEAU COALFIELD

HENRY MOUNTAINS COALFIELD

TAR SANDS

Rocketing price of oil focuses interest on outcroppings of oil-bearing tar sands (dark green) and tar sands covered by rock (light green).

Extensive deposits of uranium are shown in pink. Red pick-and-shovel symbols indicate active mines.

MAPS BY GRAHAM BOOAR
COMPILED BY JOHN A. TAYLOR
NATIONAL GEOGRAPHIC ART DIVISION

Salt Lake City ★

UTAH

ENLARGED

Grandeur above ground *and wealth below spark confrontation: town versus government versus corporation versus environmentalist. Heart of the controversy is a project that would pipe coal in a water slurry from Alton, top left, to power plants in Utah and Nevada. Federal and state officials examine a stack of studies to decide on the venture.*

Map encompasses some of the world's finest scenery: all or part of six national parks and five national forests, the Glen Canyon National Recreation Area, three national monuments, plus primitive and wilderness study areas.

KANAB, UTAH. Population 4,250. Elevation 4,969 feet. Seat of Kane County. Junction of U. S. Highways 89 and 89-A. If you're looking for a scenic drive, take any road out of town. It's 43 miles northwest to Zion National Park. Eighty miles north to Bryce Canyon National Park. East 76 miles, and you cross the Colorado River at Glen Canyon Dam. South into Arizona, just three miles away, and another 75 miles brings you to the Grand Canyon's North Rim.

Motels, restaurants, banks, and shops line the highway. In the center of town stands the Church of Jesus Christ of Latter-day Saints. Tourism is a main business, and this makes some people uneasy: What would gas rationing do to Kanab? There are a few jobs in lumbering across the line in Arizona. There is also ranching—cattle ranged on U. S. Bureau of Land Management (BLM) property, irrigated alfalfa fields.

In fact, there is a good deal of farming right in town. On a balmy spring evening I walk up and down the side streets and note that nearly every house seems to have its vegetable garden, corn patch, and a few fruit trees. Tidy little streets, tidy little houses. Lots of flowers. The scent of lilacs permeates the air. A nice, quiet, safe little Mormon town nestled at the foot of the Vermilion Cliffs, now aglow in the setting sun.

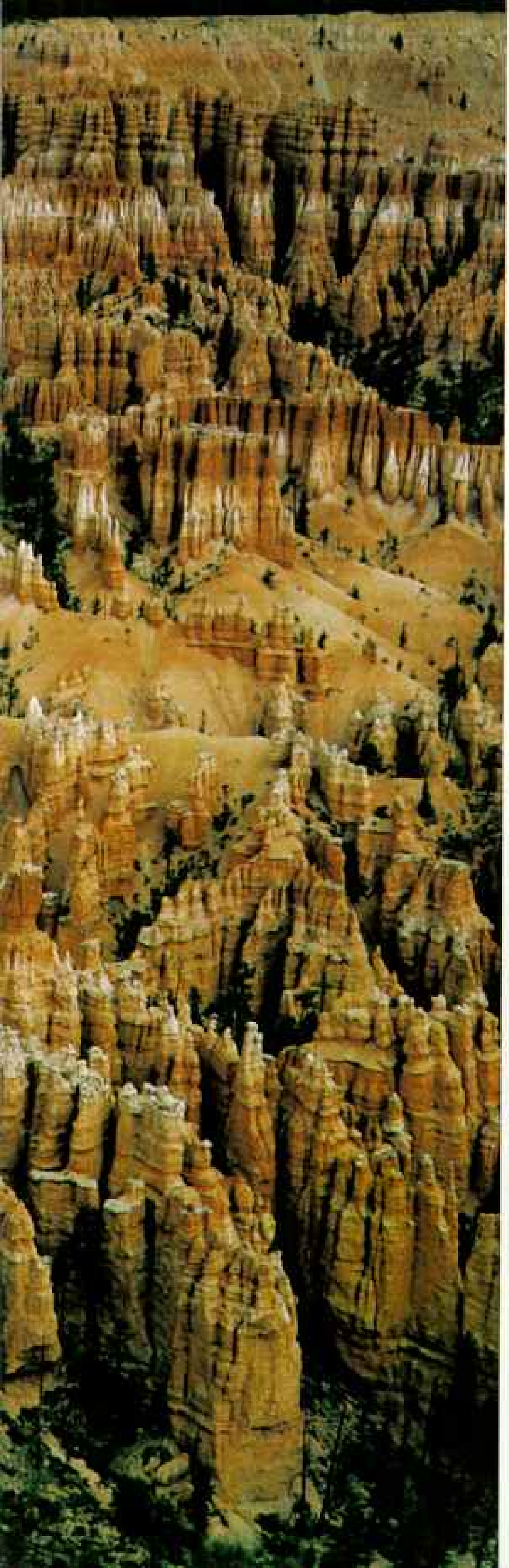
Sleep well tonight, Kanab, I think as I turn back toward my motel. Your days of quiet may be numbered.

During the first half of this year I spent weeks roaming southern Utah. Big things are happening—bigger things may soon happen. They could in the next few years drastically alter the character of this incomparable country of high plateaus and deep canyons, where some of our most splendid national parklands are located. Up to now, its remoteness and tortured topography have largely shielded it from the harsher impacts of industrial civilization.

What I have seen is a concerted drive to open the region to massive exploitation of its wealth of energy-producing coal, uranium, and other minerals. Some of the area's wild beauty, much of its serenity and solitude may be lost in the process. Opponents say that an irreplaceable national heritage is about to be sacrificed for a mess of wattage.

Many cite the proposed Allen-Warner Valley Energy System. It calls for a coal strip mine in the Alton hills 30 miles north of Kanab and only five miles, at one point, from Bryce Canyon National Park, and two coal-fired power plants, one of them 17 miles upwind from Zion National Park.

This controversial project was placed early this year on the administration's proposed Critical Energy Facilities list—energy projects that could reduce our dependence on imported oil and that therefore must receive priority review. It has been the focus of studies by the Department of the Interior's Office of Surface Mining (OSM) and BLM, in cooperation with other agencies, and by the California Public Utilities Commission (CPUC). It has set multibillion-dollar corporations against a coalition of conservation groups. It has posed squarely the question of national priorities.

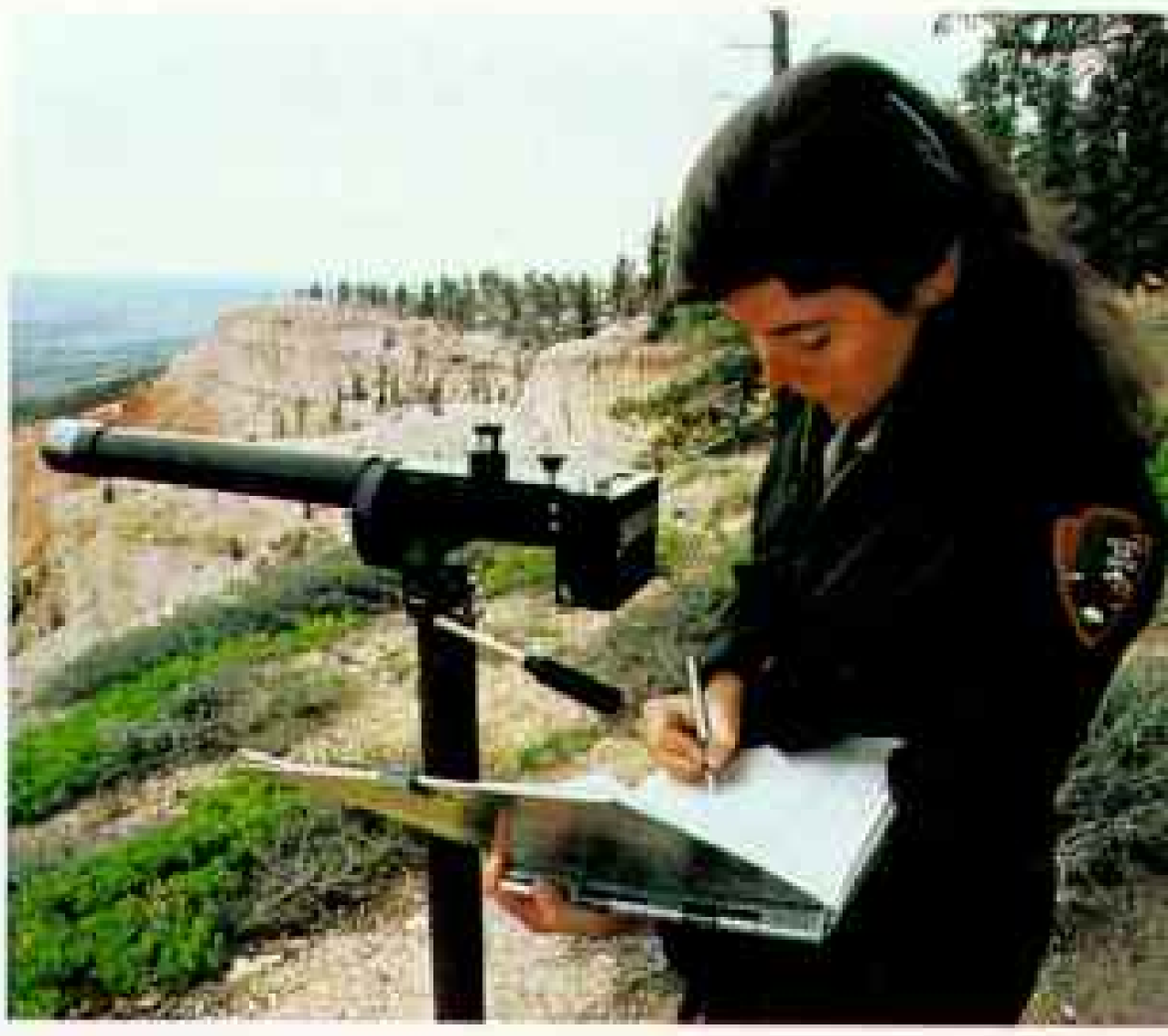


Shortly after this issue of NATIONAL GEOGRAPHIC comes off the press, the fate of Allen-Warner Valley (AWV) is due to be decided by the CPUC and by Secretary of the Interior Cecil D. Andrus. A decision against AWV would be hailed by environmental groups as a refusal to accept possible degradation of our parklands.

Even more important, in their view, such a decision could indicate recognition that it makes sense, economically as well as ecologically, to veer from the "hard path" of big oil, coal, and nuclear power plants and turn to the "soft path" of renewable energy sources and increased conservation.

Take those magnificent 20,000 square miles of southern Utah bounded on the west by Interstate 15, on the north by I-70, on the east by the Colorado River, on the south by the Arizona state line; they form a rhombus roughly 150 miles to the side. I would be tempted to say that within this one comparatively small area lies more fantastically beautiful—and infinitely varied—country than in any other like-size area on earth.

Here are some of our great national parkland treasures: Zion, Bryce Canyon,



Wondrous platoons *of hoodoos—pillars of rock carved by wind and water—stand in Bryce Canyon National Park* ***(left)****. With a network of sensitive instruments* ***(above)*** *to measure visibility here and in other parks, the National Park Service aims to detect and track parcels of dirty air.*

Capitol Reef, Arches, and Canyonlands National Parks; Cedar Breaks National Monument; and Glen Canyon National Recreation Area on Lake Powell.

Here also are areas that many believe deserve national park—or at least wilderness area—status. I have visited the Kaiparowits Plateau's Fiftymile Mountain northeast of Kanab (pages 786-7), an island of solitude frequented mainly by ravens and coyotes and the ghosts of the Anasazi, who long ago abandoned their mesa-top villages.

I have paused, too, in the Robbers' Roost country near Capitol Reef, of which Wallace Stegner wrote: "It is a lovely and terrible wilderness, such a wilderness as Christ and the prophets went out into; harshly and beautifully colored, broken and worn until its bones are exposed, and its great sky without a smudge or taint from Technocracy, and in hidden corners and pockets under its cliffs the sudden poetry of springs."

Stegner wrote that in 1963. The skies, I discovered, are no longer quite so pure. On some days a whitish haze blurs the distant views, causing the colors to be not quite so vibrant and the forms not quite so sharp.

This is not just natural haze from atmospheric moisture, forest fires, or blowing dust. At the Island in the Sky monitoring station in Canyonlands National Park, operated by the Environmental Protection Agency (EPA) and the National Park Service, air-quality scientists told me the haze is composed also of urban smog from as far as Los Angeles, 600 miles away, and emissions from southwestern coal-fired power plants and copper smelters.

Mines Would Bring Massive Change

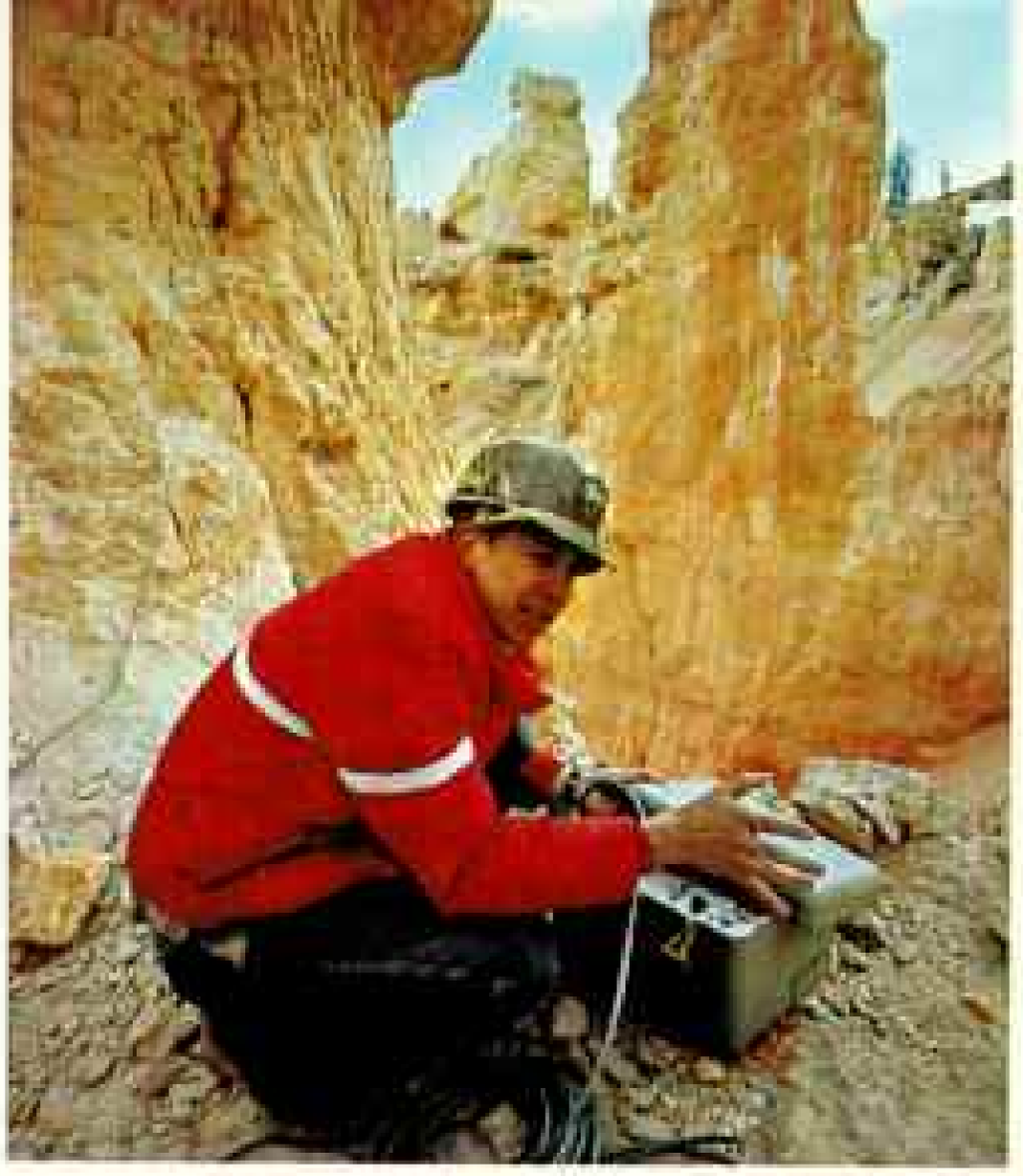
But the changes in the offing threaten much more than degradation of ambient air quality. Last August the BLM released the Kaiparowits Coal Development and Transportation Study. It describes scenarios involving the mining of from three to as much as 75 million tons of coal a year from beneath the plateau, shipping it by yet unbuilt railroads to destinations in Utah or Arizona, and producing by the year 2000 a population increase of perhaps 95,000 souls in Utah's Garfield and Kane Counties, which boast a

total population today of less than 10,000.

Minable coal exists on the Kolob Terrace, next to Zion National Park, and in the Paria Amphitheater, in full view of Bryce Canyon. There are plans to strip-mine coal from the Henry Mountains, adjacent to Capitol Reef National Park. And tar sands underlie parts of the Glen Canyon National Recreation Area, right next to Canyonlands Park.

Uranium is being mined, and a processing mill being built, at Ticaboo near Lake Powell. Now a trailer town (pages 790-91), Ticaboo may burgeon into a permanent (so long as the ore lasts) community of 2,000 inhabitants. Another uranium mill now taints the air at Arches National Park. A coal-gasification plant is proposed near Escalante, to convert coal from the Kaiparowits (if Kaiparowits coal is mined, this little town of 650 could swell by 1995 into a boomtown of 13,500).

Utah's Governor Scott Matheson, an eloquent advocate of solar energy, is keenly aware of the possible effects of such large-scale development and is committed to minimizing them by careful planning. But many



Attempting to restore *nature's balance, Utah International Inc. levels and recontours the land after mining coal at its Navajo Mine near Farmington, New Mexico (**below left**). The art of land reclamation in the parched Southwest is still a learn-as-you-plant process, since in some places grass did not grow before mining.*

Utah International seeded six varieties of native grasses and shrubs on one Navajo plot in 1977, where company spokesmen claim there is now twice as much cover as on adjacent undisturbed land. The firm continues to invest funds in reclamation techniques and is more hopeful about the proposed Alton site, which gets double the rainfall of Navajo.

*At another Utah International mine near Craig, Colorado (**below**), blasting loosens a coal seam. Tests showed that such blasts at Alton, while posing no threat to the Bryce hoodoos (**above**), would nevertheless be heard throughout the park.*

remain doubtful that such projects and environmental quality can coexist.

One snowy morning in Salt Lake City I called on Dr. Joan Coles, a member of the Sierra Club's Energy Committee and a clinical psychologist for the Salt Lake Community Mental Health Center.

"I've had my life threatened at Escalante for saying the things I'm telling you now," she declared. "But I'm tired of the attitude of so many local people that they have disposition power over national treasures like parks because they have the luck to live nearby.

"The trouble with these little towns," she went on, "is that they lack the ordinary entrepreneurship that would create a reasonable number of jobs. Small industry might be happy to locate in places like Escalante or Kanab. Utah labor is renowned for industriousness and dependability. But Escalante needs a few dozen jobs, and what does it do? It wants to develop Kaiparowits."

Like many others I talked with, Dr. Coles cited Rock Springs and Gillette, Wyoming, as paradigms of what can happen when growth outstrips planning: jerry-built boomtowns with transient populations and increased crime and alcoholism.

"Sooner or later," she concluded, "these communities are going to have to adjust their populations to the carrying capacity of the land. It can be done now, or 50 years from now when the coal or whatever is all gone. I don't think anybody owes a town a lease on life in perpetuity. Our own West is full of ghost towns."

If Dr. Coles had expressed these thoughts at the Kane County courthouse in Kanab the day I dropped in to talk with local officials, there might have been an uproar. One young man in particular was fuming.

"Just look at this," he challenged me, dropping a foot-thick pile of papers on the table with a bang. "Wilderness studies, environmental-impact statements, master plans, lease filings. Documents, documents, documents. The feds inundate us at the local level with more data than we can handle.

"Wilderness!" He almost spat out the word. "We don't want one acre of it in Kane County. It's not just what would be locked up in the wilderness areas themselves. If BLM gets a wilderness area, the EPA won't let you do a thing within a hundred miles of it because that might affect the air quality.

"It's the same with the parks. The federal government owns 85 percent of the land in Kane County. We have 16 percent unemployment and no industry. There are thousands of mineral claims—uranium, gold, silver, manganese, copper, lead, gypsum. There are oil, gas, and coal leases. If they'd let us develop some of our resources, we'd be in business. There's enough land here to have beauty *and* development. We don't see that we should be giving everything in the country to preservationists and extremists!"

Here, in one outburst, surfaced some of the antagonisms that rend southern Utah today. Minerals versus parks. Development versus preservation. Us versus Them.

How are "us" and "them" defined in the minds of southern Utahans? More or less as

***Water equals life** in a parched land where branding boys stir dust on a ranch near Orderville, Utah (**right**). Under a rainless sky near Kanab, third-generation rancher Sylvan Johnson (**left**) fears that the coal-slurry pipelines will deplete his water. "Hellawmighty," he asks, "what can I do against Utah International?"*

follows, as I gathered from dozens of talks:

"'Us' is we who are born and raised in southern Utah. Brigham Young sent most of our grandparents here to settle the land and make the desert bloom. We are God-fearing, hardworking, patriotic. We want our kids to stay here. We have lots of kids—the Mormon Church encourages large families. But the kids keep leaving. If they want higher education and good jobs, they have to get them elsewhere. If we could develop this country, perhaps they'd stay.

Getting to Know "Them"

"'Them' is all those outsiders who come here and tell us what we can and can't do. The big decisions that affect our lives are made in Washington or Los Angeles or anywhere but here. We've lost control of our own destinies. 'Them' is all the federal government people—the Park Service, Forest Service, the hated BLM that tells us we're overgrazing and cuts our allotments."

"Them" also is those environmentalists.

"The environmentalists have cost the people of this country billions upon billions of dollars," grated a speaker at a hearing in Kanab on Allen-Warner Valley. "They've weakened our nation in every aspect by stopping every power-producing project."

"Them" is the big corporations too.

"We need them just like we need the tourists—they mean jobs—but we don't really trust them." At a Kanab luncheon attended by top Interior Department officials, one young man asked, "What happens if ten years after the mining ends, Kanab and all these ranches find their wells running dry? Where will Utah International be then?" (Utah International Inc., a General Electric affiliate, would operate the Alton mine.)

At the courthouse I also met Jim Kropf, a young man who made news more than four years ago by burning actor-conservationist Robert Redford in effigy at a rally outside the courthouse (page 788). Redford had been a prominent opponent of a proposed 3,000-megawatt power plant atop the Kaiparowits Plateau, which conservationists successfully fought as the "ultimate obscenity" in an area already "violated" by Glen Canyon Dam and the Navajo power plant.

Would there be another auto-da-fé over Allen-Warner Valley, I asked? "Maybe, if we need to." Who'll be the victim? "Maybe you." Jim Kropf grinned.

If you're planning a big energy project, and you hope to have it approved with a

Spring's last snow *dusts Fiftymile Mountain, under study for designation as a wilderness area. Meanwhile, Exxon prospects here for uranium. The mountain is a southern spur of the Kaiparowits Plateau, which broods over billions of tons of coal. Delaying actions by environmentalists and uncertain demand killed a power project on the Kaiparowits in 1976.*

minimum of fuss and bother, then you should dream up something other than the Allen-Warner Valley Energy System. So said many of the staff people I talked with in various government agencies.

First, there is the attention-getting energy source itself: 300 million tons of minable, fair-quality coal. Extracting it requires strip-mining 10,000 acres at the base of the Paunsaugunt Plateau, some of them in a

nine-mile swath smack under the noses of 300,000 visitors a year who come to admire the spectacular panorama from Yovimpa Point in Bryce Canyon National Park.

To get that coal to destination, you'd probably use a slurry-pipeline system, in which coal is ground and mixed with water pumped from wells drilled deep into the Navajo sandstone aquifer. But that is bound to stir up the local people, who in a dry region are jealous of their water—"It's our lifeblood," they'll tell you again and again.

Also, since you plan to pipe the major part of the coal-water slurry out of state, 183 miles to the proposed 2,000-megawatt Harry Allen plant near Las Vegas, Nevada, you've got to provide some beneficial use to Utah for exporting its water. So you have to mollify the town boosters at St. George by offering to divert a good part of the Virgin

River into a 55,000-acre-foot reservoir in Warner Valley. (You need 10,000 acre-feet of that water to cool your proposed 500-megawatt Warner Valley plant, terminus of your other slurry pipeline.)

This diversion arouses the Fish and Wildlife Service, since it might eliminate two small fish: the woundfin minnow, an endangered species, and the Virgin River roundtail chub, a candidate for that distinction.

And the power plants. Unless you want a fight, you do not plunk one down in Warner Valley, 17 miles from Zion National Park, when you know there's a good chance—at least, a lot of protesting people are going to claim there is—that the prevailing southwesterly winds will waft the plumes from your stacks in the direction of the park, whose Class I air quality is inviolate under the 1977 Clean Air Act.

And you ponder the wisdom of locating your other plant 25 miles from Las Vegas, when there's a good possibility that its emissions, added to those from the Reid Gardner plant, will at times degrade Las Vegas's air below Class II standards. That will cause the EPA to blow the whistle on you.

Finally, you might just wonder what the local folk would say about using Utah coal and water and polluting Utah and Nevada air, when about 85 percent of the wattage initially will hum away across the Mojave Desert to power hair dryers in Orange County or microwave ovens in Berkeley.

Brawn and brains *combine in Jim Kropf of Kanab (***right***), who participated in an effigy burning of actor Robert Redford (***above***), an opponent of the Kaiparowits project. Former computer expert and a founder of ALIVE—American League for Industry and Vital Energy—Kropf drives a truck, bounces the unruly from an Arizona bar, helps coach high-school footballers, and says, "World, we're small here, but you have to listen to us once in a while."*

Battle Lines Form Over AWV

"Utilities may be a lot of things, but we're not masochists," John Arlidge told me in Las Vegas. He is manager of special projects for Nevada Power Company and overall project manager of the AWV Energy System for the sponsoring corporations—Pacific Gas and Electric, Southern California Edison, Nevada Power Company, along with the city of St. George. John was talking about the difficulties of raising huge amounts of capital (AWV will cost about 3.5 billion dollars), and insisting they would not go to the trouble if they did not feel they had to.

Part of the rationale for AWV is that Nevada Power Company, through its subsidiary Nevada Electric Investment Company, and Utah International Inc. hold leases in the Alton coalfield. Also, coal surface-mined at Alton and slurried to the Harry Allen plant near Las Vegas might be less expensive than the alternative: coal deep-mined in central Utah and shipped to Las Vegas by rail.

Evidently these advantages seemed sufficient to the AWV Energy System's sponsors. They presented their plans to all the government agencies, federal and state, whose approval would be necessary. And the predictable storm was not long in coming.

In November 1979 the Environmental Defense Fund, the Sierra Club, and Friends


COURT HOUSE
CAT

of the Earth petitioned the Office of Surface Mining to declare the Alton coalfields unsuitable for surface mining. This was the first test of Section 522 of the 1977 Surface Mining Act, which provides for such a designation if mining would "adversely affect any publicly owned park" or "result in a substantial loss or reduction of long-range productivity of water supply or of food or fiber products" of renewable resource lands.

In May 1980 I attended the first public hearing on the petition. Some 200 people had gathered in a large windowless basement hall of a Kanab motel to talk about that Alton coalfield north of town. Spokesmen for the environmental groups—and a surprising number of local citizens—stressed the damage they felt the mine would cause to Bryce Canyon National Park.

They claimed that dust from mining would ruin the matchless visibility, that blasting might topple the delicate pinnacles and spires—a fear that tests have since allayed (page 783). They decried the sights and sounds of a large strip mine—with its draglines, bulldozers, haul roads, 120-ton coal trucks—and the eventual huge scar if reclamation proved unsuccessful. All these would be incompatible, the speakers insisted, with the experience that visitors to Yovimpa Point had the right to expect.

Another charge in the petition—that the surface disturbance and mining of groundwater from the Navajo aquifer would threaten the area's water supply—worried many local citizens deeply. It was this concern that had caused several ranchers to become copetitioners with the environmental groups, in an alliance that a year or two earlier would have seemed unthinkable.

"How Am I Going to Ranch?"

I drove up beautiful Johnson Canyon, a few miles east of Kanab, one afternoon and stopped to chat with some of these ranchers. Jet Mackelprang, a burly former marine whose grandparents settled in Johnson Canyon in the 1860s, stood feeding his peacocks outside his house, set in a deep bay in a pink Navajo sandstone cliff. His irrigated fields raise fodder for about a hundred cattle.

"With a thousand miners driving up and down that road every day between Kanab and the mine, how am I going to ranch?" he wanted to know. "Like other ranchers in the canyon, I drive my cattle along that road when I move them from one pasture to another. How am I going to do that with all that traffic? And the dust—you can imagine what that will be like! Those cows are finicky eaters—they don't eat grass that has too much dust on it.

"Once we settle down, *life will be pretty good in Ticaboo," says miner Kim Wilson* ***(left)****. He lives in a trailer town fathered by a Plateau Resources Ltd. uranium mine nearby.*

All by itself north of Lake Powell, Ticaboo has a motel, grocery store, laundry, and school; developers look forward to a bank, restaurant, and gas station.

Lots are available for workers to build homes. "We're trying to avoid the stigma of a company town," a developer says.

"As for the water," Jet went on, "all I have comes from springs and streams. If they tear up the land, the springs will dry up. If they mine at Alton, we're done for in Johnson Canyon."

"That's nonsense," said John Ferrell, Alton project manager for Utah International, when I relayed these words. "Those people have prior water rights that are protected by state law. Besides, we'd be crazy to start mining if we didn't know we could count on enough water for the 35-year life of the mine. We'll have monitoring wells to tell us exactly what the water table is doing at all times."

"Why haven't you done the testing by now, and proved your case?" I asked.

"We drilled and test-pumped a well in 1978 and 1979," he replied. "And this past summer we began a program to drill and pump a much larger well—one that can eventually be used as the first of ten full-size production wells."

John is a personable, thoughtful young Coloradan, an amateur photographer, a lover of music. He escorted me on a comprehensive three-day tour of UII's Trapper Mine near Craig, Colorado, its huge Navajo Mine near Farmington, New Mexico, and the Alton site.

The scale of the operations left me in awe: the great strips, the gargantuan equipment —especially the walking draglines with 30-cubic-yard buckets at the end of 300-foot booms, operated by one person exerting fingertip pressure on a couple of levers.

I saw that if huge equipment can dig gigantic pits, it can also fill them in. The mined-over strips, once recontoured, had a fairly natural look (pages 782-3). Too, there was less noise and rather less dust than I had anticipated. Certainly the mining of coal at Navajo seemed to cause less air pollution than is produced by its burning at the adjacent Four Corners power plant, a smoke-belching mammoth.

Revegetation efforts appeared successful to my untrained eye, although Office of Surface Mining experts had doubts. Cover had been achieved at the Navajo Mine, they said, but it was yet to be proved that the new growth would be self-sustaining. As for the small test plots we saw at the Alton site, they told only part of what to expect after the real mining, the OSM experts said.

The big question still begged: Would surface mining, tolerable in the environs of Craig or Farmington, be equally acceptable beside Bryce Canyon National Park?

A bright afternoon in late May comes to mind. I am standing at Yovimpa Point, elevation 9,100 feet, near the southern tip of the park. A stiff, pine-scented wind makes me

Delicate Arch crowns a ridge in Arches National Park near Moab.

Controversial smog occasionally smudges the park's southern reaches.

December 18, 1979 9:30 a.m. Smog trapped by a temperature inversion envelops the Moab Valley.

December 19, 1979 2:25 p.m. Clear. Atlas Minerals' uranium mill stands at right center.

July 4, 1980 8:00 a.m. Thin pall of smog drifts from the mill toward Arches.

STEVE SWANKE

July 11, 1980 8:20 a.m. Valley filled, mill obscured. Smog generally dissipates by noon.

CHARLIE PETERSON; ALL COURTESY NATIONAL PARK SERVICE

clutch my Stetson. I watch the swifts as they swoop out over the abyss and wheel around the hoodoos—those fantastic stone goblins carved from the Pink Cliffs by wind and rain and frost. Three thousand square miles of high desert fall away to the southern horizon, where the Kaibab Plateau screens the great chasm of the Grand Canyon.

Eighty-five miles east southeast, beyond the straight scarp of the Kaiparowits Plateau, looms the dome of Navajo Mountain. Mount Trumbull, 90 miles southwest, is etched sharply against the sky.

"*Unglaublich!*—Unbelievable!" I hear someone say. I strike up a conversation with five tourists, who turn out to be young people from Holland and Switzerland, conversing in German. They ask me about the view, and I point out the piñon- and juniper-clad Alton hills, which begin just five miles below us to the south and undulate to the west till they disappear behind the point off to our right. Those hills, I explain, are the site of a proposed coal strip mine.

"Ah, the energy crisis," the Dutchman nods. "*Aber, gibt es keine Alternative?*—But, are there no alternatives?"

There is also a small party of French

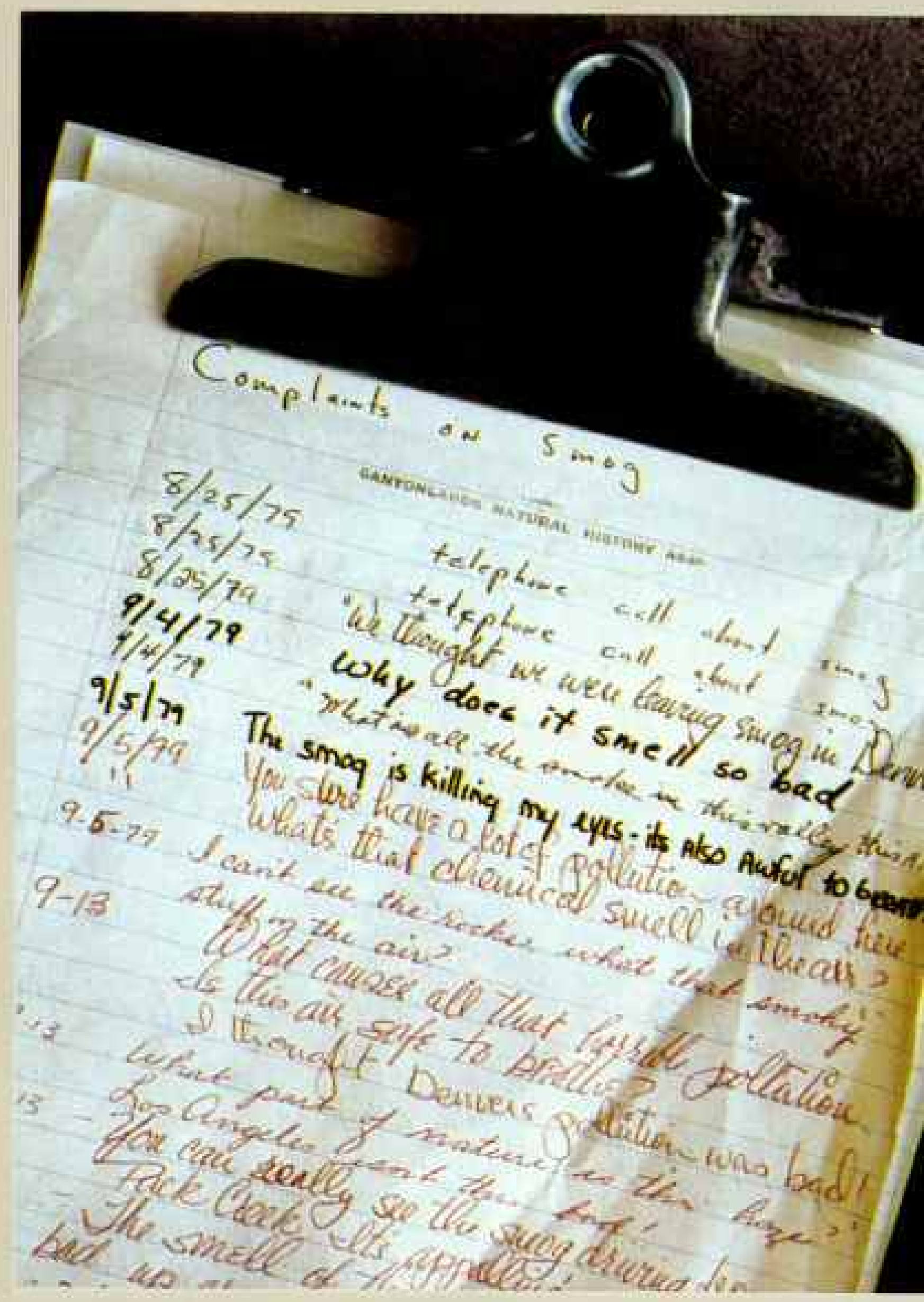
"Why does it smell so bad?"

*PUNGENT COMMENTS by visitors are recorded (**right**) at Arches. Rangers' photographs document the occasional smog (**left**) that seems to issue from Atlas Minerals' uranium mill.*

"We get blamed for everything," say mill officials. Troy Black, Moab fire chief, feels that inversions confine fumes from vehicles and winter wood fires.

Newspaperwoman Adrien Taylor estimates that Atlas contributes 50 percent of the park's smog. "You can see it drifting toward Arches some days," she says, "but not enough to make it a big deal."

Rangers feel the mill is the primary culprit; the Nuclear Regulatory Commission has said Atlas meets standards for radioactive emissions. Meanwhile, the Park Service is completing a study of particulate matter.



people. When I mention the mine, one old gentleman looks shocked: "But surely the United States doesn't need this coal? There must be coal elsewhere, isn't there?"

Indeed there is, I assure him. Utah has about 23.5 billion tons of it, and that is only 1.4 percent of all coal reserves in the U. S. Alton's reserves represent little more than a hundredth of that 1.4 percent. "If what you say is true," the Frenchman says, "and the government sanctions the mine, then you've got your national priorities upside down"—an opinion echoed by an overwhelming majority of visitors who responded to a Park Service questionnaire this summer.

What *should* be the order of priorities? On a sparkling early morning in July, a morning so clear that Navajo Mountain seemed only a yodel away, a top-level task force of Department of the Interior officials gathered at Yovimpa Point to ponder that question. They included three assistant secretaries: Joan Davenport of Energy and Minerals, Bob Herbst of Fish and Wildlife and Parks, and Guy Martin of Land and Water.

Joan asked me to point out the mine site. I gestured at a wooded hill five miles away. "Oh, my, that *does* look close," she said.

John Ferrell was present too, putting on a brave show though upstaged by the set. The view was not so pristine as it seemed, he said, waving at areas the BLM had cleared of piñon and juniper for grazing. Only 400 acres a year would be mined, mostly out of view. It would all be reclaimed. The visitors' experience would not be diminished.

Bob Herbst was unconvinced: "No matter what they do, you're going to see it. Any intrusion would destroy that view."

Guy Martin was noncommittal. His domain includes the BLM, which administers 40 percent of Utah's acreage. The state's governor, Scott Matheson, has strongly supported the Alton mine, provided that the water question is resolved. National policy is to push coal; a lot of coal lies in BLM lands; these lands are dedicated to multiple use; mining is a legitimate use.

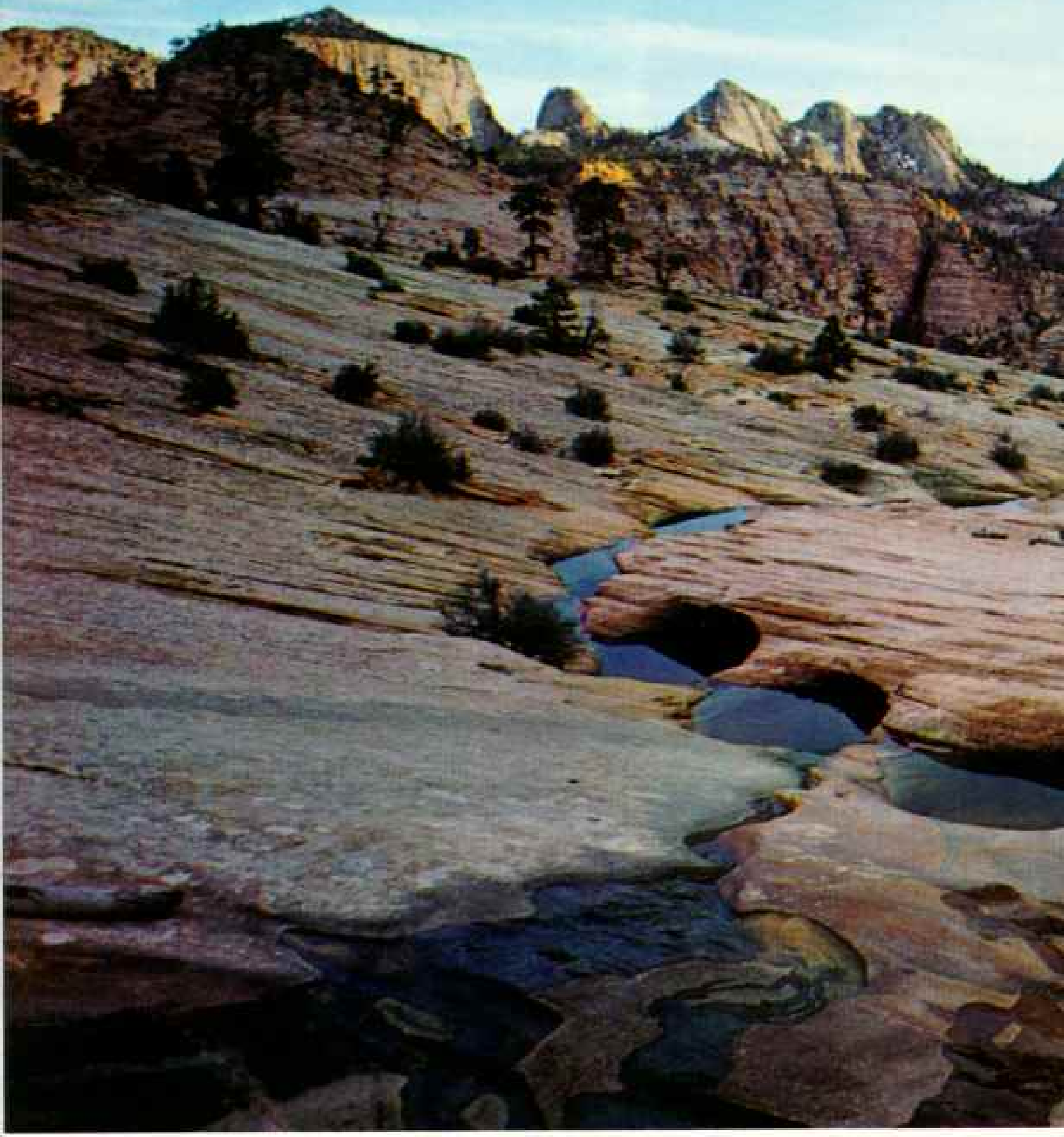
Earlier this year, when I spoke with Guy in his Washington office, he had said to me: "Three years ago the secretary of the interior was faced with a yes-or-no decision on the Kaiparowits power plant. We want to avoid that with Allen-Warner Valley. We want to present the secretary with a range of alternatives so he can say yes to *something*."

How now, brown cloud? *Precipitators at the coal-fired Navajo Generating Station near Page, Arizona (**left**), can remove 99.5 percent of the fly ash. But inversions can trap ten tons an hour of combined sulfur dioxide and nitrogen oxide—the latter sometimes causing a plume to curl above Lake Powell, at top. Scrubbers to purge SO_2 would cost hundreds of millions of dollars, and there is no commercially available nitrogen oxide removal equipment in the U. S. Power from the station is wired (**below**) to Phoenix and Tucson, California and Nevada.*

As it turned out, no less than five alternative courses of action (and a sixth, "no action") were outlined in BLM's comprehensive Allen-Warner Valley Energy System draft environmental-impact statement, issued at the end of June. Alternative 1 is the utilities' proposal; alternatives 2, 3, and 4 are variations thereof.

Alternative 5, however, is less an alternative *of* AWV than an alternative *to* it. It corresponds closely to the Environmental Defense Fund scenario. Instead of more power plants, No. 5 calls for intensification of energy-conservation measures and the development of renewable energy strategies in the utilities' service areas—in particular, solar, geothermal, cogeneration, wind, and biomass conversion. This combination of measures, though unglamorous in itself, could have a spectacular energy potential by 1990 of nearly 7,000 megawatts—almost three times AWV's.

The real shocker to the project's proponents was the assessment of need. Chapter one states, "Independent verifications of the need for power indicate that 1,828 megawatts from the AWV Energy System would be needed by the year 1990"—or less



Potholes brim *with snowmelt in Zion National Park. Will the Warner Valley power plant, sited just 17 miles away, foul the park's air? Citing a study, a proponent says, "I'm an environmentalist, too, and if I thought the plant would destroy the environment, I would oppose it." Still, the Park Service remains skeptical.*

than the planned output of the Harry Allen plant alone. Furthermore, the city of St. George, according to the impact statement, may never need any of the power that it is now slated to get.

I spent a day at the plant and reservoir sites in Warner Valley, a serene expanse of purple-blooming sagebrush curving around the foot of Sand Mountain. My guides were Rudger M. McArthur of the Washington

County Water Conservancy District, sponsor of the diversion project, and John Arlidge of Nevada Power.

Rudger, an intense, outspoken man (following page), seems to develop a megawatt or two of his own energy. He takes the large view. The population of St. George doubles every ten years, he claimed. It was now about 14,000; by 1990 it would top 28,000, 56,000 by the turn of the century, and then slow down to reach 350,000 by 2050.

Rudger said: "Our preferred source of power would have been two dams in the Grand Canyon, but the environmentalists killed those. So Warner Valley is our next choice. We'll own 125 megawatts in that plant. We'll need more than that by 1995. The minute Warner Valley is built, we'll have to start planning our next coal plant."

What of alternative sources of energy? In

Standing in favor *of Warner Valley: Rudger M. McArthur, director of utilities for nearby St. George, Utah, and John Arlidge, Nevada Power project manager. An air-monitoring tower (***above***) marks the plant site, shown in relation to Zion's peaks on the horizon (***facing page***).*

an area with year-round sunshine, couldn't solar play a part? "That's so far down the line we're not even thinking about it," Rudger replied. "We need the power. We need the water. Allen-Warner Valley is a good project. Let's get it done!"

Not all St. Georgians I spoke with agreed with McArthur's growth predictions, or saw such growth as desirable. Nor did all view AWV as necessary, even if the predictions were to come true. As Dr. Carlyle Stout, a prominent physician, put it, "Utah Power and Light has supplied the state very well and has indicated willingness to sell St. George all the power it wants."

Agencies Push Soft-path Alternatives

The BLM's draft environmental-impact statement relies heavily on information supplied by the California Public Utilities Commission and the California Energy Commission. Perhaps more than their counterparts in any other state, these two agencies have been knocking down the utilities' inflated need forecasts and pressing them to implement alternative soft-path strategies.

Much of this year the CPUC has held hearings in San Francisco on the AWV Energy System, preparatory to granting or denying Pacific Gas and Electric and Southern California Edison the "certificate of public convenience and necessity" they must have to invest in an out-of-state power project.

In a sense, the CPUC holds the trump card: If it finds that the utilities do not need the power, or have better ways to develop it, AWV will be dead, no matter the decision on the Alton unsuitability petition and no matter the findings on the impact of Warner Valley on Zion National Park. The CPUC staff position translates into a "yes" on the Harry Allen plant near Las Vegas, fueled by coal trains from central Utah mines, and a "no" on the Warner Valley plant.

"What we're saying," CPUC's AWV project manager Ron Knecht explained to me, "is that if other plants being built come on line, then there is no need for either plant to ensure system reliability—to prevent brownouts, in other words. There *is* a need to displace oil. This is our criterion: Is a given proposal better or worse than continuing to burn oil in generating electricity? We think Harry Allen is better. So are a lot of

the conservation and alternative-energy possibilities we are recommending that the commission *mandate* the utilities to develop. It could turn out that Harry Allen would be the last big conventional plant to be built in the Southwest."

"Even that would be too much," according to the Environmental Defense Fund's West coast regional counsel David Roe. He had just handed me EDF's computer-based analysis of AWV Alternative 1 and of EDF's own soft-path scenario. "Harry Allen works economically," he said, "only if *none* of the conservation and other alternative measures are carried out. If Harry Allen is built, and utilities do no more along these lines than the CPUC has *already* ordered them to do, then the energy produced will cost a great deal more than planned over the lifetime of the plant, because it will operate at less than 40 percent capacity. The lesson is that you can't have *both* the plant *and* conservation. And conservation is cheaper."

The California Public Utilities Commission is due to decide this month. If it adopts its staff's position, or even EDF's, the secretary of the interior will have a convenient out when he rules on the Allen-Warner Valley applications. And the chimera of a strip mine below Yovimpa Point would vanish, at least for a time.

Hardest Question Still Unanswered

But the coal would still lie in wait at Alton, and there would likely be other plans to dig it. So would it be with the Kaiparowits. One evening not long ago, I camped on Smoky Mountain, a spur of the plateau. An enormous full moon rose slowly over Navajo Mountain. In the stillness of the wilderness I sat motionless, marveling at the ever repeated yet ever miraculous drama.

That same moon, I thought, had shone on the Cretaceous forest buried beneath me that was now metamorphosed into coal. For perhaps a million centuries that coal had lain there. Would it all be dug and burned in the next half century? I thought of all this glorious land I had traveled in southern Utah. I thought of the frantic rush by our unthrifty society to wrest from the earth in a few short decades the stores that nature has guarded for eons. What would we leave to the generations yet unborn? □

Cupping the Colorado, *Glen Canyon Dam* ***(above)*** *sends Lake Powell snaking up a hundred canyons, even under Rainbow Bridge National Monument* ***(facing page)****. While dam and lake provide electric power and boating pleasure, enabling many to view Rainbow, some scientists voice concern over the possible collapse of the arch from erosion or slippage. Federal officials say there is no danger. Almost everybody agrees that sedimentation will fill Lake Powell in two or three centuries.*

AFTER AN EMPIRE...

Portugal

By WILLIAM GRAVES
SENIOR ASSISTANT EDITOR

Photographs by
BRUNO BARBEY
MAGNUM

THERE WAS A TIME when I thought St. Rita of Cascia must surely be the patron saint of Portugal. St. Rita's specialty is defending hopeless causes, and among all who qualify for her tender mercies, Portugal ranks second to none.

Torn by dissension, bereft of a global empire, saddled with debt and soaring inflation, Portugal by any standard is a country in serious trouble. Any standard, that is, except Portuguese.

"What nonsense," declares my friend João Cutileiro, the great Portuguese sculptor. "This country has been in trouble on and off for the past 800 years, ever since it was founded. Believe me, this is nothing compared with the 14th century—now *there* was trouble." He grins.

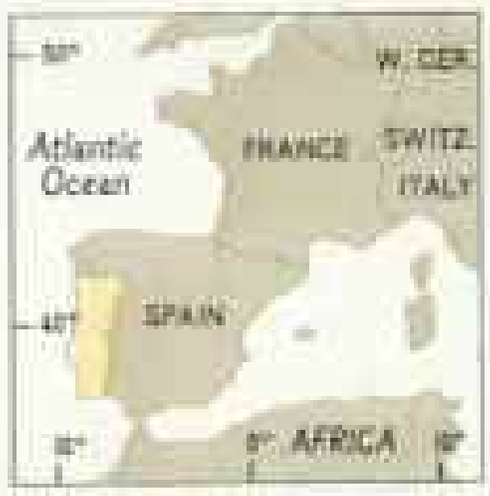
"But somehow the country has survived, and somehow I think it always will: Can you imagine a world without Portugal?"

Frankly I can't. After spending two months in João's country, I have to agree that a world without Portugal would be *uma mesa sem vinho*—a table without wine. Or to put it another way, *impossível*.

What Portugal contributes to the world is a matter of opinion, or rather of 9,866,000

Phalanxes of cabanas expand the

beachhead of vacationers who crowd fishing boats at Nazaré.



Anchorage on Europe's southwestern edge, Portugal has long made the sea its highway, harnessing the wind to colonize vast areas of Africa, Asia, and South America. Though the empire waned, a hundred million persons still speak the Portuguese language. A world leader in sardine fishing, cork production, and port wine, the country now cultivates the fastest growing tourist industry in Europe.

GOVERNMENT: Republic. **AREA:** 92,082 sq km (35,553 sq mi). **POPULATION:** 9,866,000. **RELIGION:** Roman Catholic. **ECONOMY:** Tourism, textiles, cork, seafood, wine, timber and timber products. **MAJOR CITIES:** Lisbon, capital (1,612,000); Porto (1,315,000). **CLIMATE:** Generally warm and dry in the south; wet, cold winters in the north.

Graceful as gondolas, *moliceiros* ***(above)*** *race near Aveiro. Portugal's mastery of sailing reached its height when explorers ventured to India, the Orient, and the New World in sturdy caravels. Europe's foremost geographers and astronomers traded ideas at a school founded by Prince Henry the Navigator about 1418. Today a youth hostel occupies the school's reconstructed buildings on Sagres Point* ***(left)****.*

opinions—one for every Portuguese. No two opinions match, for the Portuguese are fiercely individualistic, though all agree their country's contributions are unique.

They have a point. Despite its troubles and its small size—35,553 square miles, or little more than the area of Maine—Portugal is blessed with a variety of assets in addition to the Portuguese themselves.

What the nation lacks in size it makes up for in location. Portugal occupies a key stretch of Europe's Atlantic coastline, facing west toward the New World and south along the great sea routes to Africa. During the 15th century, Portuguese seamanship and daring combined with geography to launch a golden age of discovery and lay the foundations of Portuguese empire for half a millennium to come. Thanks to the country's once worldwide dominions, some hundred million people today speak Portuguese as their mother tongue.

Among material assets Portugal lists such varied items as the world's largest cork industry, a leading sardine fishery, Europe's fastest growing tourist trade, and a monopoly on a rare blend of distilled and fermented ingredients known to connoisseurs the world over as port wine. And finally there is an asset called Lisbon.

No one knows who founded Portugal's capital city and major port, though many believe it was a Phoenician or Greek settlement before the Romans arrived during the third century B.C. Some sources attribute Lisbon's name to the hero of the Odyssey—the city appears on several medieval maps as Olissibona, literally "Ulysses the good."

The Romans were merely the first in an endless succession of invaders that included the Suevians, the Visigoths, the Moors, and the Spaniards.

The resulting racial mix has spared Portugal at least one agony common to other nations, that of an ethnic problem. "We're all ethnics together," a Portuguese friend declares happily. "Who can afford to discriminate?"

Song and dance *sweeten the task of stomping grapes in the Douro region, where some wine makers still favor the human touch to the mechanical press.*

Who indeed, though the Portuguese lack of discrimination once hurt Lisbon in the eyes of the free world. During World War II, when Portugal chose to remain neutral, Lisbon earned an unenviable reputation for intrigue and treachery, thanks to a steady influx of foreign agents from both sides.

The influx continues, though in vastly different form. Today five million foreign visitors a year descend on Portugal, most of them by way of Lisbon. Annual revenue from the business amounts to some 900 million dollars in badly needed foreign exchange. Only the funds sent home by Portuguese living abroad—estimated last year at 2.4 billion dollars—exceed tourism as a source of income for the country.

PORTUGAL'S THRESHOLD on the world is wide as well as beautiful. Once known as the City of Seven Hills, Lisbon now occupies more than a dozen heights overlooking the mouth of the Tagus River on the Atlantic. Beneath a gleaming canopy of orange-tile roofs, the old city surrounds its new high-rise office buildings like some vast and colorful tide encircling a cluster of giant pilings.

As befits a seafaring town, Lisbon crowds close to the water's edge, lining the riverbank with its oldest and most colorful districts. Among the picturesque quarters of Alfama, Graça, and Bairro Alto, the city reveals a unique debt to the past.

Perhaps more than to any other people Portugal is beholden to the Moors, who occupied the southern portion of the country for more than 500 years, until the middle of the 13th century. Superb sailors, craftsmen, designers, and architects, the Moors left an indelible mark on Portugal, not only in the character and appearance of its people but in their style of living as well.

Among the winding thoroughfares and steep slopes of the old quarters one finds Moorish influence in the profusion of graceful arches and latticed windows, in the soft contrast of orange tile against whitewashed clay, and in shadowy inner courtyards heavy with the fragrance of lemon and almond trees. There is Moorish influence, too, in the songs of Gina Guerra.

Senhora Guerra is one of Lisbon's *fadistas*, a group of talented vocalists who specialize in a particular form of musical heartbreak known as fado. Combining elements of Moorish fatalism with chivalric romance, fado appeals to the Portuguese spirit of *saudade*, a term meaning, roughly, longing for what might have been. On a good night Senhora Guerra can reduce an entire audience to grateful despair.

After one such performance at a café in Bairro Alto, a friend introduced me to Senhora Guerra. I was new to Portugal then, and I envisioned fado as typical of the country's troubles—a preoccupation with misfortune and the futility of life. Senhora Guerra kindly corrected me.

"Fado," she explained, "deals essentially

LOREN MCINTYRE (FACING PAGE)

***Westernmost capital** in continental Europe, high-rise Lisbon (**right**) grows around a bullring where—unlike Spanish toreros—Portuguese toureiros do not kill the bull. An ancient settlement overlooking the Tagus River, Lisbon tasted the cultures of a series of invaders while staying distinctly Portuguese. A strong Moorish flavor prevails in the appearance of her people and in the buildings of her waterfront older quarters.*

*German industry, seeking skilled labor at low cost, invaded Portugal in 1976. Portuguese hands now assemble Leica cameras (**left**) in this factory in a suburb of Porto, Portugal's second largest city.*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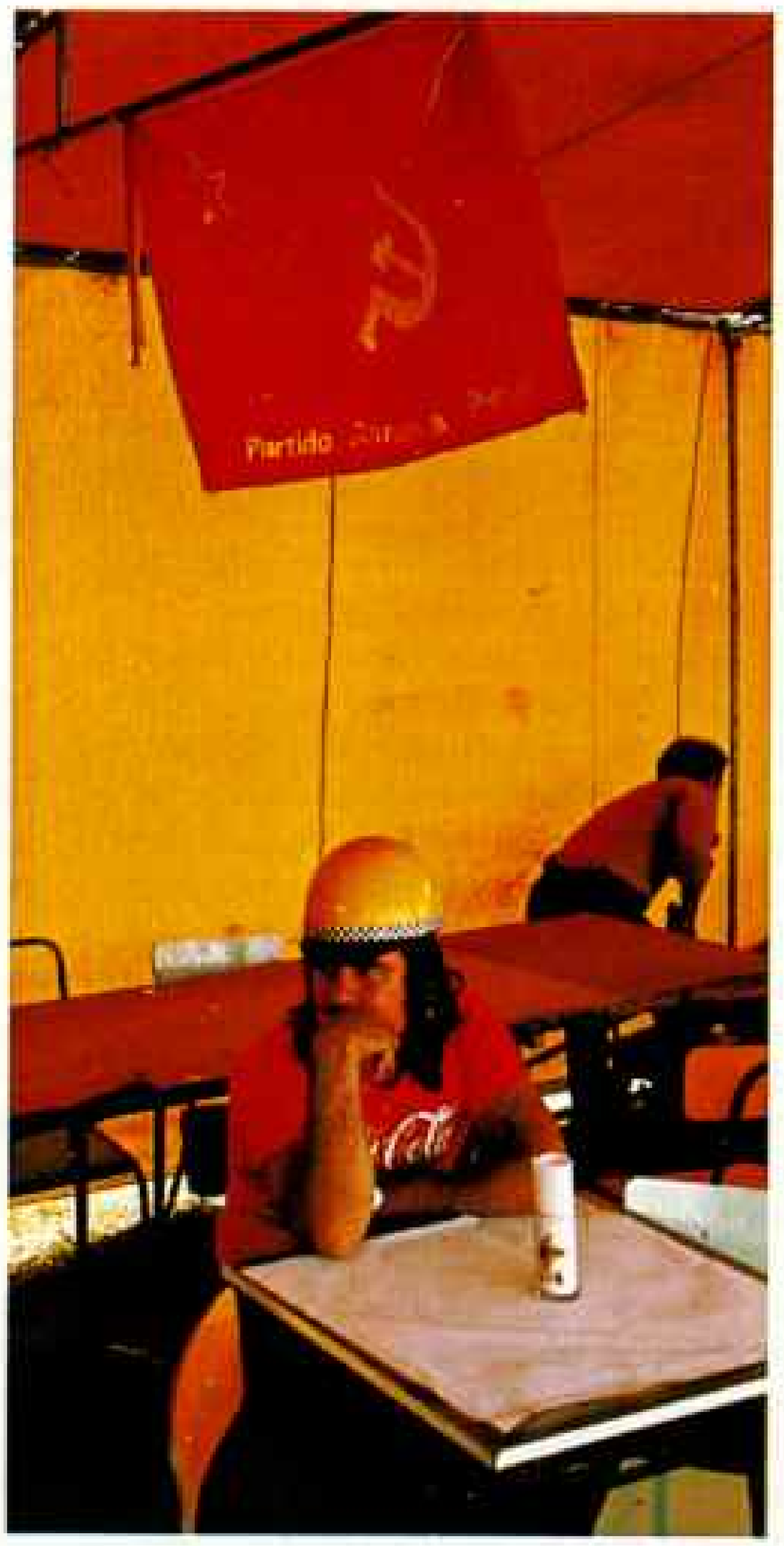
EXPRESSO
GREVE GERAL



The political pendulum *swung free when more than 40 years of conservative dictatorship ended in an almost bloodless coup in 1974. Eleven governments formed and fell in the next five years. Since the revolution the annual May 1 parade attracts celebrators from all sectors of Portugal's left wing to Lisbon's Alameda D. Afonso Henriques* ***(left)****.*

At a fair in the fruitful Alentejo farming region, the hammer and sickle hangs over a guest at a poorly attended Communist Party hospitality tent ***(right)****. Many predicted a Communist regime for a nation suffering from the lowest per capita income in Western Europe, mounting unemployment, and rapacious inflation, but Portugal has swung toward moderate government under a socialist constitution adopted in 1976.*

Revolution also spelled an end to the empire. When Angola, Mozambique, and other colonies gained freedom, Portugal was suddenly engulfed by half a million retornados—refugees who found asylum in the motherland. Faced with Lisbon's housing shortage, squatters still find shelter in illegal shacks ***(above)*** *tolerated by a beleaguered government.*

with love, and therefore with sorrow. The two are inseparable, and it is merely that bittersweet quality of life, not hopelessness, that fado portrays.

"You have a type of fado in your own country called the blues. It is a lovely form and certainly very sad, but it does not mean you Americans are a troubled people simply because you enjoy it."

ALMOST NO ONE in Lisbon feels a sense of saudade for the years prior to 1974. For nearly half a century before that time Portugal endured the dictatorship established by António Salazar. Salazar came to power in 1932, following two decades of political turmoil that succeeded the centuries-old monarchy.

Salazar ruled for the next 36 years, until a disabling stroke in 1968 forced the appointment of a successor, Marcello Caetano. Six years later, on the morning of April 25, 1974, a group of young army officers in Lisbon overthrew the Caetano regime and declared Portugal a republic.

"The country simply exploded with joy," recalls Maria Paula, then a young journalist in Lisbon and now the wife of a newspaper editor. "April 25 was a true revolution, not just a coup, and the people knew it. Those were incredible days for Portugal, with street demonstrations, political rallies, and public debates—all the things that had been forbidden us for more than 40 years."

Incredible, too, was the small number of fatalities. Despite universal chaos, apparently only five people died throughout the country, two of them accidentally. Rarely in history has an entire nation changed hands at so little cost in human lives and suffering.

"It was typically Portuguese," Maria remarks. "We are a passionate people, but we do not like violence. If you have seen a Portuguese bullfight, you will understand: Everything is done with great spirit and fanfare, but the outcome is always predictable—very few are injured and no one dies, not even the bull. Someone has said that we Portuguese practice politics the same way."

Someone doesn't know what he's talking about. Nothing compares to Portuguese politics for sheer uncertainty and confusion. During the six years following the 1974 revolution, the country has had no fewer than a dozen different governments—six of them provisional, one Communist-controlled, and at least eleven doomed to eventual collapse. "We're so fond of democratic government," one politician told me ruefully, "we can't seem to get enough of it."

Fortunately for the country one man has enjoyed continuity of office—a widely respected former general who is now president, António Ramalho Eanes. Elected in 1976 for a four-year term, Ramalho Eanes is running this month for a second term.

April 25, as the revolution is universally known in Portugal, marked an end as well as a beginning in the country's political fortunes. On July 27, 1974, three months after establishment of the new republic, Portugal announced it was officially abandoning its overseas empire. By the end of the following year the country had granted independence to two giant African colonies, Angola and Mozambique, as well as to several smaller possessions. Only the Azores, Madeira, and the tiny outpost of Macao near Hong Kong remained attached to the home country.

In that single stroke Portugal reduced its total land area by 95 percent and its global population by 65 percent. As a result, the country suddenly found itself deluged by half a million *retornados*—refugees of Portuguese or colonial origin who found it either impossible or unsafe to remain in the former possessions.

"It was a bad time," a hotel manager in Lisbon told me. "There was no place to put half a million extra people—or so it seemed, until someone thought of the Algarve, our famous southern vacation coast. The bottom had dropped out of the tourist industry—nobody cares much for other people's revolutions—and resort hotels were closing down for lack of business. So the retornados moved into four-star hotels in the Algarve as subsidized guests of the government, and the problem was solved."

It was an expensive solution, one that nearly bankrupted the country. Portugal's already weakened economy nearly collapsed under the strain. Prompt United States aid helped the government pay for the refugee airlift, and over the next five years U. S. grants and loans to Portugal totaled a billion dollars. Even today, however, the country is suffering from a staggering 20

percent inflation and interest rates to match.

From a refugee center the Algarve once more has become a leading vacation area for Europeans and Americans. With its gentle climate, unpolluted seas, miles of empty beaches, and a growing number of resort hotels, the Algarve accounts for a large percentage of Portugal's 900-million-dollar yearly tourist trade (pages 828-9). It remains one of Europe's major bargains; in less frequented areas visitors to the Algarve can live comfortably for as little as $25 a day.

The refugees who saved Portugal's tourist business in 1974 have long since dispersed throughout the country.

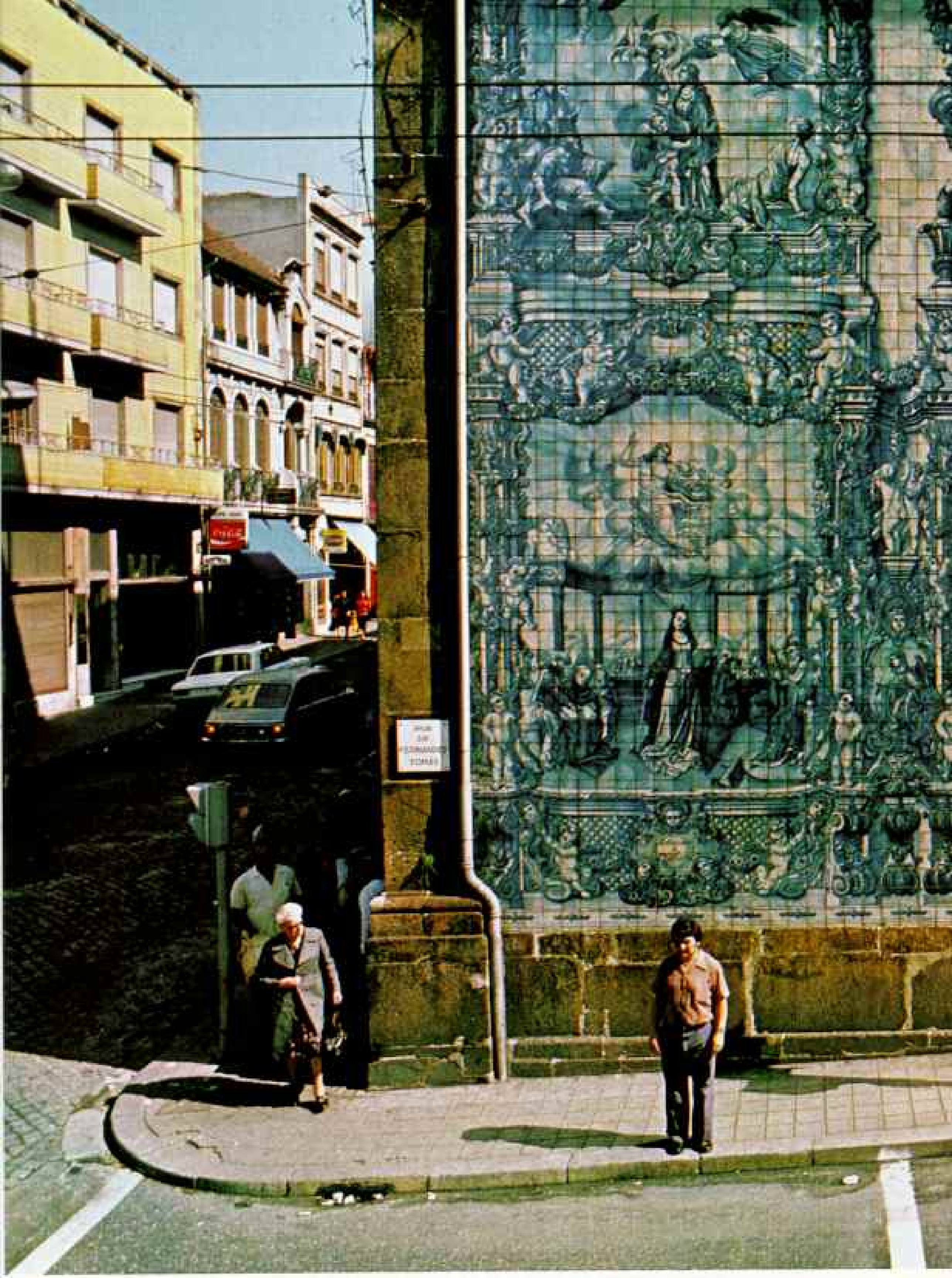
"In the end," says Antonio Ribeiro, Portugal's able commissioner of refugees, "the retornados were a blessing rather than a burden on us. They were the enterprising ones, you see—the Portuguese who went abroad to start new careers and businesses in the colonies. They brought those talents home with them, and once they got on their feet, they did the same thing here.

"Today thousands of small businesses and professional jobs are filled by retornados, including several high government posts. In a way it's appropriate that the United States helped bring them back, for they are the same type of people who colonized your country and made it great."

MANY WHO LEFT PORTUGAL for careers elsewhere have no intention of remaining abroad. From the day Isabel Alves's parents went to Paris ten years ago, they have always planned to return home. Meanwhile, Isabel lives with her grandmother and looks forward to her parents' yearly visits. Each time they come, she hopes it will be for good, but at the age of 14 she knows better.

I met Isabel in the north of Portugal, in a region known as the Douro. The Douro is famous for dramatic scenery featuring forested mountains, winding river gorges, and sun-drenched hillsides heavily embroidered with vineyards (pages 820-21).

Division of labor *in the Douro wine region lets the man stay behind while the woman handles the load. The 55-gallon drum she balances is empty, but it still weighs 25 pounds. Men pull their weight in the fields and carry their burdens on their backs, often aided by a tumpline, a sling across the forehead.*



Baroque celebration of Christian faith shimmers from glazed tiles called

azulejos—from the Persian for "blue"—on an 18th-century church in Porto.

What the vineyards produce is equally famous, for the Douro is port wine country—an area of some 950 square miles whose unique combination of climate, soil, and type of vine creates the only true port in the world.

Despite its annual production of 20 million gallons, the port wine industry employs relatively few people. Like the majority of farms in northern Portugal, the vineyards of the Douro are mostly small holdings worked by single families with the help of extra hands at harvesttime.

As a result, northern Portugal has a chronic surplus of people over jobs, a problem facing thousands of families such as that of Isabel Alves. Many solve the problem by emigrating temporarily to one of Europe's more industrialized countries, such as West Germany, Switzerland, or France. There they take whatever unskilled jobs are available and save with the one purpose of returning home to retire.

I met Isabel during harvest season. A pretty girl with a quiet manner, she told me her father and mother live and work on the outskirts of Paris. Her father manages three separate jobs: one in a commercial laundry, another as a gardener, and the third cleaning offices at night. Her mother works full time as a housemaid.

Isabel's parents are hardly alone on the job. Paris today is the third largest Portuguese city, thanks to half a million resident workers. Only metropolitan Lisbon and Porto, with more than a million residents each, have larger Portuguese populations.

"My parents never speak of friends," Isabel remarked. Then she added quickly: "They are very nice people, but they have so little time. After ten years I don't think they even know much about Paris itself."

Isabel's situation is common in the Douro.

Morning fog drifts down *the Douro River* ***(above)*** *and through a century-old bridge in Porto, hub of Portugal's populous north and gateway to the Douro port wine region. A trolley advertisement* ***(right)*** *touts a shirt as the kind preferred by Europeans. Such slogans increase as Portugal looks toward membership in the European Common Market in 1983.*


EUROPA
137
A CAMISA DOS
EUROPEUS

LOREN MCINTYRE (LEFT)

Sweet port wine *flows from once barren land in the Douro* ***(left)****, where hills of stone were terraced and packed with soil. The British developed Portugal's wine industry in the 18th century. Local farmers, many of British descent, now own most of the vineyards. Their resistance to nationalizing farmland was credited with preventing a Communist takeover in 1975. Portugal plugs its own bottles and then some; the country produces two-thirds of the world's cork. Freshly stripped of its spongy bark, a fiery red cork tree* ***(above)*** *will wait nine years before another harvest.*

Out of 27 children in her school class, a third have parents who work abroad. I asked when her father and mother plan to come home to stay, and she answered hesitantly, "Perhaps in four or five years. If things go well, they will have saved enough by then to build a house in the Douro and retire."

By that time Isabel will be 19—old enough to marry and, quite possibly, forced to work abroad. I asked if she would mind it.

"Yes," she acknowledged, "but many of my friends will do the same. If I have sons or daughters, my parents will care for them as my grandmother has done for me. I will miss them, but it cannot be helped. Still, it would be nice if one day nobody had to leave the Douro—especially for the children."

UNLIKE ISABEL's parents, Joaquim Sequeira has never left the Douro. For most of his 65 years he has worked in the wine-growing business and is now *procurador*, or chief steward, of a large family vineyard in a part of the Douro that lies in Trás os Montes, literally "beyond the mountains."

At Quinta do Castelo, Senhor Sequeira welcomed me and took me on a brief inspection of the vineyards. Most of the vines had been stripped, and the grapes were being wheeled in fragrant cartloads to a huge building called the *lagar*. Through the doorway I could hear a steady chant like that of troops marching to cadence. I stepped inside and found half a dozen young men marching in unison through a sea of grapes.

They walked abreast, arms over one another's shoulders, chanting to keep in step as they strode back and forth through an enormous stone tank partially filled with grapes. The grapes were already up to their knees, and from time to time crews of harvesters dumped more basketloads into the tank. Amid the slightly dizzying fumes of fermenting grapes I asked Senhor Sequeira if I could join in the pressing.

"You are more than welcome," he answered, "though it is not as easy as it looks, especially when the level of the grapes gets higher. Your shorts will be permanently dyed the color of port wine, but in Trás os Montes that is considered fashionable."

Removing trousers, socks, and shoes, I joined the line of marchers in the tank and

A farmer shepherds his goats *home* ***(above)*** *after a day of dove hunting in the Alentejo, a spacious plain of grainfields and groves of cork and olive trees. The Alentejo sun warms the stark walls of Estremoz* ***(right)****, site of 17th-century fortifications erected against Spanish invaders. Now the Portuguese feud among themselves over the land. Vast absentee-owner farms were seized and divided after the 1974 revolution. The region's overall productivity dropped, prompting moves to restore some of the land to the original owners, but many Alentejanos resist a return to what they consider serfdom.*

soon found that Senhor Sequeira was right. The partially crushed grapes were like quicksand, dragging at my legs as I tried to keep pace with my partners. The grapes were surprisingly cold, the footing was slippery, and the fumes grew steadily stronger.

As the level of the grapes crept above our knees and we were forced to lift our legs higher, we looked like a group of men parading in the bottom halves of their red-flannel underwear. After 20 minutes of marching, I had had enough and rejoined Senhor Sequeira outside the tank.

Later, over a glass of delicious 30-year-old port, Senhor Sequeira explained the advantages of crushing grapes by foot rather than by mechanical press, which is slowly overtaking Portugal's wine industry.

"The press," he said, "crushes stems and seeds as well as the fruit, and gives the juice a slightly bitter taste. The human touch is gentler and starts the wine out in a happy mood. It is a slower process, but in my opinion it is worth it."

Once the juice has partially fermented, it is put in barrels and fortified with a measure of *aguardente*—wine that has been distilled into brandy. The ratio is one part aguardente to four parts wine, producing an alcohol content as high as 20 percent. Months later the port wine is trucked to the city of Porto, some 60 miles west of the Douro region on the Atlantic coast. There, under the supervision of licensed shippers, as many as a dozen wines are blended together.

"From there the port goes into a cask to age," Senhor Sequeira said. "If the blender, the wines, and the years all do their work well, the result will be something like this." He raised a small decanter and refilled our glasses before I could stop him.

I remarked that a guest in the Douro had to guard against too much hospitality, and Senhor Sequeira laughed.

"We have a saying that on the way home when you see three roads in front of you, take the one in the center. It is the real road."

From Trás os Montes I took the center road to Porto and paid a call on Michael Symington, an Englishman whose family has lived in Portugal for three generations. Since 1882 the Symingtons have produced fine port wine through their firm, Silva and Cosens, Ltd. At Michael's invitation I joined him and his wife for dinner at a restaurant near the old district of Vila Nova de Gaia, where the wine companies are located.

WITH COFFEE the talk turned to Portuguese politics, and I learned of another side to the Douro. According to Michael, the small farmers and winegrowers of northern Portugal saved the country from a Communist takeover in the spring of 1975.

"That was the year of our first national elections after the revolution," Michael explained. "As election day approached, it looked as if the PCP, Portugal's Communist Party, might attempt to seize control of the country through a coup. The United States and Western Europe were both concerned, for Portugal is a member of NATO, and a Communist victory meant almost certain withdrawal.

"Even to us the prospects looked grim. The Communists controlled most of southern Portugal, including areas like Alentejo, where the great landed estates had been broken up after the revolution. In addition, the PCP had strong support in the industrial cities like Setúbal and in the working districts of Lisbon.

"What the Communists needed was the north. Almost half of Portugal's population lives in the northern third of the country, and we're basically conservative: loyal to the Catholic Church, bound by close family ties, and devoted to the principle of private property—even if that property amounts to no more than a single acre of farmland or vineyard.

"At first," Michael continued, "the Communist campaign went well in the north. They appealed to the little man, avoided a fight with the church, and soft-pedaled the party line. Then they made an incredible mistake: They repeated an earlier campaign pledge to abolish private property.

"Well, naturally most of us knew that was their ultimate goal, but to announce it publicly was fatal. The northerners overwhelmingly rejected the PCP, and by election day the whole country had been turned around. Even today the Communists don't like to talk about it."

The Communists, however, are happy to discuss the United States, as I learned

during a brief visit to Coimbra University. Coimbra is Portugal's oldest and most respected institution of higher learning, a historic center of conservative teaching.

Recently Coimbra has begun to shed some of its sober trappings as well as its conservative philosophy. In place of the long black capes once worn by Coimbra students, the campus today runs strictly to T-shirts and faded blue jeans.

After a brief tour of the university I was invited to join a group of students discussing international affairs. Several of the group turned out to be members of Portugal's Communist Party and were openly critical of the United States. I wasn't prepared, however, for the level of ignorance some of them displayed.

"Your country," one student charged, "calls itself democratic, but you support oppression everywhere—in Rhodesia, South Africa, Korea, Pakistan, Libya. . . ."

I held up a hand. *Libya?*

"Yes," he insisted. "Egypt is an enemy of Libyan independence, and it is well known that the United States supports Egypt's criminal president, Anwar Sadat."

At that point, I'm afraid, I did the unpardonable: I laughed. To my surprise a number of the group joined in and I heard someone say: "He forgot to mention Ethiopia again."

From Coimbra I made my way to the village of Nazaré and a memorable voyage with Tome Limpinho. Nazaré, named for Christ's childhood home, is a travel poster come to life. Nestled at the base of a great rampart of 300-foot-high cliffs facing the Atlantic, the village's cluster of whitewashed houses overlooks a seawall forever garlanded with drying nets. Beyond the wall Nazaré's fleet of brightly painted fishing boats lies beached and ready for sea.

The postcard image is misleading, for Nazaré is a working community whose men have put to sea for more than three centuries. Many in their time fished the Grand Banks of Newfoundland under sail, gathering rich harvests of *bacalhau*, or cod, and occasionally giving their lives in exchange.

Nowadays Nazaré sends a few diesel-powered boats to distant Atlantic grounds in summer, but much of the fishing takes place only a mile or two offshore. There in smaller craft restricted by law to oars instead of engines, the men of Nazaré seine by night for sardines and for the slightly larger fish called *carapau*.

Nazaré's welcome to visitors normally stops at the water's edge, but Captain Limpinho made an exception in my case. In the rough but workable French we discovered in common, he invited me to join him and his seven-man crew for a night's fishing aboard his 28-foot boat, *Julio*.

It turned out badly. The sea developed a nasty chop, the carapau were scarce, and the seine finally tore on a submerged rock. After six frustrating hours we came ashore with a hundred carapau for our pains—too few for market and barely enough to divide among *Julio*'s crew. Captain Limpinho collected his share of a dozen fish, then took me cheerfully by the arm.

"Now," he declared, "you and I will proceed to enjoy this miserable evening!"

It was an understatement. Returning through the deserted streets to the Limpinho house, we grilled the carapau over a charcoal brazier and devoured them whole along with a bottle or two of strong red wine. Dawn had begun to edge the great line of cliffs above the village when at last we said good-bye.

"The net will be repaired in a day or two," Captain Limpinho assured me, "and *Julio* will go back to work. You are welcome to join us at any time." He shook my hand. "Consider Nazaré your home."

I DO, along with the Red Carnation farm in the region known as Alentejo. No area of Portugal is more hospitable to strangers or more deeply divided within itself. Even today, six years after the April 25 revolution, Alentejo suffers from the bitter hatreds and resentments that infect the entire country.

At issue are the vast and fertile plains that stretch east and south from the Tagus River and form the granary of Portugal. Located along the historic route of conquest through Spain, Alentejo has suffered for centuries at the hands of invader and defender alike. It is no accident that Évora, the region's largest city, has a coat of arms featuring two severed human heads.

Even the weather plots against Alentejo

with wild extremes. "We have six months of winter," Alentejanos joke grimly, "and six months of hell."

Alentejo's difficulties stem from a feudal tradition of vast family estates whose owners were known as *latifundiarios*. For centuries the latifundiarios ruled supreme, and the Alentejanos were little more than serfs. Then came April 25.

"Within hours of the revolution," a longtime American observer in Alentejo told me, "groups of army officers and Alentejanos simply drove up to the doors of the estates in jeeps and said, 'Give us the keys.'"

In less than a year a total of 3.7 million acres—roughly 25 percent of Portugal's forests and cropland—was seized from the estates and turned over to the Alentejanos, mostly in the form of cooperatives.

"It was a victory for the little man," says my American friend, "but the cost was high. The Alentejanos are farmers, not managers, and the cooperatives simply couldn't equal the latifundiarios in efficiency. Today

*"**It still makes us remember** the beautiful times," reads the inscription on a moliceiro docked at Aveiro (**above**). Once used to harvest Atlantic seaweeds for fertilizer, most moliceiros now stay close to shore as pleasure boats with prows decorated for good luck.*

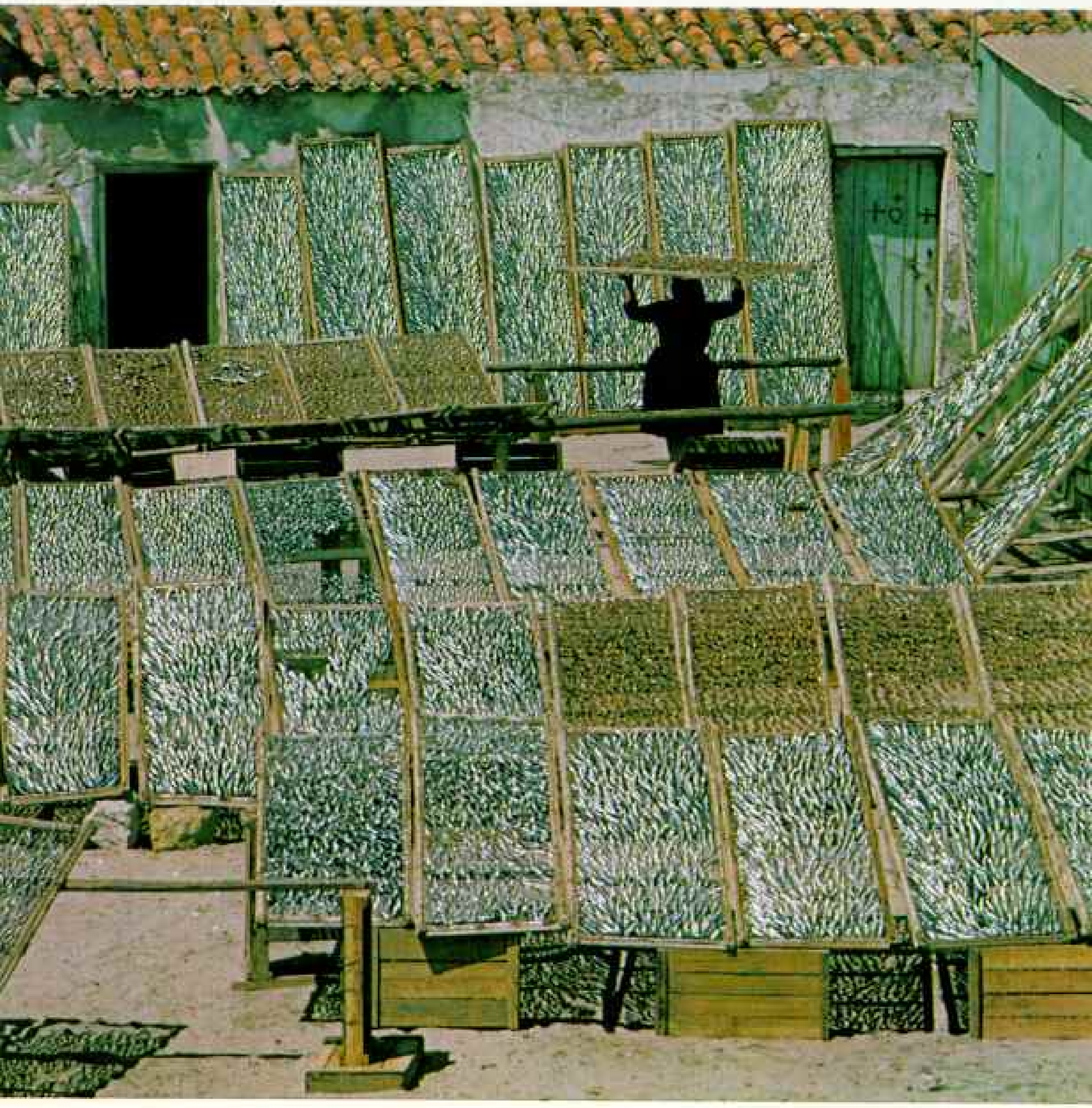
*Besides their love for sardines, the Portuguese also relish the carapau, or mackerel; a silvery harvest dries in the sun at Nazaré (**right**).*

Alentejo produces only a third to a half of the grain and livestock it supplied before the revolution, and the country is hurting. Portugal is due to join Europe's Common Market in 1983, and agriculture traditionally has been one of the country's mainstays.

"Recently," my friend added, "there's been a move to return a sizable amount of land to the latifundiarios, and the Alentejanos have vowed to fight it to the death. It's really an insoluble problem."

Not to João Deus. In João's opinion all Alentejo needs is more farms like his own Coletiva Agricola de Cravo Vermelho and the latifundiarios will be out of business. João's farm is named for the red carnation—*cravo vermelho*—that became the symbol for April 25. The collective comprises 1,500 acres of prime Alentejo land and employs 325 people.

"Before the revolution it employed only 50 people," João told me when I called at the farm just west of the city of Évora. "The latifundiario who owned it grew cork trees



LOREN MCINTYRE

Gingerbread castles *and boxy beach housing share the terrain of a country eager for visitors with money to trade for memories. The fabulous Palácio da Pena at Sintra* (**above**)*, built in the 1840s for Portugal's Queen Maria II by her young German consort, reflects Spanish and Moorish influences on the German architect.*

No such eclectic indulgence inspired the hotels and condominiums shooting up in the Algarve (**right**)*, a playground on the southern coast blessed with a Mediterranean climate. Vacationers steered clear of Portugal after the 1974 coup; they now arrive in ever increasing numbers. Retornados took on hotel and restaurant jobs to help build a 900-million-dollar tourism industry.*

and hunted partridges on it." He snorted. "Imagine—1,500 acres of good land to grow nothing but cork and partridges!"

João and his fellow workers have changed all that. Today the Red Carnation produces wheat, corn, hay, apples, pigs, cows—and, of course, cork and partridges.

Cork trees, João explained, mature at the age of about 15 years and are stripped every nine years thereafter of their spongy outer bark. Alentejo, he added, still supplies almost two-thirds of the world's cork.

João indicated a recently harvested tree displaying the distinctive red inner bark left intact by the stripper's knife (page 821). "Some say the cork tree is blushing because it has lost its clothes," he remarked. "Others say it bleeds for Alentejo."

We spent half a day inspecting the farm, and I was impressed both by the energy and the air of determination among its 325 collective owners. Many in the way of Tome Limpinho urged me to consider the Red Carnation my home.

"Last year," João concluded, "we earned a total of 2.5 million escudos [roughly $51,000], and we expect to do even better this year." He swept a hand across the fields. "We don't say that small farmers should have a monopoly on the land—we only believe that whoever owns it should work it."

SOUTH AND WEST of the Red Carnation farm another bitter controversy is brewing. At Cape Sines on the Atlantic coast, the Portuguese government has already poured 500 million dollars into a superport whose eventual price will be more than five billion dollars, and whose future is far from certain.

Designed to rival Europe's other giant terminals, such as the Netherlands' Europoort and France's Bouche du Rhône, Sines hopes to attract oil and other bulk cargoes away from the North Sea and Mediterranean routes to its deepwater facilities on the Atlantic. From there, runs the theory, the cargoes can move by ship, truck, pipeline, and rail to destinations all over Western Europe.

Critics of Sines point to the astronomical cost not only of the terminal itself but also of the transportation network, which will require the cooperation of competing countries such as France.

Other critics cite an earlier failure in long-range planning: a repair dock for million-ton tankers at the LISNAVE shipyard on the Tagus opposite Lisbon. Started in 1969, when such colossal vessels seemed destined for the ways, the dock was completed in 1971, just before the tanker market collapsed and orders were canceled worldwide. The LISNAVE dock never held a million-tonner.

No matter. At least one Portuguese would have applauded Sines as a risk well worth the taking. His name was Henry of Avis, and he lived nearly 600 years ago. The world remembers him better as Prince Henry the Navigator.

One of my last stops in Portugal was Sagres Point in the Algarve, on the country's southwestern corner (pages 806-807). There in the early 15th century Henry founded his famous school of navigation, attracting scholars and experts from all over Europe. And from a nearby port he dispatched his sturdy caravels into what was known and feared as Mare Tenebros—the Sea of Darkness—in search of a world he was convinced lay beyond.

Thanks to Henry's genius, his courage and inspiration, the Sea of Darkness ultimately became a sea of empire, and Portugal followed it to the height of world power. In time the power faded and the empire vanished, but the country and the people have endured.

I stood one afternoon on the cliffs at Sagres, where the land thrusts straight and sheer into the Atlantic like the bowsprit of some long-ago caravel. Through an offshore haze I made out the shapes of a steadily passing stream of ships, rounding the shoulder of Europe and setting a course for the open sea.

All the world seemed to be passing Portugal in review. □

Catching precious sunlight *as it leaves a narrow street, a man takes in the air and the news from his apartment in an old district of Lisbon. At night nearby clubs send out the strains of fado, Portugal's equivalent of the blues. The music's essence isn't doom but consolation, evoked by the sharing of stories of anguish endured.*


SOLIDAR
PEDRO-CANTAS

Fátima: Beacon for

Text by JANE VESSELS NATIONAL GEOGRAPHIC STAFF

Portugal's Faithful

Photographs by BRUNO BARBEY MAGNUM

CAPTIVATED BY BELIEF in a miracle, nearly a million Roman Catholics pilgrimage in prayer and penance each year to the village of Fátima, Portugal, where in 1917 three young shepherds said they had seen the Virgin Mary. Votive offerings to the Virgin from the predominantly Portuguese faithful may include wax models that express gratitude for the healing of children (***left***).

The phenomenon of Fátima began on the 13th of May in a sere pasture where Lucia dos Santos, ten, and her cousins, Francisco and Jacinta Marto, nine and seven, grazed their flocks. A beautiful woman "more brilliant than the sun" appeared above a small oak tree. In dulcet tones she delivered her message: Recite the Rosary—a devotion to the Virgin—to bring peace to a world at war, and make sacrifices for sinners who have no one to pray for them. She promised to return on the 13th day of the next five months, and each month they saw her.

News of the visions attracted increasingly larger crowds to Fátima. An audience of 70,000 surrounded the shepherds by October 13. Although only the children saw the Virgin, many reported that the sun seemed to dance and whirl closer to the earth.

The pasture today is a paved mall stretching to a towering basilica, the Shrine of Our Lady of Fátima. The tiny Chapel of the Apparitions stands in place of the oak, long ago stripped for relics.

Pilgrimages commemorate the six vision dates, most dramatically in May, when an average of 300,000 people observe the rituals.

"O MY JESUS, pardon us, and save us from the fire of hell." In fervent petition for grace, a woman clutches her rosary and surrenders to soaring emotion (***above***).

Devotion to Fátima is strongest in rural areas, and many suppliants travel hundreds of miles partly or entirely on foot for services on the 12th and 13th of the vision months. Limbs swollen from the walk are treated by clinics at the shrine (***left***).

Knees to asphalt, a woman crawls half a mile across the mall to the basilica, shouldering her child to increase her burden (***facing page***). Thin kneepads protect some of the devout during this act of mortification.

Gentle refrains of "Ave Maria" chime throughout the night of the 12th during a candlelight prayer vigil (***overleaf, left***). The sea of believers parts as the statue of Our Lady of Fátima is borne on a flower-covered litter from the chapel to the steps of the shrine for the climactic Mass on the 13th (***overleaf, right***).


PILGRIMAGE is a family affair in Portugal, where many households span three generations. Makeshift tents (***above***) shelter most groups during their stay in Fátima, named for a 12th-century Moorish princess.

Embracing an offering, a woman prepares to give thanks for the child she prayed to conceive (***above right***).

The pilgrimages began as a grass-roots movement, opposed by the government and unsanctioned by the church. Liberals ruling Portugal in 1917 accused the church of fabricating a myth. Wary of anticlerical attacks, most church officials were reluctant to endorse the visions of the peasants.

Positions of both church and state have changed. The Bishop of Leiria declared the visions authentic in 1930, though the church maintains that belief in such apparitions is a matter of individual faith.

Jacinta and Francisco Marto (***right,*** left and center) died of respiratory

NATIONAL CATHOLIC NEWS SERVICE (BELOW)

diseases during childhood. Lucia dos Santos, at right, today lives in seclusion as a nun. Her written accounts detail the Virgin's request for prayers for the conversion of Russia. Some observers believe that the anti-Communist message of Fátima has tempered the success of Portugal's Communist Party.

Whether prayers are political or personal, the pilgrims at Fátima find in their faith assurance that they have been heard. □

DAWN IN THE SERENGETI is a special time. As the horizon colors, the branches of the dark acacia trees begin to catch the first light, and each twig stands out in sharp relief. Soon, if there are clouds, gentle sunrise shades of mauve, pink, and crimson spread over my head.

I slowly sip a cup of coffee before starting my day, sleepily absorbing the soft early light, and watch the dik-diks that tolerate my camp. As long as I am quiet, they will walk between the guy ropes of my tent, pausing to nibble new growth on the bushes.

The view from camp is never the same. Sometimes the difference is as subtle as grass that has dried and browned just a bit more. Sometimes it is as dramatic as the arrival of the wildebeest herds over the hill opposite the camp. At first they come in just a trickle, but soon they are so dense that the sound of thousands of wildebeests grunting to each other is pervasive.

I was first drawn to this place in 1974 by Mzee and Ndutu, two silver-backed jackals, also called black-backed jackals, *Canis mesomelas*. Tamu, their pup, and later her mate, Tipper, drew me back. With approval of Tanzania's National Scientific Research Council, I have returned again and again to study the lives they and ten other jackal pairs live on this wondrous savanna.*

As a predator the little jackal is easily overshadowed by the big cats of the Serengeti Plain. In fact, most people consider jackals to be skulking scavengers who don't

*The author's work, under auspices of the Serengeti Research Institute, has been supported by the Harry Frank Guggenheim Foundation, the National Geographic Society, and the University of Wisconsin.

Jackals of the

ARTICLE AND PHOTOGRAPHS BY

earn their own dinner. While jackals do scavenge at times, these close relatives of the domestic dog are more impressive as agile and lithe hunters.

Moreover, in the seemingly harsh world of survival on the Serengeti, jackals have close-knit families that humans might envy. Jackals are one of the few mammalian species in which male and female probably mate for life. In addition, some offspring stay with their parents and help raise a subsequent litter of pups. This is fascinating behavior, and by carefully documenting it, we may better understand how it evolved.

Watching a family of jackals through most of the days of their lives is, at times, a slow-paced endeavor. I might sit for hours as a jackal sleeps in the cold of early morning, curled up, nose tucked into its furry tail. But once the jackals are awake and active, I must quickly shift mental gears and, with intense concentration, precisely record all their movements and social interactions. This is demanding and exhausting, so I am happy to relax again when the jackals settle down for another nap.

Camping on the Serengeti sounds like adventurous living. But it is much more a matter of living simply. One learns how to enjoy solitude, to repair one's Land-Rover, and to cook special things in a campfire. I derive immense satisfaction, for instance, from being able to bake bread under an upside-down metal bowl covered with hot coals. But at the same time I recognize that few people can be totally self-sufficient. Without the warm hospitality of the staff at nearby Ndutu Lodge, life in the bush would have been much more difficult.

One has time in the Serengeti to recollect.

Serengeti

Branded a devious scavenger *in African legends, the nimble jackal is less well known as a courageous, family-oriented hunter.*

PATRICIA D. MOEHLMAN

I remember a day in 1976 when I decided to watch Tamu. I had first met her when she was a year old and helping her parents raise that year's litter. Now the parents had disappeared, but Tamu was still in the area, holding a portion of their old territory. She had mated with a stranger whom I called Tipper because of a distinctive white tip on his tail.

My camp was on their territory, and it was a short drive in my Land-Rover to their current den, a series of interconnecting holes dug in the ground. Both Tamu and Tipper were curled up in the grass, lying a few yards from each other and close to the den. Tejas, their year-old pup, was lying underneath a thornbush about ten yards distant. He was the only pup of the last year's offspring who had stayed to help Tamu and Tipper with their new litter.

JACKAL PARENTS seem to encourage their young to stay on the home territory by sharing food with them, grooming them, and playing with them. I found it not unusual for both male and female offspring to stay with their parents for as long as two years. They continue to act submissively toward their parents and do not breed while they remain with the family.

Tamu had had a new litter six weeks before. For the first two to three weeks, I knew, she would have spent most of the day in the den with the pups. She would have emerged only briefly every three or four hours, to eat food that Tipper and Tejas would regurgitate for her. Although regurgitated food sounds unpleasant, it is a very efficient way for adults to transport and share food. It enables the mother to stay with her pups during their most vulnerable period.

But now Tamu was beyond those early secluded days of motherhood. One morning she stood, stretched, and trotted toward the south. Tipper went along, leaving Tejas to guard the den. I followed the pair in my Land-Rover, to which the jackals had gradually grown accustomed. It was a perfect moving blind. I could easily stay within 30 yards of Tipper and Tamu as they moved through the brush, foraging for the rodents and fruit that are their staple foods.

Suddenly I saw Tamu standing tense and alert, staring toward the northwest. Tipper

Jostling beneath an adult, *a litter of silver-backed jackal pups (Canis mesomelas) beg for regurgitated food* ***(above).***

Their menu usually includes fruit, rodents, or other small prey the adults have foraged. Meat scavenged from the carcasses of larger animals is a relatively

*small part of the silver-back's diet. A more common victim, an unstriped grass rat caught by a parent, fills the mouth of a month-old silver-back (**left**), while another rat flies through the air (**right**) in a sated adult's game of catch.*

Using a Land-Rover as a mobile blind, the author has spent more than three years studying both the silver-backed, also known as the black-backed, jackal and the golden jackal (Canis aureus) on Tanzania's Serengeti Plain, where their ranges overlap. Active both day and night, silver-backed jackals live mainly in bushlands from Ethiopia to South Africa, while golden jackals prefer shortgrass plains from western Africa to Thailand.

Both species grow to about the size of an Irish terrier.

No room *for jackals at this lion's feast of eland* (**above**).

To join a fresh kill is one of the few reasons jackals stray from their territories. Within areas of about a square mile, monogamous mates share foraging for food, feeding and guarding pups, marking and defending boundaries. A male silver-back stands by as his mate confronts a trespassing female (**right**); *he would attack if the intruder were male.*

Whelping season on the Serengeti is usually in July and August for silver-backs, December and January for goldens. Pups stay near the den for the first four months.

stood about 20 yards away looking in the same direction. Soon I saw another jackal trotting through the brush. Then Tamu, her hair bristling and ears flat back, shot toward the intruder (preceding pages).

The trespasser was Libra, the resident female from the territory to the northwest. Libra retreated into the thornbushes and crouched with ears back and one forepaw extended as if to ward off Tamu's fierce attack. Tamu, snarling with all teeth bared, leaped toward Libra. Libra whirled away and ran flat out toward home, with Tamu in close pursuit.

After chasing Libra to the edge of her territory, Tamu returned to Tipper. He had done nothing to help his mate. Had the intruder been a male, however, the roles would have been reversed. Tipper would have run the trespasser off while Tamu watched. This is standard behavior for silver-backed jackals. Both the female and male mark and defend the boundaries of the approximately one square mile they stake as their feeding territory here in the Serengeti. But I have never seen a male chase off a female, or vice versa.

The reason may be linked with reproduction. If a female permits another female on her territory, she may have to share the male. The male might then have two litters of pups to defend and feed. Since the male has only so much paternal energy, fewer pups would survive if he were to have to divide his care.

Conversely, a male, by excluding others of his sex, ensures that he alone will mate with the female, eliminating the possibility that he will care for pups he did not sire.

IT WAS NOW midmorning and the sun was well up in the sky. Grass rats, diurnal rodents, were active, and Tipper and Tamu each caught several. They also stopped beneath so-called desert date trees, *Balanites aegyptiaca*, to eat the fallen fruit. Then, with full bellies, Tipper and Tamu headed home. They were greeted by Tejas. He wagged his tail and crouched beneath them, licking their muzzles. Tipper bared his teeth to the young jackal in an open-mouthed threat, asserting his dominance.

Tamu trotted past Tejas, whimpering softly, calling her four pups out of the den to nurse and to feed on regurgitated rat and fruit. Tejas retreated to the shade of a thornbush to watch.

Why do young jackals like Tejas stay on to help tend younger brothers and sisters? I have studied seventeen litters of pups, and twelve have had such helpers. Clearly, another family member capable of hunting and fighting is important to pup survival. Pairs that had no helpers raised on the average only one pup. With just a single helper, three pups survived. I observed one family

Life or death *for many pups depends on an older brother or sister. Juveniles who stay an extra year to help feed and protect a new litter from predators greatly increase pup survivals. With just one helper at a den, three pups in a litter of six may live, compared to one with parents only. And by helping rear his little brother, this young silver-back (**right**) does as much to continue his genes as he would by raising a pup of his own.*

*Attentive parents groom a helper (**left**) and share food.*

Nipping *with blurring speed, a 20-pound golden jackal repels a spotted hyena six times his weight* (**above**). *In defense of a den, jackals have also taken on cheetahs and honey badgers, and even barked at lions. When three hyenas gathered nearby, however, a golden female* (**below**) *moved her litter. Left alone, jackal pups make easy prey for spotted hyenas, leopards, or eagles.*

with three helpers and six surviving pups.

When a pair tried to raise a litter without a helper, they often had to leave their pups alone for as long as eight hours. That made them vulnerable to predators such as spotted hyenas, large birds, and perhaps even other jackals.

Even a young adult such as Tejas, who might not weigh 20 pounds, is adept at chasing off a 120-pound hyena. The quick and agile jackal will run up behind the more clumsy hyena and bite it in the rear, darting away before the hyena can even turn around (above). Often all a jackal has to do is bark, and a hyena will retreat with its tail between its legs.

Jackal helpers dramatically illustrate a recent theory of "kin selection," developed by British evolutionary biologist W. D. Hamilton. Evolutionary theory has long held that the individuals of a species who are most physically and behaviorally fit for their environment will leave the most offspring. Now Hamilton stresses that an individual's genetic relationships are also very important. Jackal helpers are as closely related to their full siblings as they would be to their own offspring. So if a helper increases the survival rate of his younger brothers and sisters, he helps his own genes survive into future generations.

Helpers derive other benefits from staying around the home territory. They probably live longer and may in time raise their own pups more successfully. In a few cases they inherit part of their parents' territory.

THE SILVER-BACKED JACKALS I studied live in a relatively hospitable wooded bushland habitat with an abundant rodent population and fruit available during the whelping season. Next to these woodlands are shortgrass plains, which during the dry season from June through October become an environment that few animals, even rodents, can survive in. Here I studied another species, the golden jackal, *Canis aureus*.

Goldens can survive during the hot, dry months by sustaining themselves on dung-beetle larvae and lizards. Oddly enough these harsh months are not the cruelest time for the golden jackals. The December rains that bring the days of plenty can have devastating effects on young jackal pups.

As thunderstorms pour down, jackal dens on the grass plains are often swiftly flooded. I have seen the plains become a great shallow lake, and watched golden pups stand at their den entrance soaked and shivering.

Some mothers, like Ndege, are very clever. I saw her carry two of her litter of four to their father, Ndugu. He curled up with the pups nestled in his long belly fur. She did the same with the remaining two pups, keeping them warm and reasonably dry during a heavy storm.

But all families did not fare so well. In February 1977 Raha and Refu had three pups that were nine weeks old. Gumu, the male helper, and his parents kept the pups well fed and healthy. Early February saw four days of torrential rain, with water sometimes standing half an inch deep on the plains. It was so cold that I shivered in my Land-Rover. When the sun finally shone, only one of the three pups, Safi, was still alive. She lay shaking, sprawled on her

Serengeti standoff: *A golden jackal crowds three vultures over a carcass. In December, when game floods the plains, goldens hunt young gazelles and vie for the kills of larger predators. Competition for food grows even keener during the dry season, from June through October, when golden jackals live on lizards and dung-beetle larvae.*

belly. Raha groomed her and gently touched her with a paw. Safi, barely lifting her head, snarled. Refu also attempted to arouse Safi, but by now she just lay inert. All three adults left to hunt, and they succeeded in killing a Thomson's gazelle fawn.

Refu was the first to finish eating, and he trotted back to the den to feed Safi. When he arrived, she was dead. He nuzzled her and whimpered. Finally he picked her up in his mouth and trotted away. About a quarter of a mile from the den he found a small hole and buried her.

He trotted back to the den, where Raha and Gumu had arrived and were searching for Safi. When Refu was a few yards from them, he stopped and howled. So did Raha and Gumu, in a doleful way I had never heard before. I could only believe that they were mourning their dead pup.

Like silver-backed jackals, goldens appear to mate for life. Both male and female defend their territory.

Golden jackals tend to be friendlier with their pups than do silver-backed jackals. Their greetings are gentler and consist of a nose touch rather than the more threatening open mouth and bared teeth of the silver-backs. In addition, golden parents are more tolerant of their young and allow pups to crawl all over them and to play tug-of-war with their tails.

Golden young also help raise the next litter. In my study, all pups who survived stayed with their families. But pup survival in goldens did not correlate with the presence of helpers. Perhaps it's simply that eluding predators and finding food are not the biggest problems goldens face. In such a harsh environment, even a dozen helpers cannot undo a flood or prevent disease.

In any event, jackals present a rare opportunity to observe and perhaps to understand how and why family bonds develop among hunting-and-gathering mammals. They give us ideas about the evolution of monogamy and helping behavior. As social carnivores who share their food and care for dependent young, they contend with conditions similar to those experienced by early man, and may provide insight into our own behavior. □

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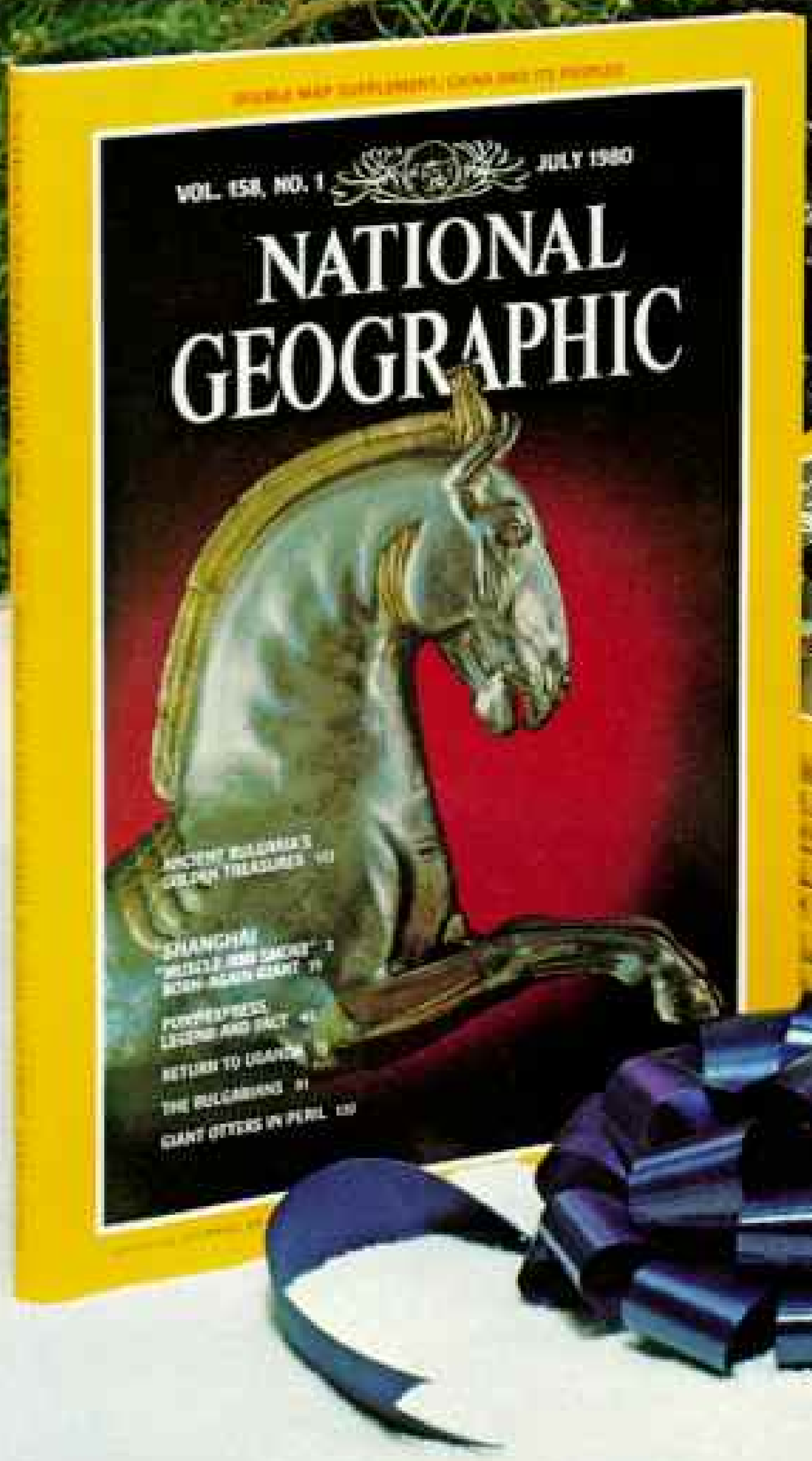

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The Gold Coins of Mexico not only provide the convenience, portability and liquidity of owning gold in coin form, but they also offer more alternative choices for purchasers. Mexico's 50 peso gold piece, more commonly known as the "Centenario," is the heaviest of all high circulation gold bullion coins in the world—boasting a high gold content of 1.2057 troy ounces. The "Azteca," Mexico's 20 peso gold piece, features a .4823 troy ounce gold content for purchase on a small scale. A variety of Mexican gold coins of smaller denominations are also available.

Many people consider the value and purchasing power of gold as an alternative hedge against inflation. Of course, the decision to own gold is a highly personal one in which risks and advantages should be carefully considered in light of one's specific financial and investment goals. Since gold is a commodity, its value is subject to continual market fluctuations.

Over the years, The Gold Coins of Mexico have become among the most popular gold bullion coins in the world. Due to the careful craftsmanship of Casa de Moneda de Mexico and the wide distribution of these coins, you can usually avoid the cost and delay of determining their authenticity upon resale. As with all gold coins, your purchase price includes a premium above the then current market price of gold bullion to cover minting and distribution. Furthermore, purchases may be subject to state and local taxes.

ACTUAL SIZE

THE℠ GOLD COINS OF MEXICO

Call any of the following toll-free numbers for up-to-the-minute prices. For additional literature, write: The Gold Coins of Mexico, Information Center, Grand Central Station, P.O. Box 1812, New York, N.Y. 10017.

The Gold Coins of Mexico are exclusively supplied to:

Citibank, N.A. 800-223-1080
N.Y. State call collect: 212-559-6041

Swiss Bank Corporation 800-221-9406
N.Y. State call collect: 212-938-3929

Republic National Bank of New York 800-223-0840.
N.Y. State call collect: 212-930-6338

The Gold Coins of Mexico are also available at coin dealers plus selected banks throughout the country.

The Gold Coins of Mexico is a Service Mark of Banco de Mexico, Mexico City.

Sony Introduces The Whole Earth Radio.

Imagine a radio with the whole earth on one set of pushbuttons.

Push a button, hear the English-language news from Moscow. Touch another button and check the Voice of America, currently offering world news, U.S. news, U.S. government criticism and discussion, in your choice of thirty-eight languages.

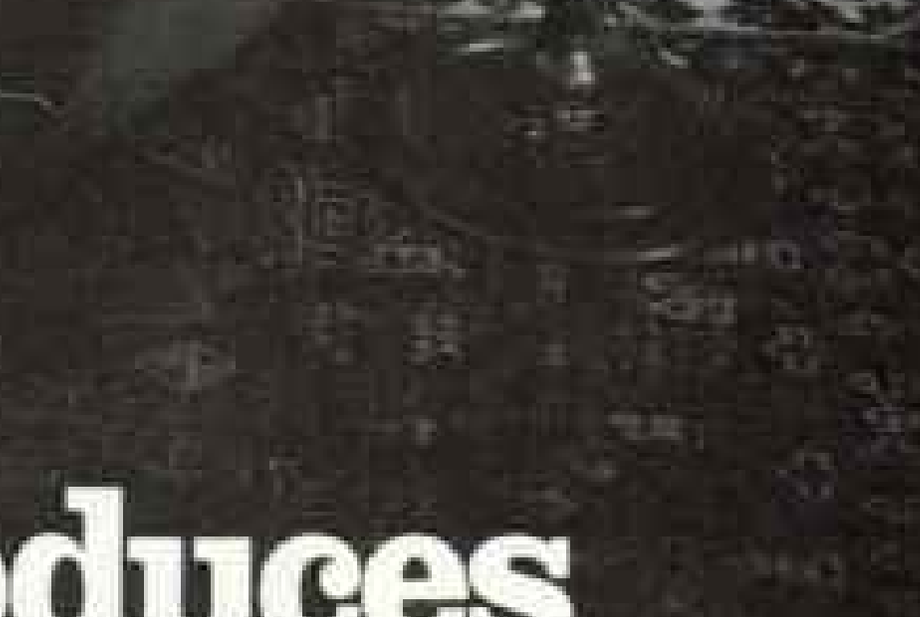
What's the price of oil in the Mideast? Would broadcasts from Spain help you learn Spanish? And how about music from all over the whole earth, in everybody's second language?

With the touch of a fingertip you can change stations all over the FM and AM bands, shortwave, mediumwave, and longwave. You can even listen to amateur SSB and CW Morse code.

You can do it all with The Whole Earth Radio. On AC or DC or even car-battery power, it couldn't be easier.

In fact, that's one of the nicest things about getting so much out of this little radio.

A child can do it.



SONY
THE ONE AND ONLY

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1. Single Copy Sales	3,291	2,102
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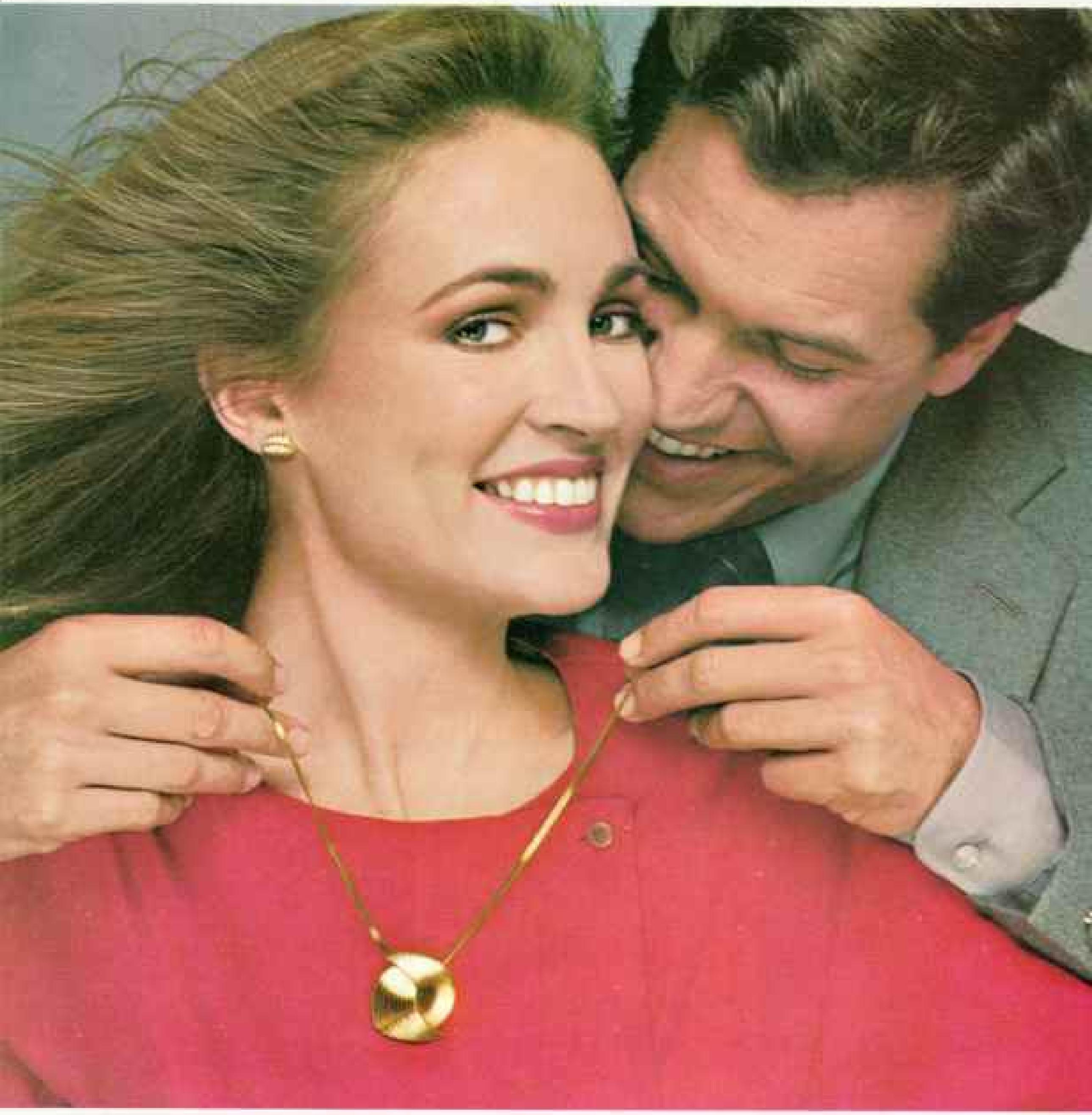
C. TOTAL PAID CIRCULATION	10,487,262	10,549,881
D. FREE DISTRIBUTION (Incl. samples) BY MAIL, or OTHER MEANS. (No News Agents)	104,371	112,254
E. TOTAL DISTRIBUTION (Sum of C and D)	10,591,633	10,662,135
F. OFFICE USE, LEFTOVER, ETC.	96,162	105,990
G. TOTAL (Sum of E & F)	10,687,795	10,768,125

Give her a food processor.
Or give her a present.



Nothing feels like giving real gold.

Ask for it by name.
Karat Gold Jewelry.

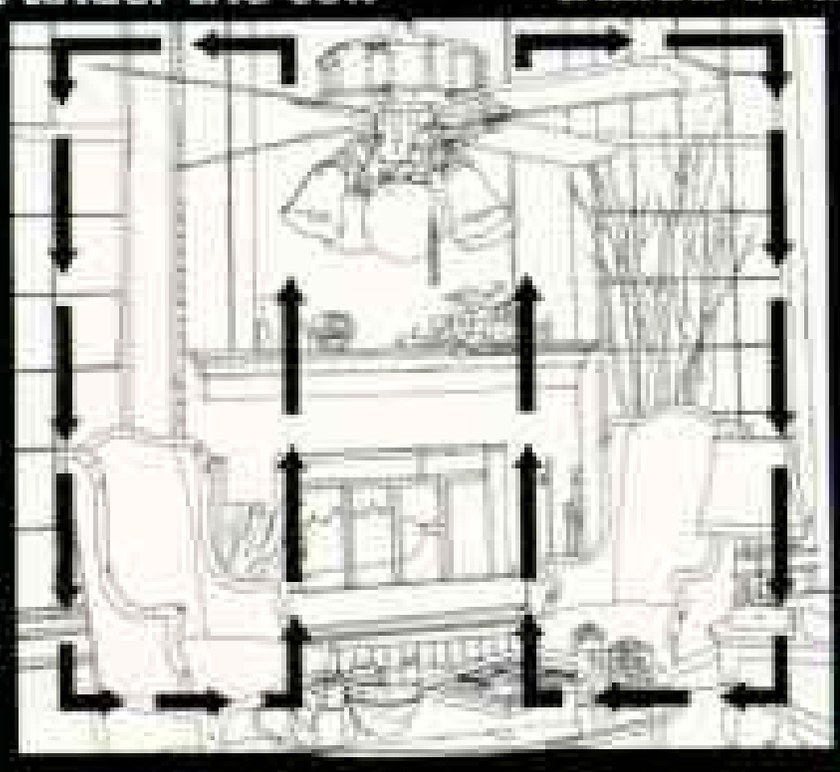
HOW A CEILING FAN CAN KEEP YOU WARM THIS WINTER.

AND LOWER YOUR HEATING BILLS, TOO.

During the winter, much of your home's heat hangs in a layer just under the ceiling. But ceiling fans from CasaBlanca Fan Co. can turn this situation around.

Each has a special reverse switch and a full-range variable speed control. By reversing the air flow upward and selecting a low speed, warm air is moved across ceilings and down walls without creating a cooling draft.

You use heat more efficiently, so you can set your furnace thermostat several degrees lower. That saves you money, thanks to a fan that draws little more electricity than a 100-watt lightbulb.

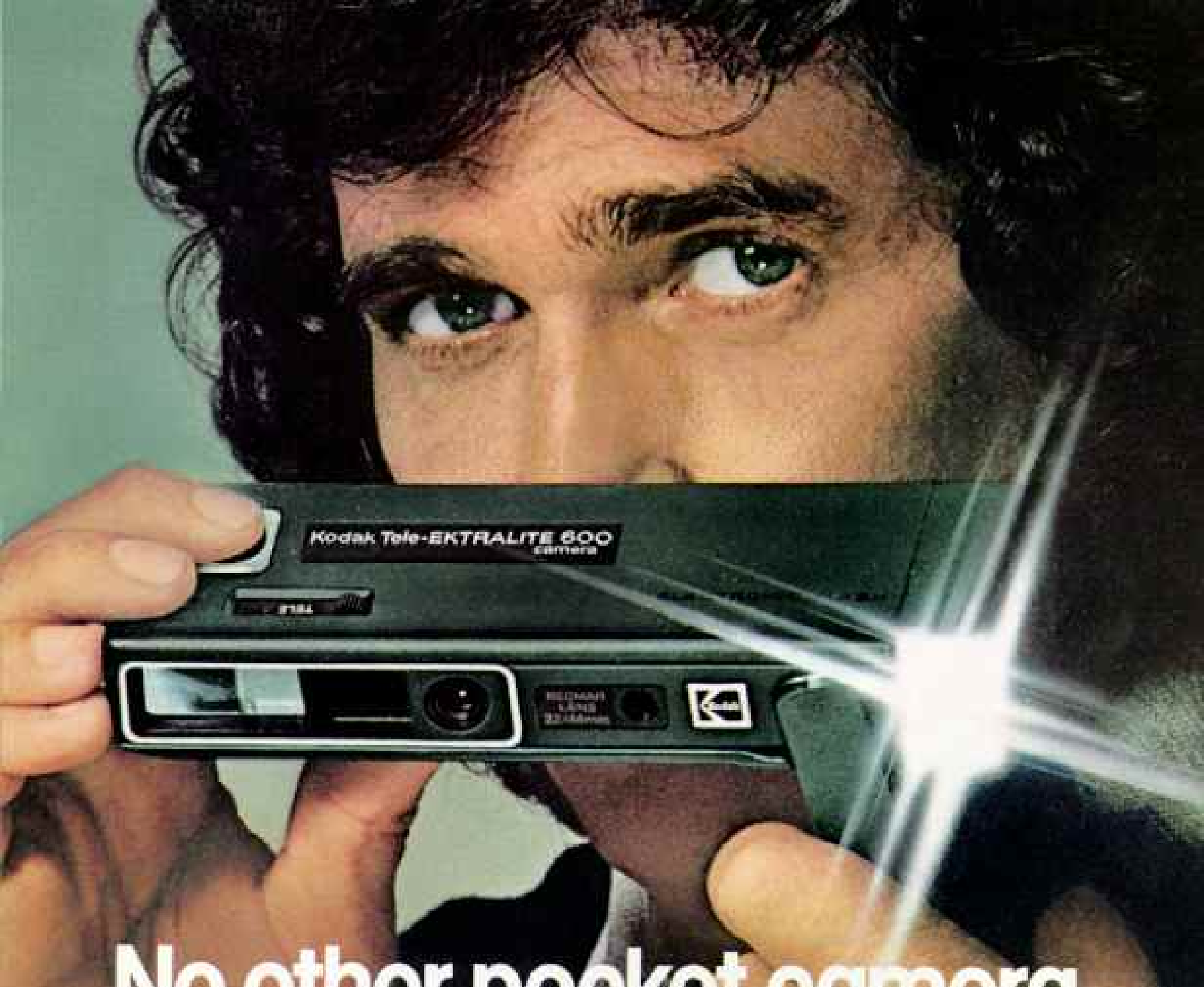


Your fan is an investment in quality and energy savings. And it's as beautiful as it is effective. CasaBlanca Fan Co. offers the greatest array of styles available. From simple to ornate, they truly are the World's Finest Ceiling Fans.

CASABLANCA FAN COMPANY

The World's Finest Ceiling Fans.

For the name of an authorized dealer in your area, call toll free 1-800-447-4700 (except from Alaska and Hawaii.) In Illinois, call 1-800-322-4400.



No other pocket camera in the world does what this little baby does.

Unique Sensalite flash turns itself on and automatically flashes whenever you need more light. And it even turns itself off. Two new Kodak cameras, the Ektralite 500 and Tele-Ektralite 600 with Sensalite flash. Now you can take care of your pictures and your Christmas gifts at the same time.

Sensalite™ FLASH

1880 Kodak 1980

America's Storyteller

Kodak gifts make the giving easy.

Experience the freedom of total control.

The new Sony Betamax SL-5800 frees you from the restraints of time, memory and circumstance. And makes you master of them all.

Mastering time, memory and circumstance.

The Betamax gives you the power to alter the fabric of time itself. You can record one channel while watching another.

You can program it to record a variety of shows on four different channels, for up to fourteen days in advance. And with our optional BetaStack tape changer you can even record up to twenty solid hours of consecutive programming.

If having all this programming in the palm of your hand seems a bit overwhelming, we've got some more good news for you.

Mastering motion.

The Sony Betamax SL-5800 has a remarkable feature called BetaScan that allows you to find any single image from amongst the thousands of images on a tape many hours long. BetaScan lets you go fast forward or reverse without interrupting the image on the screen. A Variable BetaScan feature lets you adjust the speed at which you can view the tape from five times up to twenty times normal speed. A Variable slow motion feature allows you to go from Freeze Frame up to one-third normal speed. And our Freeze Frame is really frozen. It's clear and still and optically true, without noise lines or distortion.

Mastering space.

This Betamax also has a Time Commander Remote Control feature that lets you utilize Variable BetaScan, Variable Slo-motion, Frame-by-Frame Advance and Freeze Framing, without moving from the comfort of your bed or easy chair.

Mastering the medium.

The elegant, sophisticated technology of the Betamax SL-5800 gives you a new kind of freedom. It lets you record whether you're home or away. It gives you access to a vast variety of programming that you can buy or rent. And a Sony Portable Videotape Camera enables you to actually make your own programs, and play them back instantly.

The Sony Betamax SL-5800 lets you shape and mold television to conform to your desires, to satisfy your own particular needs and interests. It allows you to make the final decision about what you'll watch and the way you'll watch it. It presents you with an almost infinite possibility of choices. And that's what freedom is all about.

SONY
THE ONE AND ONLY

Models shown: Betamax SL-5800, KV-1945R.

NEW DATSUN 280-ZX.
LUXURY IN THE FAST LANE.

Remember yesterday's image of a sports car? It had to be as noisy as a foundry. Ride like a rock. And be as spartan as a monk's cell.

Well, the Datsun 280-ZX has turned it all around. Up above you see its lavishly appointed interior. Every luxury has been well attended: from power windows to climate-control air conditioning. And for the first time, an optional T-bar roof is available on the roomy 2+2.

Even long-time owners of Cadillacs and Mercedes have seen the wisdom of opting for a sleek new Z-Car. It gives them all the luxury they're accustomed to, plus the mileage and range they need today.

This year's 280-ZX boasts a 10% increase in horsepower, just for the thrill of it. Yet this fuel-injected, 6 cylinder OHC powerhouse delivers [21] EPA estimated mpg, 32 estimated highway mileage with 5-speed transmission. Based on these figures, an estimated MPG range of [443] miles and a highway range of 675 miles await you. Use estimated MPG for comparison only. Your mileage and range may differ depending on speed, trip length and weather. Highway mileage will probably be lower. California highway estimates are slightly less.

Buy or lease one today. And get to know what AWESOME is. The Datsun 280-ZX is another example of superior workmanship from Nissan Motor Co., Ltd., a worldwide company whose name stands for quality.

NISSAN

DATSUN
WE ARE DRIVEN

Superb picture and more.
More sharpness. More sound. More channels.

We're moving television into the future. With our new PRP (Peak Resolution Picture) circuit. For 25% more picture sharpness than ever before.* With four speakers, separate amplifiers, even an audio control center. For more fidelity, more true-to-life sound.

With built-in cable tuning (no converter needed). For access to more channels. A hundred and five channels. Zenith System 3. For superb picture. Dependability. And more.

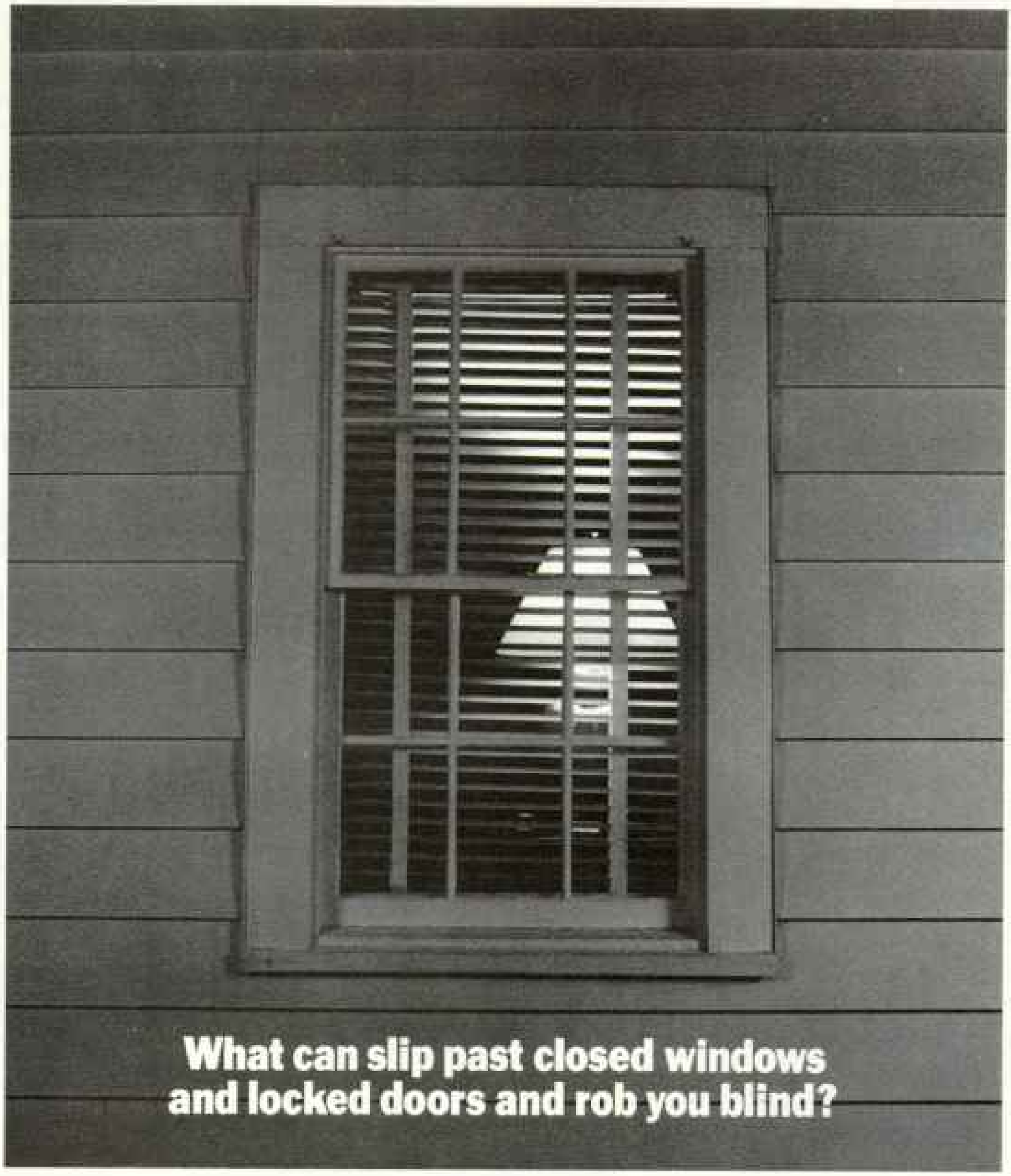
*70 more lines of resolution than previous Zenith models. The PRP Circuit is available on 19" and 25" (diagonal) System 3 models.

Features available on selected System 3 models and screen sizes. Shown: The Andantino, model SMS575E. Mediterranean styled console. Genuine Oak wood veneer top and sides with parquet top. Decorative front and base of simulated walnut in matching finish. Simulated TV picture.

ZENITH

SYSTEM 3

The quality goes in before the name goes on.®



In winter, it's the cold air that sneaks into the house you're trying to keep warm. In summer, it's cold air slipping out of the house when you want to keep it in. When your house leaks air badly enough, it can make your furnace and air conditioner work overtime, and send your energy bills sky-high.

Shell's popular Answer Book, The Home Energy-Saving Book, can show you easy do-it-yourself ways to fix those air leaks and cut your heating and cooling bills by up to 40%. It also contains many other simple tips to help you cut your overall home energy bills by up to 50%.

The book is absolutely *free*. You can pick one up at any participating Shell station. Or you can write to Shell Answer Books, P.O. Box 61609, Houston Texas 77208.

Come to Shell for answers

Dodge

ARIES K

Dodge Aries-K is the first automobile to deliver both 6-passenger room and gas mileage ratings of 25 EPA est. mpg./41 est. Hwy.* A combination that no other car can match. How did Chrysler do it? With advanced front-wheel-drive technology. Solidly based on over 11 billion estimated miles of owner experience with Chrysler Corporation's highly successful small cars, including Dodge Omni, Dodge 024 and Colt. More small-car front-wheel-drive experience in America than Datsun, Toyota, GM or Ford.

Front-Wheel-Drive

With all that experience, Chrysler engineers designed Aries-K as a total system—a *Direct Power System* of front-wheel-drive that puts the weight of the engine and transaxle directly over the front driving wheels. This gives you excellent traction in rain and snow. The car is *pulled* through turns, rather than pushed. So you get sure control and maneuverability. And with the engine, transaxle and entire power-train in front of the passenger compartment, Aries-K offers mid-size room —6 passenger room —in a neat, efficient package. And without a transmission, drive shaft and rear-axle differential churning away underneath the Aries-K, you'll enjoy a smooth, quiet ride. And an efficient use of energy.

America's only 6-pass

The Aries-K Direct Power System:
The heart of Aries-K is the new Chrysler 2.2 litre Trans-4 engine designed specifically for front-wheel-drive. It's part of a Direct Power System that puts the engine directly over the front driving wheels of the car and allows power to flow directly to them.

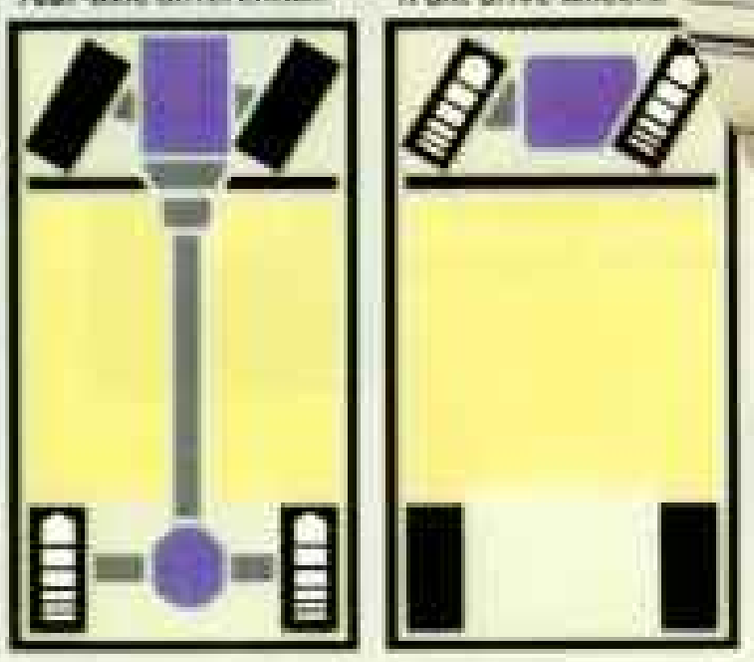
Trans-4: the engine with an electronic control computer.

The Trans-4 is an engine with an electronic control computer, a sophisticated feedback system. Chrysler's exclusive Electronic Fuel Control System that includes electronic ignition, electronic control of spark timing and electronic feedback carburetor; seven sensors located throughout the engine monitor functions and feed data to an on-board computer which continuously adjusts the timing and air fuel ratio for optimum efficiency.

America's only front-wheel-drive 5-passenger wagon rated 24 EPA est. mpg. 40 est. Hwy.

Rear-drive cars transmit engine power thru drive shaft & rear-axle differential.

In Dodge Aries-K Trans-4 engine power flow directly to the front drive wheels.



*Use est mpg for comparison. Your mileage may vary depending on speed, weather and trip lengths. Actual highway mileage will probably be less. Calif. est lower. Buy or lease at your Dodge dealer.

High mileage. Room for 6.
There are other cars on the road that have mileage ratings as high as Aries-K. But none of them have the 6-passenger room Aries-K delivers. The reason: Chrysler front-wheel-drive.

Keeping the power train completely forward of the passenger compartment has a number of benefits. All of them make more room for people. Without a huge transmission hump, Aries-K has plenty of front leg room. Without the drive-shaft hump that runs the length of rear-drive cars, middle seat passengers in the new Aries-K don't have to sit with their knees tucked up under their chins. In fact, the entire passenger compartment has been designed for lots of head room, shoulder room and hip room.

25/41

6-passengers

"Service-Engineered" Aries-K. Simple to service. Designed inexpensive to maintain.
Aries-K was designed to make servicing as simple as possible. Many components that require scheduled maintenance are up front and easy to reach. We eliminated many service operations other cars still require. Aries-K performs them automatically. And scheduled maintenance intervals have been extended.

enger car rated 25 41.

EPA EST MPG EST HWY*

Aries-K engines are handled with such care, that even a white glove inspection isn't permitted for fear of leaving lint on any part.
Our engineering goal was to build the highest quality car in its class in America. To help achieve that goal, Chrysler set up one of the most technologically advanced plants in the world with the most sophisticated assembly techniques. Critical care is taken in every phase, from assembly to shipment. It's why Aries-K has a guarantee.

Satisfaction guaranteed or your money back.
If you're not satisfied with your new Dodge Aries-K, purchased for personal use from a participating dealer, bring it back in good condition and with no metal damage within 30 days or 1000 miles, whichever comes first. When the dealer gets clear title, you'll get your money back, excluding finance and insurance charges. Trade-in refund may differ from trade-in allowance on retail sales contract. Ask participating dealer for details. With Aries-K pulling for you, America's not going to be pushed around anymore.

AMERICA'S NOT GOING TO BE PUSHED AROUND ANYMORE.

AAIOHA

Starting December 17, The No. 1 Choice takes off for Hawaii.

*For the third straight time, American Airlines has been named the number one choice for domestic travel in the Airline Passengers Association survey of the most demanding passengers in the sky: frequent flyers.**

The main reason: our service.

And soon you'll be able to get this number one service, with a bit of Hawaiian flavor added, on convenient daily flights to The Islands.

So call your Travel Agent. And say you want number one service to Hawaii.

We're American Airlines. Doing what we do best.

#1 AGAIN

*1979 independent mail survey of 37,495 APA members with 11,931 responding.

"Give the Olympus OM-10... and never worry about what to give again."

Cheryl Tiegs

The moment you give the Olympus OM-10 you can stop worrying about what to give next birthday, next anniversary, next Christmas, next Chanukah, next anytime.

First gift: the camera

Olympus OM-10. The most innovative Single Lens Reflex of its time. Fully automatic. Conveniently compact. Operationally simple. With exclusive Olympus Off-The-Film metering that assures perfect shots even if the light changes *during* exposure. So you can take every single picture with complete confidence.

Gifts and more gifts

Next, give the automatic Olympus T-20 flash. It's certain to light up a smile.

Then give an Olympus interchangeable lens. Wide-angle, telephoto, zoom. There are more than 33 Olympus lenses made to fit the OM-10.

A quick gift idea. An Olympus auto winder that accelerates film advance to 2.5 frames per second. Fast enough for professional action shooting.

And before you know it, you'll be ready to give an Olympus camera bag. They're handsome and big enough to handle all those Olympus gifts.

A lifetime of gifts

You can choose from more than 250 precision-designed gift accessories crafted by Olympus to fit the OM-10. A lifetime of gifts you'll be proud to give. Or receive.

For information on giving (or owning) the remarkable OM-10 write Olympus, Woodbury, N.Y. 11797. In Canada, contact W. Carsen Co., Ltd., Toronto.

OLYMPUS®

Excellence by design.


SMITH-CORONA
CORONAM

Give him a gift his teachers will appreciate.

He's excited. He's going into high school next year, and he's got a sleek, new Smith-Corona® electric portable.

Of course having a Smith-Corona isn't going to make him into a genius. But it is going to help him with his papers.

They'll be easier and faster to write than in longhand. And they'll look neater and be easier and faster to read. (What teacher won't appreciate that!)

There's something else you ought to know about buying your student a Smith-Corona. Like a solid investment, it will pay off year after year after year. (He'll even be taking it to college with him!)

A Smith-Corona is built to last. It's the only electric portable that's still made to the same exacting American quality control standards that have made Smith-Corona a household word for "typewriter."

Compare it with any other electric portable and you'll see what we mean.

First of all, Smith-Corona has an exclusive cartridge ribbon system. With the cartridge correction ribbon you can change words, or even whole sentences, as well as correct individual characters.

You can also use carbon film ribbon to produce extra crisp and sharp typing, like the big expensive office machines. And changing ribbons is a snap—literally.

Next, notice that a Smith-Corona sounds professional—solid and smooth, like the fine precision machine it is.

Now, look at the way it types. Smith-Corona type marches across the page evenly, smoothly, cleanly. Not one single letter out of line or out of step.

A Smith-Corona is a very special gift. Once a person uses it, he will really appreciate its special qualities. (And so will that person's teacher!)

Give your student a Smith-Corona. Teachers will listen to every word it writes.

Patented Correction Cartridge

Smith-Corona

GM

OUR 1981 CHEVROLET CAPRICE CLASSIC WAGON.

A versatile vehicle. With available third seat you get seating up to eight like a van.

With both seats down you get the 87 cu. ft. of hauling capacity you might otherwise have to turn to a trailer for.

With available diesel engine you get the day-in, day-out fuel economy often associated with small compact cars.

And you get the comfort, luxury, and ride of a 1981 Chevrolet Caprice Classic 3-Seat Diesel Wagon. Look it over at your Chevy dealer's. You're going to like what you see. Especially when you see everything you're getting.

21	33	462	726
EPA EST. MPG	HWY. EST.	EST. RANGE	HWY. RANGE

Remember: Compare the "estimated MPG" to the "estimated MPG" of other cars. You may get different mileage and range depending on how fast you drive, weather conditions and trip length. Actual highway mileage and range will probably be less than the estimated highway fuel economy. Highway estimate and range lower in Calif. Range obtained by multiplying 22-gallon fuel tank by mileage estimates. Chevrolets are equipped with GM-built engines produced by various divisions. See your dealer for details.

Chevrolet

1981 CHEVROLET CAPRICE DIESEL WAGON.

How to cut travel costs without cutting travel.

In a time when cutting travel could cost you more than it saves, Beech has some well designed alternatives.

Business airplanes.

Granted, an airplane is a major investment. But we've put together some answers that can show you how a Beechcraft company plane can cost you less than you're spending now on air travel.

And let you travel more in the bargain.

Utopia? Not exactly. More like simple efficiency. Flying on your own schedule can save you hours at the least, days at best. And two, or more, can fly as cheaply as one.

It takes a certain aggressiveness to even consider your first company plane. But, if you weren't looking for answers, you wouldn't be reading this. And a Beechcraft company plane might just answer more questions that you're asking.

Send for your free Management Guide to Business Aviation in the '80's and put the business back in business travel.

Write us on your company letterhead, and we'll send you everything you need to decide whether your company can profitably use a Beechcraft. And which Beechcraft suits you best. Write to: Beech Aircraft Corporation, Dept.A 6, Wichita, Kansas 67201, and please mention if you're a pilot. If you'd rather call, call collect and ask for Dick Schowalter, Jr. (316) 681-7072.

Member of General Aviation Manufacturers Association

The Beechcraft jetprop King Air F90. An 8-10 seat executive aircraft that can take busy people where they're going at over 300 mph. Pressurized for maximum comfort.