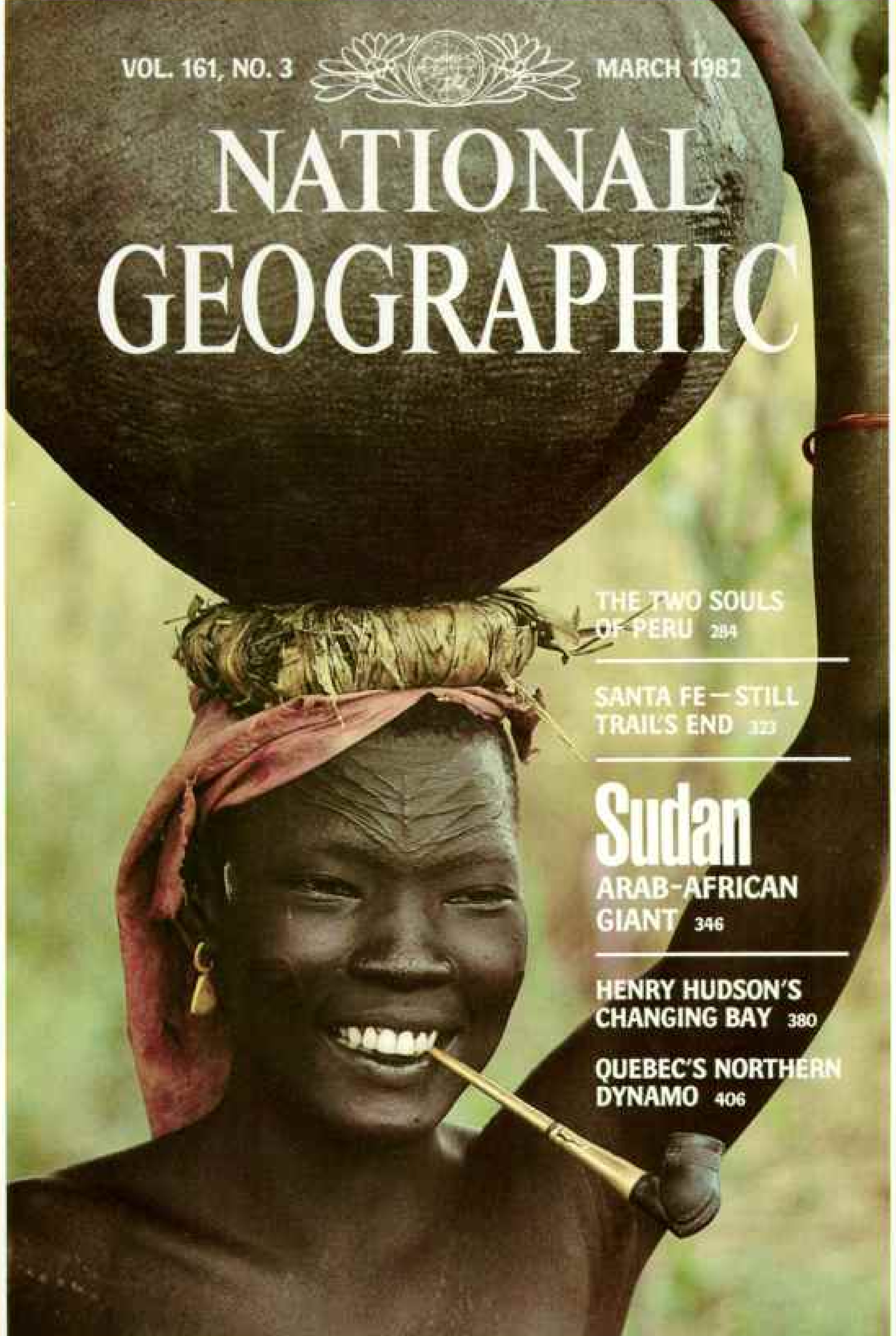
DOUBLE MAP SUPPLEMENT: INDIANS/ARCHAEOLOGY OF SOUTH AMERICA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SEE "POLAR BEAR ALERT" WEDNESDAY, MARCH 10, ON PBS TV

IN JANUARY 1981 Dr. Clifford Evans, a Smithsonian archaeologist and National Geographic research grantee, was called to Dulles Airport to help U. S. Customs officials authenticate 154 pieces of pre-Columbian gold, ceramics, and textiles confiscated from the baggage of a New York art dealer.

Dr. Evans found some of the specimens, all from unknown sites in Peru, to be finer than any he had seen in 35 years of work. He was depressed and angered by the inestimable archaeological losses represented by the loot.

According to Customs Special Agent Richard Conger, Dr. Evans said, "I don't want to look at this any more—it's making me sick."

A few hours later, at his home, he suffered a fatal heart attack.

Nobody can say that Dr. Evans's anguish directly caused his death. What is certain is that the voracious market for antiquities is destroying the heritage of Latin American nations. U. S. dealers import as many as 40,000 items a year from Peru alone—many of them literally strip-mined from archaeological sites with bulldozers and backhoes, destroying the history as well as the more delicate artifacts.

This collection was seized on a "price tag" technicality. The art dealer had declared its value at $1,785; an appraiser for Customs set it at $288,000. One item alone, a feather cape, was valued at $150,000. There is no law specifically forbidding such imports, and our government is almost powerless to cooperate with those nations whose antiquities are at the mercy of well-financed thieves and art collectors.

In this issue, we bring you a wall map of what is already known of the pre-Columbian history of South America. And beginning on the following page, we offer a view of the rich tapestry of cultures that is modern Peru.

COTTON COULSON

Confiscated gold-and-silver burial mask from Peru

Wilbur E. Garrett
EDITOR

NATIONAL GEOGRAPHIC

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March 1982

The Two Souls of Peru 284

Indian and Spanish heritages mold a nation of sharp geographic and social contrasts, where a new government makes a fresh start. Harvey Arden reports, with photographs by William Albert Allard.

Santa Fe: Still the Goal at the End of the Trail 323

William S. Ellis finds artists, tourists, and "deserters from drudgery" seeking modern haven in the oldest capital city in the United States. Photographs by Gordon W. Gahan and Otis Imboden.

Sudan: Crucible of Cultures 346

Ranging across Africa's largest nation, author-photographer Robert Caputo visits diverse peoples of a country struggling for unity a decade after the end of a 17-year civil war between African south and Arabic north.

Henry Hudson's Changing Bay 380

The 20th century brings technology and political clout to a handful of Inuit villages trying to balance old ways and new in the isolated wilderness around Hudson Bay. By Bill Richards, with photographs by David Hiser.

Quebec's Northern Dynamo 406

A far-flung network of dams and hydroelectric plants is harnessing subarctic Canadian rivers for new power for industries and cities. Text by Larry Kohl, photographs by Ottmar Bierwagen.

COVER: *Forehead scarification identifies a Mondari woman of Sudan. A pad of woven grass cushions her waterpot. Photograph by Robert Caputo.*

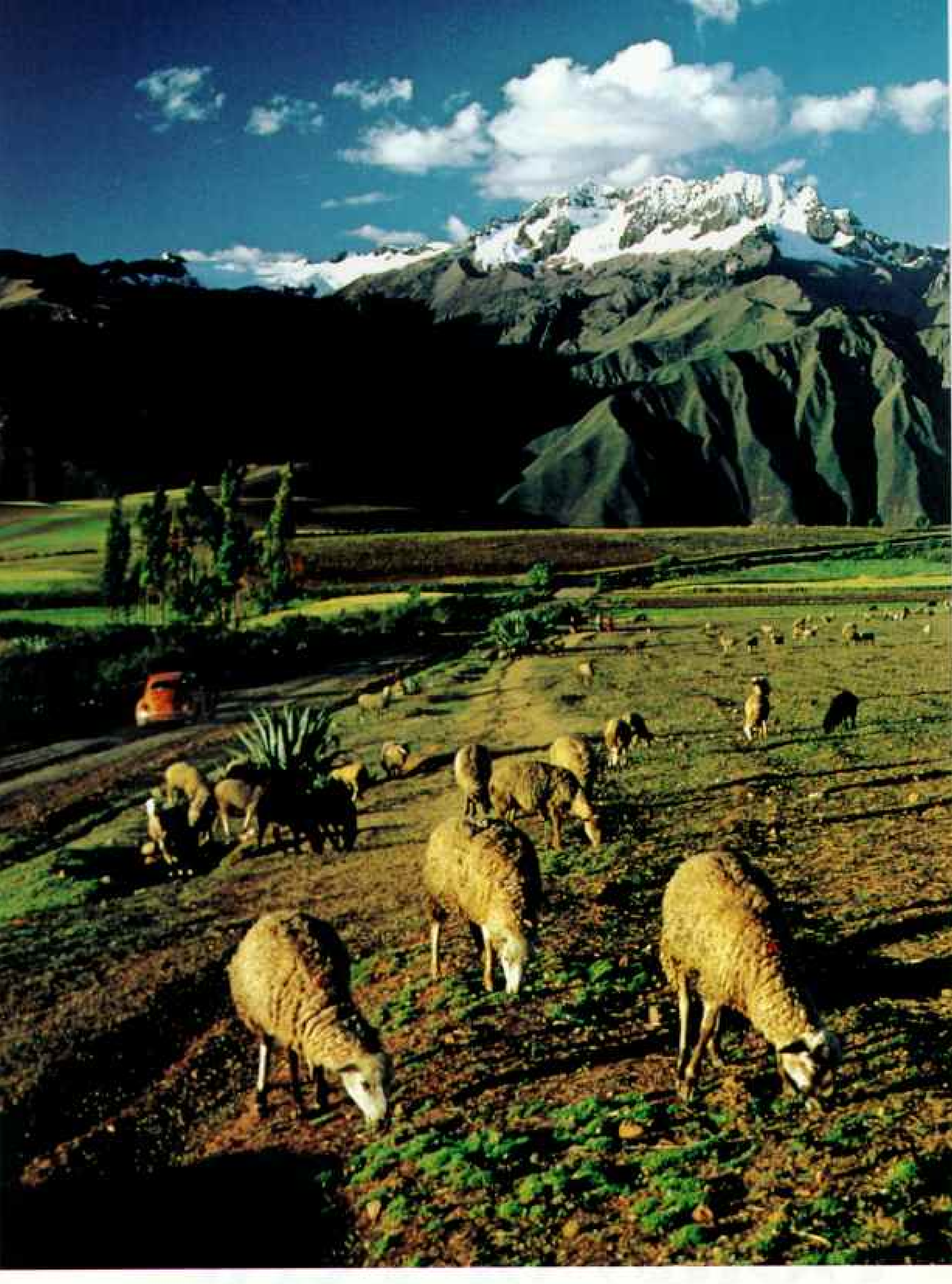
Tradition *keeps faith with time for Indian women whose hats bespeak their highland districts. But the present stirs with change to bridge the gulf between these descendants of the land's original peoples and those of their conquerors.*

The Two

By HARVEY ARDEN
NATIONAL GEOGRAPHIC SENIOR STAFF

Souls of Peru

Photographs by WILLIAM ALBERT ALLARD



Heart of a lost empire, *the sacred valley of the Incas lies between snowcapped Andean peaks and a colonial-era church near Cuzco. From here, in the 15th*

century, rulers of a small tribe extended their sway over the far reaches of the continent's west—a dazzling epoch ended by Spain's Francisco Pizarro.

"YOU MUST UNDERSTAND about the two souls of Peru," the old blind harp player in Huancayo told me. "There is the Indian soul and the Spanish soul—the condor and the bull." Aurelio Navarro touched his harp and an arpeggio as light as an Andean breeze wafted out.

"That is the condor," he said. Through his dark-smoked glasses he seemed to watch with inner eyes as the sacred bird soared high and free on an updraft of melody.

Now his fingers crashed onto the lower strings. The barrel-bellied Andean harp seemed to bellow.

"That is the bull, the Spanish soul."

He played both motifs at once—the two souls of Peru in poignant counterpoint.

There was a time when Andean villagers would tether the sacred condor—with a wingspread of ten feet—to the back of a bull and let the two of them fight it out. The bloody practice is now illegal, civilization's advance having made the condor an endangered species. In an experimental program, condor young raised in captivity have been successfully released in the wild. But such matters have little meaning for the blind Indian harp player, himself a member of an endangered culture.

His fingers merged in a blur with the strings. Crescendoing rhythm and melody clashed, collided, and finally intertwined in a triumphal flourish. "You see," he said, "the souls are at war. But when the war is over, the two are one."

A SERIES of alarming predictions cast a mood of apocalyptic expectancy over Peru as I arrived in Lima before Holy Week. A U. S. physicist, Dr. Brian T. Brady, had predicted not one but three colossal earthquakes for coastal Peru in the summer of 1981.

The final "earth-forming event," said Dr. Brady, would approach an astounding 10 on the Richter scale and power a huge tsunami through already quake-devastated Lima.

Despite a flat-out disclaimer of Dr. Brady's predictions by a council of earthquake experts in the United States, the people of Lima were understandably alarmed. The city, after all, had been virtually razed by the great earthquake of 1746. And who could forget the 1970 quake north of Lima? That one had killed 70,000 from the seacoast to the mountains and buried the Andean village of Yungay beneath an avalanche of ice, mud, and rock.

No doubt there would be a special fervor to the 1981 Holy Week procession in Cuzco honoring El Señor de los Temblores—Our Lord of the Earthquakes.

Meanwhile, relief agencies stocked up on body bags. Schools rehearsed earthquake drills. People hoarded food, water, and medicines. Tourism dipped, along with real estate prices. Outbound flights were heavily booked by Limeños planning vacations beyond reach of Brady's predicted disasters.

Ominously, in early April, rain fell for three hours—almost unheard of on this "rainless" desert coast. An even greater rarity—lightning and thunder—accompanied the April storm. In 1970, it was recalled, January rains had preceded the quake in May. And, historians noted, a rare thunderstorm with lightning in 1803 had been followed by an earthquake in the same month a year later.

Cried the leader of a Lima religious sect: "It's the end of the world!"

"WE HAVE enough real problems without inventing imaginary ones," lamented President Fernando Belaúnde Terry as we spoke in the government palace in Lima.

The white-maned, charismatic politician and architect—they call him *El Arquitecto*—took office in 1980 after a democratic election that ended 12 years of dictatorship by left-leaning generals. His first try at the presidency ended in 1968 when armed

Prayers rise with smoke *from a silver incense burner as hundreds of thousands in Lima walk in the October procession of Our Lord of the Miracles. The event venerates a gold-framed portrait of Christ, a copy of a painting found on a wall that stood when a 1655 earthquake razed surrounding homes. All but a fraction of Peruvians are born to the Roman Catholic faith instilled by Spain.*

officers rudely roused the leader from his presidential quarters one night and hustled him aboard a plane bound for exile.

Taking up residence in the United States, President Belaúnde taught at several American universities and watched from afar as the generals who ousted him took Peru on a swerving turn to the left—giving large private estates over to cooperatives, nationalizing major industries and banks, controlling the media, flirting with the U.S.S.R. and Cuba.

Even Belaúnde admits reforms had been desperately overdue in a country ruled for centuries by a tiny elite—a country where even today, after a dozen years of leftist-socialist rule, the top one percent of society gets 25 percent of the income and the bottom 25 percent must make do with 3 percent.

In any case, the generals' radical experiment failed dismally. Formerly well-run estates fell into ruin in the hands of inexperienced campesinos, even though only about a third of the rural poor benefited from land redistribution. Nationalized industries—copper, oil, and fishing—faltered. The national debt ballooned. The price of copper plummeted. The fish disappeared, and oil did not appear in hoped-for quantities. Annual inflation topped 70 percent by 1978. Foreign debt hit nine billion dollars, and the country went bankrupt as the ruling generals far exceeded the nation's revenues to buy Soviet jets and build an oil pipeline.

HAVING TUMBLED the economy first on its head and finally on its back, the hapless generals decided at last to turn the whole mess back to a civilian government.

Belaúnde returned and led his centrist Partido Acción Popular to victory, garnering 45 percent of the votes against 14 other candidates and capturing 26 of the 60 senate seats. To him and his colleagues now falls the job of getting Peru back on its feet—with the generals still in the wings watching closely for any misstep.

Can democracy survive in Peru? If so, it will be a tremendous accomplishment in a

Democracy on parade . . . and on trial. *Peruvian troops goose-step past President Fernando Belaúnde Terry—reelected by popular ballot in 1980 after having been ousted by a military coup 12 years earlier. The years between saw Peru swerve to the left under a military dictatorship that led the economy into a*

country that has suffered four coups since World War II.

Just during the early months of 1981, which spanned the time of my visit, there was a new clash in a long-festering border war with Ecuador, a wave of increasingly violent terrorist attacks (for which no faction has claimed credit), a series of crippling industrial and municipal strikes . . . and the list goes on.

Almost every roadside wall and rock in the Peruvian Andes has been inscribed with political slogans, most scrawled in red paint by the PCP (Partido Comunista Peruano), calling for *lucha armada*—armed conflict.

"You're calling for insurrection against the government?" I asked one Communist deputy to the new leftist mayor of Arequipa. "No, señor," he said. "Lucha means struggle as well as conflict. And armada—it means to be armed with the truth, not guns." I then asked, "Are the Communists behind the terrorist attacks, as the government claims?" Again a denial. "No. Perhaps it is the far right, trying to destabilize Belaúnde's regime in order to stage a new coup. Perhaps it is the government itself, looking for a pretext to justify repression of the left."

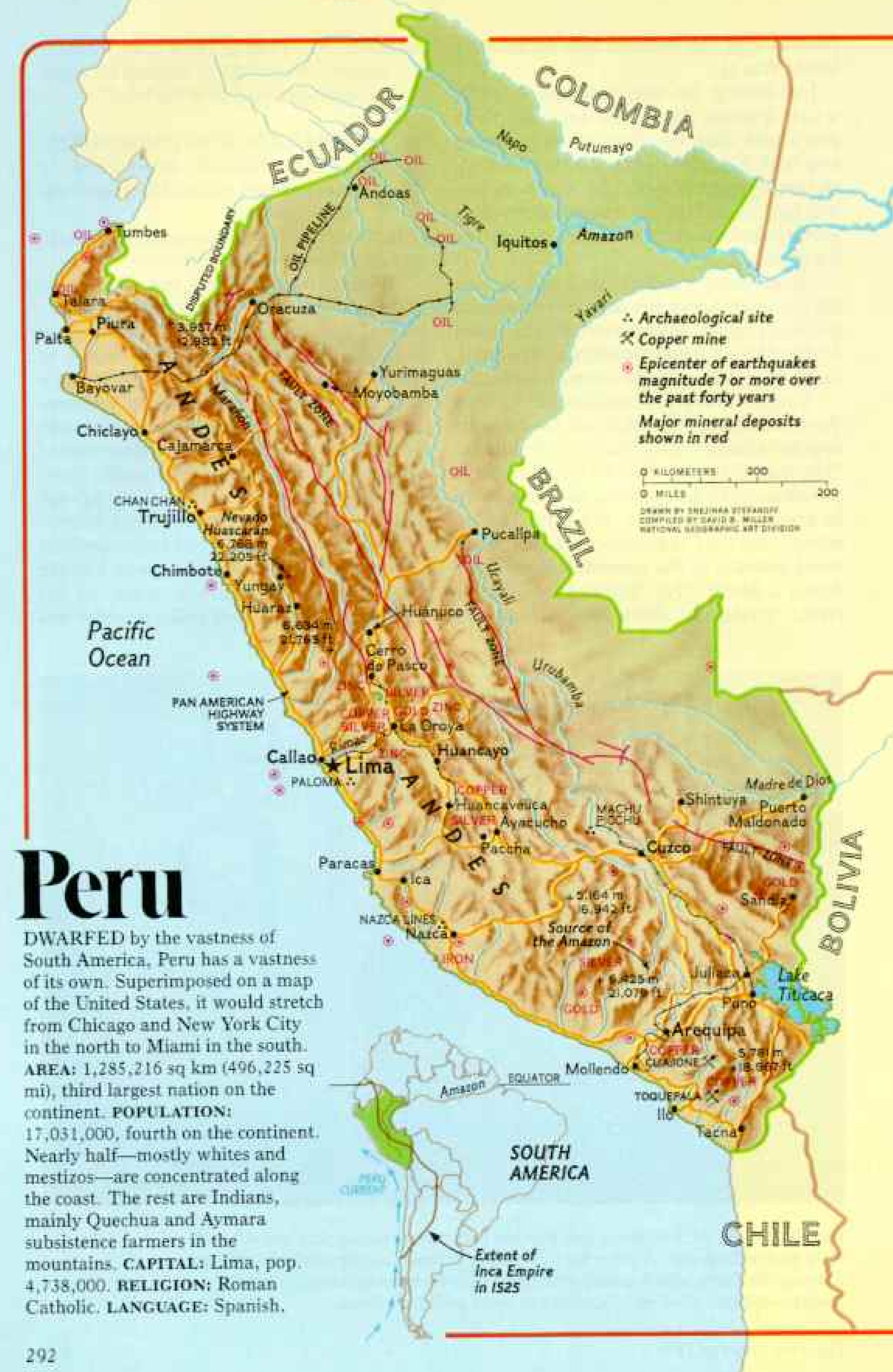
DESPITE TALK OF TERRORISTS, security was light, even casual, on the evening I visited Lima's government palace.

In his office with photographer Bill Allard and me, President Belaúnde said:

"We have problems, yes, but we are hard at work on the solutions. The terrorists? Left-wing dissidents who will be stopped. We've already caught many of them. And economically we are entering a new era. Foreign investors are welcome again. We anticipate friendly relations with the U. S., but it must be a relationship of equals. And the press is free again. Some industries are being returned to private ownership. The rate of inflation has slowed.

"What's more, we have 86 major projects planned or under way—a highway into the deep interior, irrigation systems, an oil pipeline, factories, steel mills, resettlement

shambles. Now, as democracy gets another precarious chance, factions left and right jockey for power. A scrawled wall slogan (**above**) *champions the Peruvian Communist Party, which joined with other leftist groups and made gains in recent municipal elections—pointing to more political unease.*



Peru

DWARFED by the vastness of South America, Peru has a vastness of its own. Superimposed on a map of the United States, it would stretch from Chicago and New York City in the north to Miami in the south. **AREA:** 1,285,216 sq km (496,225 sq mi), third largest nation on the continent. **POPULATION:** 17,031,000, fourth on the continent. Nearly half—mostly whites and mestizos—are concentrated along the coast. The rest are Indians, mainly Quechua and Aymara subsistence farmers in the mountains. **CAPITAL:** Lima, pop. 4,738,000. **RELIGION:** Roman Catholic. **LANGUAGE:** Spanish.

Quechua, Aymara. **LITERACY:** 73 percent. **LIFE EXPECTANCY:** 57 years, low for South America. **GEOGRAPHY:** Dominating the nation, the Andes rise with stupendous verticality to snowfields and glaciers at 6,768 meters (22,200 feet). They wall off the arid coast where little rain falls. Snowmelt from the Andes feeds rivers that cross the arid coastal plain and supply irrigation farmers. The moist eastern slopes of the Andes tumble to dank, humid, jungle lowlands whose rivers are the sole highways for transportation. Peru lies atop an area where the Pacific Ocean crust slides beneath the continent, resulting in severe earthquakes and occasional volcanic eruptions.

HISTORY: For 20,000 years diverse Indian peoples have made their home in Peru; 7,700-year-old Paloma may be the oldest village in the Americas. The Incas were ruling from Cuzco when gold and silver lured the Spaniards, who considered the very word Peru synonymous with glittering riches; "Vale un Perú"—worth a Peru—was long a phrase denoting anything of immense value. In 1824 Gen. Simon Bolívar's forces ended Spanish rule on the continent.
GOVERNMENT: Peru has since been ruled largely by authoritarians. The election in 1980 of Fernando Belaúnde Terry gave democracy a chance.
ECONOMY: Oil and minerals such as silver, zinc, gold, lead, iron, and copper from huge open-pit mines at Cuajone and Toquepala dominate the export-oriented economy, with the United States the major customer. Recent drilling for oil in the jungle has upped proved reserves to 800 million barrels and led to the 800-million-dollar, 825-kilometer (513-mile) trans-Andean pipeline. Ongoing exploration has located phosphate deposits on the north coast and coal in the northern mountains. Manufacturing is the fastest growing sector of the economy, but agriculture remains the chief occupation, with sugar cane and cotton grown on the coast, coffee in the uplands, and gardening and ranching where possible.

programs, housing. . . . But, here, there's something I want you to see!"

He opened the office doors and led us into the cavernous hall outside. It was pitch dark. Presidential aides had stepped away momentarily, turning off the lights. We felt our way through the darkness, pushing into still another enormous room, equally black. It seemed passing strange to be there in the dark, groping for a light switch with the president of 17 million people.

At last two uniformed aides came running in, stammering apologies, and switched on the lights to reveal, in the center of the room, a model of a modern city.

"It's my special pride," Belaúnde said. "I'm still an architect at heart, and this is a new housing project whose progress I've overseen. Look—there are parks, wide streets, playgrounds, a shopping mall. Soon it will be home for thousands of middle-income Limeños.

"Write of *this*," he implored. "Not only of our problems and Brady's predictions. Write of *con*struction, not *de*struction!"

LEAVING the government palace, known as Pizarro's House, I stepped out onto the elegant colonial Plaza de Armas. Here, in 1535, Francisco Pizarro, conqueror of the Incas, founded the city that was Spain's chief stronghold in South America until independence was declared in 1821.

I plunged down a side street jammed with *ambulantes*—the ubiquitous sidewalk vendors—selling everything from alpaca ponchos and TV antennas to skewers of sliced beef heart and murky red potions of "iguana blood" *para la fuerza*—for strength.

They compose a kind of conquest in reverse, these ambulantes, a pushcart army of impoverished campesinos driven by want from their ancestral Andean highlands and drifting now by the hundreds of thousands—perhaps millions—to pathetic shantytowns in the cities. Jobless, barely educated, with welfare payments not even a dream, they take to the streets as vendors, shoeshine boys, tire changers, minstrels, beggars, and, when all else fails—alas—as petty thieves. The government, since my visit last spring, has cleared them from elegant central Lima, but still they come—a

tsunami of poverty washing over Pizarro's proud City of Kings.

On the desert fringes of Lima, I visited a new *barriada*, or shantytown. Row upon row of the most wretched imaginable patchwork hovels straggled up gray hillsides of sand and stone. Not a tree or blade of grass could be seen. The bleakness and barrenness seemed absolute. And yet I could hear the sound of hope. . . .

Beside a huge rocky heap a group of women were chanting as they wielded shovels and pickaxes in a communal effort to wrest a patch of level ground from a hillside.

Explained CARE official Tim Truitt: "We provide tools and food. They provide the labor. A few days back this spot was covered by tons of rock. Now it's been cleared, rock by rock, stone by stone, to make room for a new school building."

The government euphemistically calls these barriadas *pueblos jovenes* (young towns), providing them, when possible, with water, electricity, schools, and a few minimal city services. But many of the newer ones, springing up literally overnight, don't get even that.

A cry of collective triumph rang out as the women pried loose a boulder half the size of a Volkswagen. Soon a flurry of hammers began smashing it into smaller stones.

"They work hard, without complaint," Tim said. "Nothing means more to these people than having a school for their children. Without education there's no way out of here, and they know it."

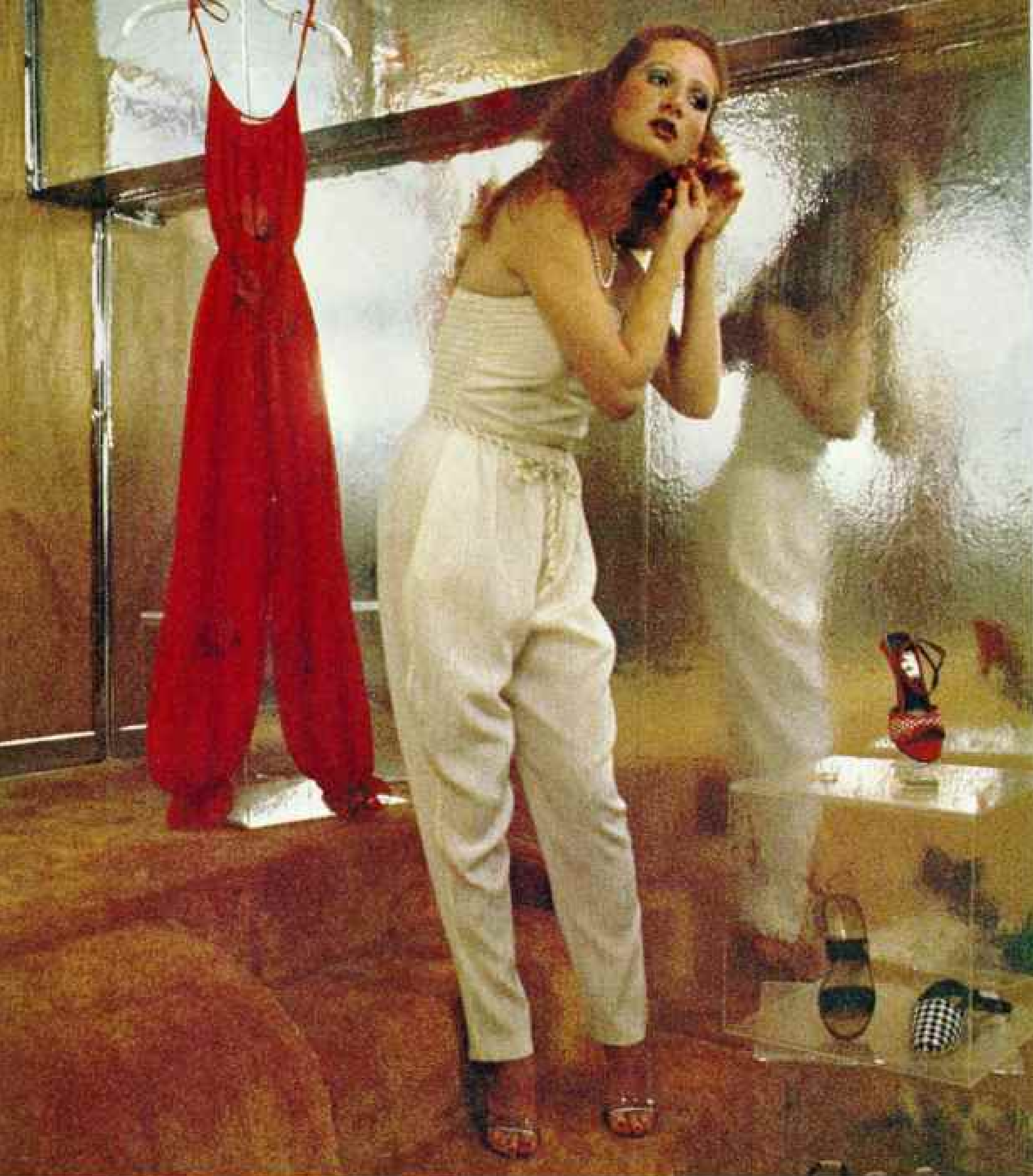
Some barriada dwellers dream of a return to their ancestral mountains. In fact a long-range program calls for resettling many of them in jungle-region irrigation projects to open fresh areas to farming. But whether people—like condors—will ever be returned to their native Andes remains a doubtful dream.

A CAB WHISKS ME to another world—the glittering upper-class neighborhood of Miraflores. Taking a sidewalk table at Vivaldi's café, I order a *cortado*—sweet espresso topped with frothy cream—and watch Lima's crowds parade along the avenue in the latest styles from Paris, New York, and Madrid. Here and there an Indian woman, as out of

Lima whirls *around plazas, a pattern set in 1535 when Pizarro founded the capital from which Spain began its South American empire that lasted*

nearly three centuries. Royalist Lima held fast as winds of freedom swept the continent. But independence was declared in 1821 and realized three years later.

Anticipating crowds for the Procession of Our Lord of the Miracles, vendors stake early claims in the usually quiet Plaza Bolognesi (***above***).



place as an astronaut, trundles along beneath some nameless bundle, sandals scuffling, eyes earthward, oblivious to it all—her soul, I suppose, back in the mountains.

But the others are all openly happy to be here, to see and be seen, to drift from sidewalk table to table, chatting, laughing, flirting in the high-octane atmosphere.

Before the glittering store windows, almost like mannequins themselves, pose lovely fair-skinned criollas of near-pure Spanish descent and stunning mestizas with dark red hair and glowing cinnamon complexions. Flashing sidelong glances at appreciative observers, they eye their own reflections in the windows, then move back into the swirling crowds, lovely as clipper ships. The men, for their part, stride smartly

Dressed to fill ***Dressed to fill** Lima's stylish role, Peru's 1981 Señorita Playa (Miss Beach), Paulina Muro (**above left**), models fashions in Camino Real Shopping Center (**above**). True to its translation—royal road—the mall in the San Isidro section draws travelers on the high road of life.*

among them, handsome and imperious as conquistadores, viewing the passing flotilla of beauties with practiced eyes.

LIMA IS A CITY on a binge, fueled by pure adrenaline. It's not just Brady's earthquake predictions. Life here is *always* lived, somehow, as if the end of the world were expected at dawn.

Maybe it's the overpowering geography that creates this apocalyptic air. Clinging tenuously to a fragile green oasis, where the River Rimac plunges down to the coast from the Andes, this sprawling metropolis is set about by geographic extremes.

TO THE NORTH and south encroaches one of earth's driest deserts. To the west the Pacific. To the east the abrupt wall of the Andes—a presence even when you can't see it through the *garúa*, or sea mist, that blankets the city from May through September.

The preconquest Indians who occupied this same oasis for thousands of years had the good sense to live on its fringes and use arable land for farming. Today almost five million Limeños occupy most of the oasis, and only a vast capillary system of irrigation ditches brings enough precious moisture from the Rimac for limited agriculture.

Where the irrigation ends, the stone and sand desert begins, a desolation of dune and wasteland stretching for nearly 1,400 miles along Peru's coast, stitched together by the two-lane, sand-drifted Pan American Highway. At Paloma, just south of Lima in the Andean foothills, archaeologists have discovered remnants of the oldest known village in the Americas—a village inhabited some 7,700 years ago.

The remains of ancient Peruvian peoples have been found along many watercourses across the desert—Paracas, Nazca, Moche, and a host of others (see the double supplement map, **Indians/Archaeology of South America,** distributed with this issue). Arid sands preserve their fascinating artifacts—all too often exhumed by industrious looters for sale on the illicit and thriving international market in pre-Columbian art.

Armed robbers also have taken a toll of such art, specifically irreplaceable works of silver and gold from the Inca Empire. In a raid last November 26, gunmen seized 34 artifacts from the National Museum of Anthropology and Archaeology in Lima. Among them was a world-famous ceremonial knife, or *tumi*, fashioned from two pounds of gold—perhaps the single most valuable object in all Peru's museums.

Since *any* gold pre-Columbian artifact is a great rarity today—and since none has

Old World glitter: *Bullfighting roared into Peru with Pizarro. Lima's Plaza de Acho, oldest bullring in the Americas, draws matadors* **(above)** *and aficionados from Spain and Latin America.*

New World glory: *The "lost city" of Machu Picchu graces a lofty berth high above the Urubamba River (**overleaf**). For 500 years the Inca ruins lay concealed, until found by Hiram Bingham in 1911 and explored with help from the National Geographic Society. Somehow the outpost escaped detection by Pizarro's forces, who in 1533 sacked and plundered nearby Cuzco, the Incas' royal city.*

ever been legally exported by Peru—potential purchasers should exercise the greatest caution, demanding a complete legal pedigree for any such items for sale.

MOST PEOPLE would expect Peru's parched coast to be a jungle, like the Pacific coasts of Colombia and northern Ecuador. One reason for the anomaly: the Peru (Humboldt) Current, which flows northward from the Antarctic, working a sea change over virtually everything.

Surface winds chilled by the ocean are trapped beneath the warmer air above the coast, thus inhibiting rainfall. From the east the Andes block rain-laden clouds coming out of the steaming Amazon basin. The result: Most of the coast records only a few inches of rain in each decade, if that.

Prevailing winds from the south drive surface waters offshore, causing cold water to upwell from the ocean depths. The plankton that permeate these waters attract vast swarms of small fish called *anchovetas*, or anchovies, which in turn attract millions of seabirds, whose droppings over the centuries coated offshore islands with guano hundreds of feet thick. A century ago, before the wide-scale use of man-made fertilizers, guano was the primary export of Peru.

More recently, Peruvians turned to catching the anchovetas themselves for use as fish meal to be sold as animal feed. Never known as world-class fishermen, Peruvians, by the early 1960s, surpassed Japan, China, the Soviet Union, and the United States to rank as the leading fishing nation.

But overfishing combined with warm-water invasions of the cold upwellings have lately caused the whole web to unravel. By the early 1970s the anchovetas had diminished drastically, as had most of the seabirds that lived on them. Peru's fish-meal industry suffered a near collapse. While sharp restrictions on fishing have revived anchovy stocks somewhat, only time will tell if they can restore themselves to their previous numbers.

ALL NIGHT LONG the dogs barked in Ayacucho. An old saying has it that dogs bark the night before an earthquake—which only added to my sleeplessness that Good Friday morning.

I had arrived the previous evening in this city of the Andes, noted for its Holy Week ceremonies, after a battering 12-hour drive up from Paracas on the coast. Along precipitous dirt tracks hardly wider than our little Toyota Land Cruiser, my guide, Tony Luscombe, and I had snaked ever upward from sea-level desert to ear-popping Andean heights above 15,000 feet.

Several times downward-hurtling buses and trucks had loomed suddenly out at us from around blind mountain curves. Each

Anguish written on her face, *a woman in the Andean village of Paccha mourns the loss of loved ones in the earthquake that struck the Ayacucho region on Good Friday, 1981. Repeated aftershocks drove terrified villagers out of their crumbling adobe houses to set up makeshift straw huts and tents in the main square.*

In 1970 residents of Yungay, north of Lima, had no forewarning when a massive earthquake broke loose a glacier. The subsequent avalanche buried Yungay beneath ice, mud, and rock. A tombstone **(right)** *looks down on the obliterated town, now a graveyard for the 18,000 who died in that catastrophe.*

Piety perseveres *as celebrants at Ayacucho's Good Friday night procession last April transport an ornate glass coffin containing a statue of Christ. Only 20 minutes before, the Andean religious center had been violently jarred by an earthquake, which measured more than 5 on the Richter scale.*

Damage in the city itself was slight, unlike the nearby villages where eight persons were killed by the quake and a dozen more were injured.

time Tony had somehow managed to swerve away from onrushing traffic without plunging us thousands of feet into the beautiful chasm we could see below. Crosses routinely set up at curves marked points where unluckier travelers had made that final plunge.

Fortunately, I'd been too sick to pay close attention. A cold chicken sandwich, eaten in Paracas the night before, had set off a tumult in my insides. Compounding my problem was *soroche*—altitude sickness—a constellation of miseries including dizziness, headache, fever, and stomach-curdling nausea.

Now, wrapped like an Inca mummy in my sweat-soaked bed sheets, I roused to a knock at my hotel-room door. It was one of the bellboys, bearing a cup of coca-leaf tea—a popular antidote for soroche.

"Make you feel better," he said. "You stay in bed today, señor. Not good to go out Good Friday night anyway. Christ dies today. Until He rises to heaven on Sunday, there is no one to punish men's acts. Thieves and drunks will be out. Maybe terrorists too. You beware, señor."

Mildly narcotized, I drifted asleep to vague nightmares of barking dogs.

THAT EVENING, feeling somewhat better, I attended Ayacucho's Good Friday night procession—highlight of the year in this Andean religious center famed for its 30 churches. Just off the Plaza de Armas, I elbowed my way into a dense crowd waiting for the life-size image of Christ to be borne out of a church in a ceremonial glass coffin.

Just then—it was exactly 7:32 p.m.—there was a tremendous blast, as if two subway trains had collided directly beneath our feet. A terrorist bomb? I took three steps and froze. The man behind me broke into wailing prayer. For three or four seconds the old stone church towers swayed and shuddered. Then, a moment of eerie stillness, followed by a cacophony of screams.

"¡*Terremoto*!—Earthquake!"

Others picked up the cry. "¡Terremoto!"

And, in fact, that's what it was—measuring, we learned later, 5.1 on the Richter scale. This, however, was not one of the earthquakes Brady had predicted. (In fact, Brady has since revised his predictions several times.)

Peruvian leads UN

SAW LWIN, UNITED NATIONS

"AS A CHILD IN LIMA, living in a mixed society," says Javier Pérez de Cuéllar, "I learned not to discriminate. All people—rich or poor, whatever their race or religion—must be treated with the purest impartiality."

Last December, Pérez de Cuéllar was chosen Secretary-General of the United Nations, succeeding Kurt Waldheim. He is the first Latin American to hold the post—and only the fifth Secretary-General since the founding of the United Nations in 1945.

"Also, as a Peruvian, I am bound by my conscience to give a rightful emphasis to the problems of the Third World," the soft-spoken career diplomat told author Harvey Arden. "If the Third World improves, so do the First and Second Worlds. To bring the three worlds together—I see that as my mission."

For his global task the new UN chief draws on a lifetime's experience as Peru's Ambassador to the Soviet Union, Poland, Venezuela, and Switzerland, as well as to the United Nations; as UN Under Secretary-General; and as UN negotiator during crises in Cyprus and, most recently, Afghanistan.

His avowed aim as Secretary-General: "Negotiate, negotiate, negotiate."

No serious damage was reported in Ayacucho—except that the city's water reservoirs drained out. But two days later the campesinos from the deep Andean valleys around Ayacucho began arriving by foot with tales of destruction: several villages damaged, eight people killed, many injured. Two more days passed before helicopters reached the stricken villages with medical teams and emergency supplies. I helicoptered out with the white-robed Archbishop of Ayacucho, Federico Richter.

Descending into the tiny village of Paccha, inaccessible by road, we found the numbed inhabitants living in tents and makeshift straw shacks in the main square, too terrified to move back into their mud-brick homes for fear of another terremoto. (Indeed, there were aftershocks for days.)

Archbishop Richter, robe fluttering in the mountain wind, held a moving service in the shell of the town church, whose roof had collapsed during the earthquake.

Meanwhile, four days after the quake, the first emergency supplies to arrive in Paccha were being unloaded. But the people stood among the boxes in the square, poking through the contents with puzzled faces.

"Can anyone tell me, what is soya flour used for?" one man asked aloud, cradling a sack marked "From the people of the United States of America."

But what do you *do* with soya flour? No one could tell him.

Archbishop Richter walked by in the hot sun, wiping his brow. He shook his head.

"Who could have imagined? That church has stood here for centuries. We've had several tremors since last November in Ayacucho, but never a real earthquake in this region. Now *this*. The people are terrified. But, did you know . . . already they're making plans to rebuild the church?"

AMERICAN adventurer Leo Little was about to leave Cuzco for a couple of months of gold prospecting in the Madre de Dios jungle near Puerto Maldonado. He'd been back in civilization only briefly, but that was enough.

"You get used to it out there, somehow. Heat, snakes, bugs, wild animals, thieves and con men and murderers, every possible danger and discomfort you can imagine. But

you're your own man. If you survive, you've got yourself to thank for it.

"A while back I was working at a gold camp out of Puerto Maldonado, deep in the jungle. There are dozens of big gold camps out there right now, and thousands of small pick-and-shovel operations. It's a genuine gold rush, Peruvian style.

"Well, one night at dinnertime a huge storm suddenly blew out of nowhere. Winds must have been a hundred miles an hour. You could hear the trunks of 150-foot trees snapping . . . like explosions. One tree fell right on the dining hall with 50 men inside. Three killed right off, 12 injured. Two more died that night. Took several days to get survivors out of there to a doctor.

"Another time I was out alone sawing a log for the sluice. The chain saw I was using slipped and hit my leg. Sliced it clean open. I'd have bled to death if I hadn't sewn my own muscle and skin together with a needle and thread. No, sir, it's no place for folks who want the easy life. But at least you don't get bored."

We were sitting in the patio of Leonard's Lodgings, a few blocks off Cuzco's main tourist drag. Leo was arranging his gear in a backpack. He held up a large green plastic pan. Would he demonstrate, I asked, how one pans for gold?

He scooped some earth from the edge of the garden and tossed it in the shallow pan. Going over to a washbasin, he let running water flow over the dirt and pebbles.

"The Incas got nuggets big as peanuts," he said, "but you rarely find anything like that today. Down in the jungle you find only flour gold, no bigger than grains of salt. Still, those grains of gold add up. People with perseverance have gotten rich, but most people lack the patience to come out with much."

He swished the water and mud around in the gold pan. "Couldn't be simpler. You let the lighter stuff wash away. Pick out the pebbles and stones. What's left is this fine black sand mostly. Then you've got to stir it around and look close. . . . Hey!"

He held the pan under my nose.

"Look at that!"

Sure enough, clear as the sparkle in Leo's eyes, two tiny grains of gold shimmered in the muck at the bottom of the pan.

"Now that's why I love Peru!" he said.

I MET A SNAIL in Machu Picchu. She (such grace, I thought, *must* be feminine) was crawling along one of those perfectly fitted unmortared stone stairways the Incas are famous for, just below the precipice-topping altar or sundial called Inti Huatana—"hitching post of the sun." Here Inca priests likely made offerings to the sun god, Inti. Standing at the platform's edge, you look down a stomach-wrenching depth over near-vertical Inca terraces to the curling white thread of the Amazon-bound Urubamba River 2,000 feet below.

The snail, of course, saw none of this with the bulbous eyes atop her probing tentacles. I doubt that she even saw my foot as it swung down on her. Only at the last instant did I spot her—stopping my heel just inches above her alertly raised head.

She was beautiful, this little snail of Machu Picchu. Her moist gray skin glistened with rainbows. Her whorled shell bobbed proudly behind her like the ornate poop deck of an old Spanish galleon.

Like me, she was out for a stroll before the daily onslaught of tourists arrived by train from Cuzco. Lest she be trampled under some foot less cautious than mine, I picked her off the stair and set her to one side.

We were entirely alone, the sole observers of this sacred city of the Incas, wreathed and tangled now in early morning fog. Discovered by Professor Hiram Bingham of Yale University in 1911, it was cleared and explored from 1912 to 1915, under National Geographic Society and Yale grants.

Historians speculate that this was one of a series of outlying refuges to which the last Inca rebels fled after Pizarro ousted them from their imperial capital at Cuzco, about 70 miles away as the condor flies.

But why did they abandon this aerie, which the Spaniards never discovered? No one knows. Bingham found it moldering beneath centuries of vegetation.

With my friend the snail, I contemplated this ruined wonder of a people who had no knowledge of the wheel, no written language, no draft animals or beasts of burden sturdier than the delicate llama—and who yet managed to impose their rule over a domain as far-reaching as ancient Rome's.

From the abyss below came the hoarse-throated voice of the Urubamba River,

Broad shoulders of the Andes *near Cuzco wear a shawl of checkered fields during a dry October. Here on the high Sierra reside Peru's Indians, most of whom speak Quechua, the tongue of the Inca Empire. Potatoes and corn are their staple*

crops. During the previous government, large private landholdings were reorganized into centrally administered farm cooperatives, but productivity suffered, requiring agrarian Peru to import much of its food.

whispering of forgotten worlds. And now, from somewhere, came the unexpected *tap-tap* of metal striking stone. Two workmen were beginning the day's work on maintenance of the old Inca buildings. The morning fog was lifting. Soon the tourist hordes would arrive. The spell dissolved.*

It was time for the snail and me to go our ways. I got up to leave, but noticed that she had once more crawled out onto the stair. Again I picked her up and set her out of harm's way—a last friendly gesture from one traveler through history to another.

LET US SAY FAREWELL to the Urus. The guidebooks still speak of them, and tourists daily set out from Puno on Lake Titicaca to seek them out on their famous "floating" islands here on the world's highest navigable lake—12,500 feet above sea level. But knowledgeable people will tell you those aren't really Urus out there any more. Those are Aymaras, people of the mainland. The last real Uru anyone remembers died some 20 years ago.

With him went much of the culture and history of an Indian people who for centuries stubbornly maintained their identity against the onslaughts of Inca and Spaniard, Aymara and Quechua.

I set out one dawn aboard a rusty boat to visit the farthest of the reed islands, out beyond those usually visited by tourists. We passed by islands the size of football fields, replete with villages, schools, and playgrounds. Others were so small they supported only a few rude huts.

Through a maze of reed-grown channels we came after several hours to a little island from which a lad in a totora-reed *balsa* came poling out to greet us. He led us "ashore" at the island's rotting, waterlogged edge. My feet sank inches into the spongy reeds. I half-expected to fall right through, but quickly found my sea legs. The reeds go down about six feet, I was told, and the topmost layer must be renewed each year, while the bottommost rots away. From the same reeds these islanders make their homes, bed mats,

*The forging of the Inca Empire of six million people and its destruction by one man with fewer than 200 followers is told by Loren McIntyre in the December 1973 GEOGRAPHIC and in an expanded version two years later for a National Geographic book.

An uphill struggle *against poverty confronts the majority of Peruvians, who share South America's common problem—a large gap between rich and*

poor. Lacking social welfare, Indians on the economic bottom hustle with an Andean spirit of survival. Adding to his family's income, a boy carries his shoeshine trade to a Saturday fair above Ayacucho. Expansion of rural public schools increases his generation's chance to break with the past.

baskets, boats, and sails. They even eat them, relishing the celerylike lower stalk and the roots.

A man—one of 25 people living on this tennis-court-size island—was making a reed boat in the traditional manner, binding the totora reeds together with tough ichu grass from the Altiplano.

"A boat takes only a few days to build," he said, "but it lasts many months. With this we get all the fish we need with some left over to sell. We also hunt ducks and frogs. To grow potatoes and vegetables, we bring in soil from the mainland."

Did he consider himself an Uru?

He shrugged, a quizzical expression on his face. "My grandfather was born on this same island, like my father. He spoke Uru. But my grandmother was Aymara. We weren't taught the old language. People were ashamed of being Urus. Others said the Urus were dirty, that they ate lice. We were taught that we were Aymara."

Did they practice the old religious ways?

"Those are forgotten," he smiled. "We are Seventh-day Adventists now. There is a church on one of the islands, three hours away by boat. But is that too long a trip for a chance to talk with God?"

The Urus are no more. Unlike the condor and the vicuña, they were never declared an endangered species. No conservationists came to their rescue. No monument records their passing.

THE PLANE OUT of Lima hurdled the snow crests of the Andes and took us out over the steaming green Amazonian jungle, which covers more than half of Peru. We landed at Iquitos—population 173,600—the only city of any size in a region as big as Texas.

No roads lead here. You arrive by air or water. When demand for rubber made this jungle entrepôt boom back in the 1880s, travelers from Lima had to go entirely around the northern coast of South America to the mouth of the Amazon in Brazil, then upriver to Iquitos—a 7,000-mile journey. Today it's only a 1½-hour, 640-mile flight.

Gamble gone bust: *Art was the artifice of a drug smuggler, who modeled plates and statues from clay mixed with cocaine, center. He intended to extract it in the United States but was foiled by Peruvian officials. Peruvians lawfully chew leaves of the coca bush, but legally grown coca probably accounts for only a third of Peru's crop. The remainder may supply half the cocaine in the world.*

The town still boasts relics of the rubber-boom era. On the main plaza stands a wondrous two-story building of riveted iron plates designed by Alexandre-Gustave Eiffel, of Eiffel Tower renown. It was first displayed at a Paris exposition in 1889. Later it was dismantled and shipped here by a rubber baron.

The rubber boom collapsed before World War I. Today the talk is of oil—sizable reserves in the jungle near the Ecuadoran border. Some strikes were made back in the early 1970s, but drilling and exploration came to a near standstill when the oil proved of poor quality. Foreign companies gradually pulled out; the cost of exploration in the jungle is staggering. Completion of the pipeline to the coast in 1977 and more discoveries have begun a new boom that will help lubricate Peru's creaking economy.

Around Iquitos itself, the jungle has been logged over for hundreds of miles. Primitive Indians who dwell in that green vastness are being rapidly assimilated. Many come from deep in the jungle to Iquitos, bringing old ways with them—including jungle magic.

I asked around, hoping to find a sorcerer. I was told they use the bark of a jungle vine to brew a hallucinogenic elixir called *ayahuasca,* under whose influence they cast potent spells.

Two kinds of magicians use this elixir. There is the *brujo,* caster of powerful spells, capable of causing almost unimaginable evil. No one I talked to knew of any brujos—though everyone seemed to know people who suffered from their evil spells, which are said to cause melancholy, impotence, blindness, sickness, even death. A brujo's victims, I was told, must seek out a *curandero,* or curer, who cannot create spells but can, with the help of the ayahuasca elixir, break the power of a brujo's spell.

Could I find a curandero in Iquitos?

Oh, no, people said, even the curanderos are gone. But one taxi driver finally suggested someone.

"There is a man who works at the slaughterhouse. Perhaps he can help you."

And that's how I met the maestro.

Gamble becomes boom: *Welding fuses a pipeline near Andoas, after a 1978 oil strike helped boost Peru's known reserves by almost 20 percent. When the state first struck jungle oil in 1971, it urged foreign companies to join the probe. All failed except U. S.-owned Occidental Petroleum, which persevered, making strikes that allowed Peru to export a billion dollars' worth of oil last year.*

***Robbed of moisture** by the effects of the Andean rain shadow and chill Peru, or Humboldt, Current, the nation's narrow coastal region is one of the earth's driest deserts, with spectacular dunes such as these*

near Lima. Nonetheless, 50 percent of all Peruvians live along the 1,400-mile coast, and several irrigated river valleys support the country's most productive farms, yielding cotton and sugar as key crops.

Taken to a small home near the slaughterhouse, I was introduced to Cristóbal Solín.

He brought out a corked bottle filled with a brownish, bubbly fluid.

"Ayahuasca," he said. "With this one can cure the victim of a brujo—but only if the brujo was not too powerful."

He pointed to his right eye; the pupil seemed broken, like the yolk of an egg.

"A brujo did that to me when I was a young man," he said. "The eye went blind, there was terrible pain. The doctors couldn't help, so I went to a curandero. For months he tried to cure me. The pain went away, but still the eye was blind. Finally the curandero said he could do no more; the brujo who had cast the spell was too powerful.

"From that time I studied the ways of curanderos. I learned the old knowledge and how to make the ayahuasca. Now I try to help others. We have meetings every Sunday where people come to be cured."

Could I attend?

He measured me with his one good eye. "Yes, but you must buy the cigarettes."

The cigarettes?

"We need them for the ceremony. Two packs. You will see."

THAT SUNDAY NIGHT we drove out to an old abandoned tanning factory on the outskirts of Iquitos. We sat in a circle on the dirt floor. In the pitch-darkness a single candle was lit. The maestro and four "patients" each drank a small tumbler of ayahuasca, then sat back.

Now the maestro took out the cigarettes. He would smoke them incessantly for the next four hours, taking in deep gulps of smoke, then blowing it onto the heads and into the nostrils of the men.

Each patient in turn lay on the ground. The maestro took out a fist-size rock he called the sucking stone. Chanting hypnotically, he leaned over each of the men, applied the stone to the parts of their bodies where they felt pain, then made a loud sucking sound as he drew the "poison" through the stone and spat it out on the ground.

For hours the chanting, the smoking, the sucking, and the spitting went on. The men moaned and shook as the maestro hovered over them. Finally, he got up.

That was it?

A child's grief *all but overwhelms him moments after a hit-and-run taxicab rounded a blind curve and killed six of*

his sheep on a mountain road near Puno. Now he awaits the arrival of his parents, who have been summoned with the news of the accident. Loss of six sheep can be a sharp economic blow in a country where the majority of farmers survive at the subsistence level.

Afloat on the highest inland sea, *the island people of Lake Titicaca—legendary birthplace of the Incas—fashion their lives around the buoyant totora reed. Thickly matted, it forms the "ground" upon which they build reed villages. In the*

clear waters of the 3,200-square-mile lake, they fish from reed boats called balsas. Women of the surrounding 2.5-mile-high Altiplano, one of Peru's poorest areas, earn tourist dollars from colorful fabrics, woven in ancient tradition.

"Yes," he said. "It takes many sessions to work a cure. This man, for instance, has had pain in his stomach for many months. This is his fourth session."

Was he feeling better?

The man rubbed his navel, where the sucking stone had been applied.

"I feel pain, but not so bad now."

But why would a brujo cast such a spell on him? He shook his head.

I'd heard that many so-called curanderos are the worst sort of fakes. But what exactly is a fake? Unless I'd stumbled on a company of gifted actors, these men fully believed in what they were doing.

Was this religion? Magic? Primitive folk medicine? Sheer tomfoolery?

I leave it to wiser heads to decide.

BEFORE LEAVING, I asked the maestro if he could repeat a particular chant he had sung. He sat back on the ground, composed himself for a few moments, then started singing again.

"Oh, *condorcito, condorcito,*" he began, his voice rising and falling with breathy intensity. When he had finished, I asked him what the words—half Spanish, half Indian—had meant.

"I am calling the condor, the sacred bird," he said. "He is the messenger of the gods, you know. We need his help."

He repeated the simple but moving melody, "Oh, condorcito, condorcito. . . ."

Suddenly he stopped.

"Listen," he said, "do you hear the wings, out there in the dark?"

I cocked an ear to the jungle night sounds outside. Well, there did seem to be *something* rustling out there.

The maestro looked at me feverishly.

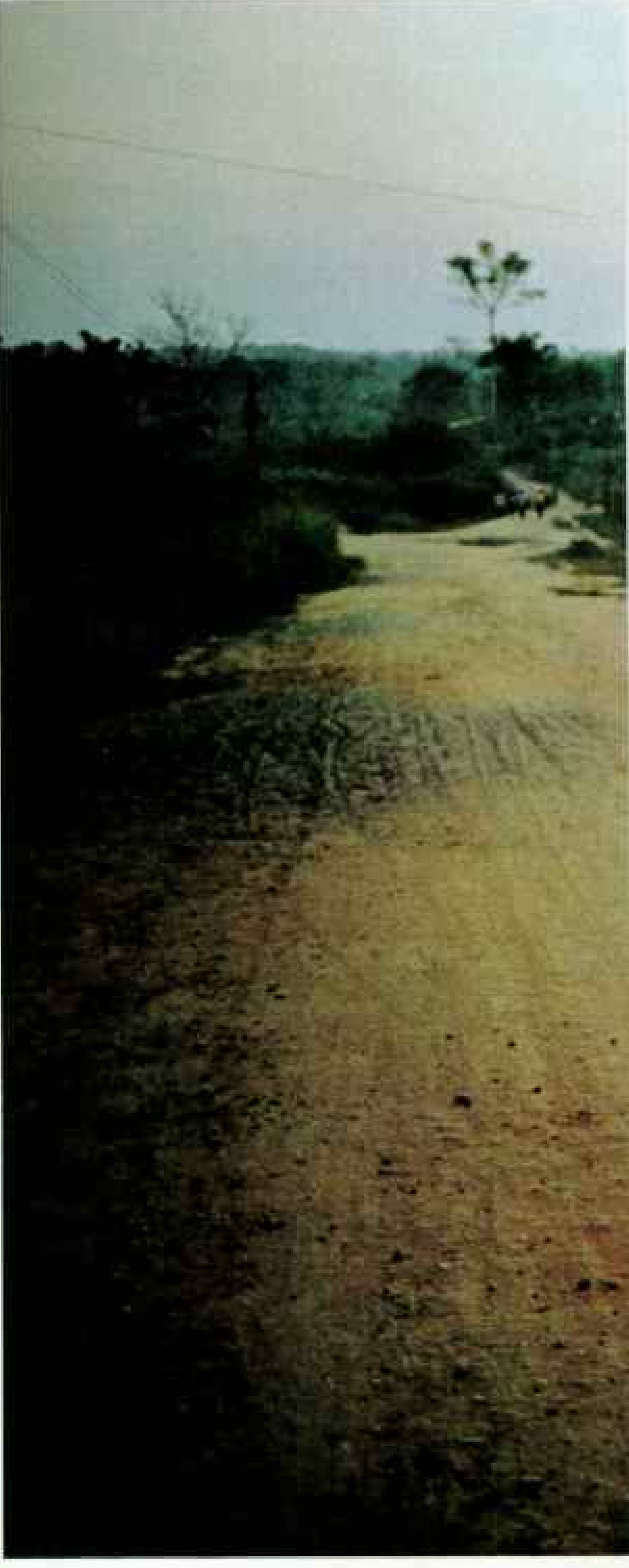
"Sometimes," he said, "the spirit of the condor comes when we call out to him.

"And sometimes," he went on, leaning toward me with a conspiratorial whisper, "*Sometimes the real condor comes. . . .*"

His intensity was such that disbelief on my part would have been irrelevant. The maestro and his patients *did* believe. The fact that I didn't was my loss alone.

The old blind harp player of Huancayo would have understood.

The condor—and my experience of Peru—had come full circle. □



"Go east, young man," *some Peruvian sage might well have advised the father of these youths with toy guns in the gold-mining town of Puerto Maldonado.*

From this settlement to the Equator, 870 miles north, the wild eastern frontier comprising some 60 percent of Peru's territory lures the adventuresome with mineral wealth and agricultural promise. Though lack of roads hampers development, Peru has begun to take its Amazonian challenge seriously.

Goal at the End of the Trail

SANTA FE

By WILLIAM S. ELLIS
NATIONAL GEOGRAPHIC SENIOR WRITER

Photographs by GORDON W. GAHAN and OTIS IMBODEN
NATIONAL GEOGRAPHIC PHOTOGRAPHERS

SANTA FE wears nothing so well, or so often, as the bunting of festival, and even on this late September afternoon, blessed with breeze enough to quake the aspens, the plaza is being strung for a celebration of remembrance.

It is to be a Spanish affair this time, sometimes solemn (in veneration of the saints) and often swaggering (in the style of the conquistadores). A few weeks earlier it was the Indians who gathered to call down the spirits of ancestors, some of whom helped drive the Spanish from here three centuries ago.

In a way Santa Fe is a celebration itself, an enchantress among cities without the Circean evil that turns men into swine. In the 19th century it was the end of one of the great trails that opened the West, and today those who come this way still stop here in New Mexico's capital, many to stay. Only one city in the United States, St. Augustine, is older than Santa Fe, and perhaps none is so youthful with the pangs and problems of growth.

So on Friday, the first day of Fiesta de Santa Fe, one troupe of Spanish dancers after another jackhammered clunky heels into the outdoor stage in the plaza. Later there would be a candlelight procession to the Cross of the Martyrs on Fort Marcy Hill, and another night the burning of Zozobra, a 40-foot-high sculpture of wood and chicken wire meant to depict gloom. For a full week Santa Fe honors the memory of Don Diego de Vargas, the king's representative who, in

Even housing is an art in Santa Fe: *After a hard day's construction, John and Georgine McGowan, at left, and their apprentices cool down in the reservoir of their experimental Garden House. It was conceived, but never funded, as a larger residence for the handicapped; designed to be self-sufficient in both heat and food, it faces the sun and shoulders into the earth. The interior garden is watered from the pool.*

GORDON W. GAHAN

"People wanted to buy *what I bought; that's how it started." Now Elaine Horwitch* **(right,** *foreground) has an art gallery in Santa Fe that is about to double in size. Here she entertains to celebrate the opening of a show by Tulsa artist Otto Duecker, left rear. She also represents Tom Palmore, in the black hat, a leading realist painter who rents a solar-heated house* **(above)** *on a nearby hill. It is a modern statement of the adobe style, as traditional in Santa Fe as a ristra of tongue-searing chilies* **(left)**.

Palmore was raised in Texas and Oklahoma, "where the summertime could blow your brain," schooled in the East, and has found in Santa Fe "just a beautiful environment." So have thousands of others, and Santa Feans are not altogether happy that the news is spreading.

But the appeal is undeniable: A city whose only major industry is state government; a place that blends with the earth, untainted by glass boxes or high rises; a locale flanked by mountains and surrounded by Indian pueblos and Hispanic villages; a colony of artists, craftspeople, and writers; somewhere too friendly to keep itself a secret.

GORDON W. GAHAN (BELOW); OTIS IMBODEN

1692, reclaimed this "city of holy faith" for the Spanish following a dozen years of occupation by the Pueblo Indians.

Fiesta has been celebrated here for 270 years; indeed, it was by decree of the Spanish government that the pageantry began. Then, as now, the script for most of the events was drawn from the church. Even when Fiesta ends, the ecclesiastical ambience clings to Santa Fe like a vestment. Somewhere in the area, one knows, penitents are wounding themselves behind locked chapel doors. Everywhere, it seems, lines are forming for the taking of the Eucharist. It is all enough to give some stigmatic significance to the blood red wash that scuds across this southwestern sky most evenings.

"De Vargas's rule here reflected his devotion to the church, and in the beginning everything in Fiesta revolved around religion," said Faustin "Tino" Chavez, president of the Fiesta Council. "The trouble started when the date was changed, to coincide with Labor Day. That attracted some rowdy people—motorcycle gangs and others. Finally there was a riot in 1971, so we returned to the date decreed by the Spanish, September 14."

THOSE WHO ARE ATTRACTED here (and indeed, attracting and accommodating visitors is a major industry in Santa Fe) now come less often on motorcycles than in Mercedes-Benz sedans. Many are wealthy retirees, although of them it is not said that they retire, but rather "step down." Among them are names to be reckoned with in the councils of high finance, and others renowned on stage and in films. Western artists whose works command tens of thousands of dollars come for the light and for the kinship of a land still scarred with the tracks of covered wagons.

And often they come as deserters from drudgery, chasing a dream of a new and looser life-style. John Ehrlichman came in the wake of Watergate and returned after serving his prison sentence to take up residence and pursue a career as a novelist. When he walks the streets here, few pay any heed, for they are worldly people. (I know of one Santa Fean who counts among his friends an herbalist in Mozambique.)

For all that, Santa Fe's character is rooted in the Old West. The infusion of elitism from elsewhere has altered the image to a degree, like silver buttons sewn on buckskin, but this city of 50,000, second in population only to Albuquerque, remains something of a set piece from the drama that was the Spanish in the New World.

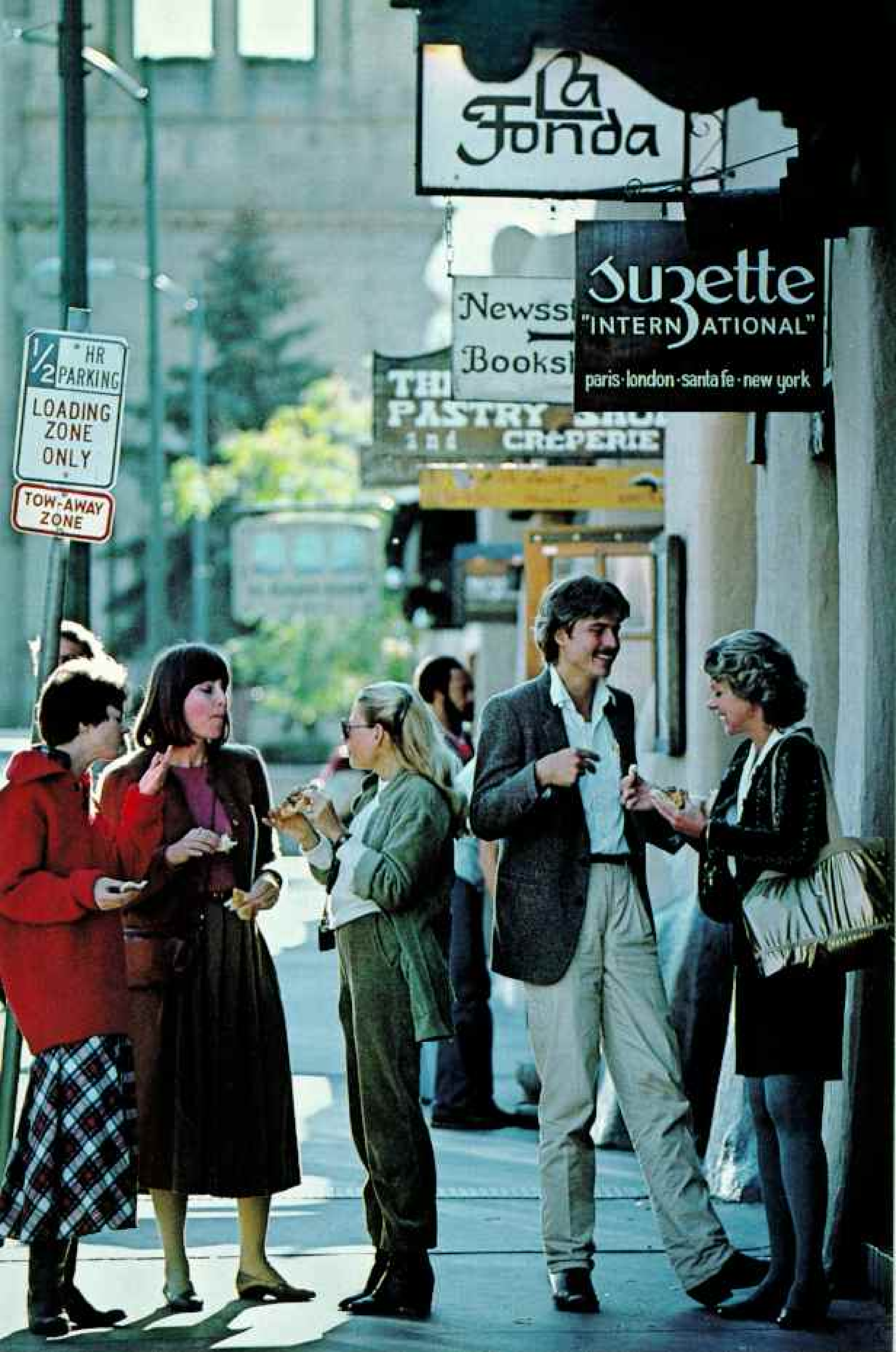
Fifty-five percent of the population claims Spanish heritage; far fewer—less than 2 percent—are Indians. Most of the rest are Anglos, both native and newcomer. There are certain social stresses in this mixture, and most of them spring from the smarting of Hispanics over the plasticizing of their culture.

Orlando Romero is a short, wiry man of 36 who fears that Santa Fe is "losing its true spirit." He told me that in a soft voice barbed with the prickly inflections of indignation.

"What's happening to Santa Fe," he said, "is manifested in the stuccoed adobe they're using in construction here. Real adobe springs from the earth—it has subtle lines about it. Mud adobe is part of Santa Fe, but to meet the needs of all the transplanted people coming here, they have to turn to something that's plastered all over and then painted brown or earth colored. It looks like hell, you know."

Romero is a sculptor and a writer, the author of a highly praised book titled *Nambe—Year One*. Nambe is the name of an Indian pueblo and village 15 miles north of Santa Fe, and it is in the village that Romero lives on land deeded to his family more than two centuries ago. For him it is a spiritual exercise to oversee a land that rolls under a stubbly covering of piñon before turning purple and mountainous in the distance. So it is that he wrote for his book: "There are tractors in Nambe, but my Grandfather and I have chosen to plow with a horse and to plant by

"A traditional morning routine" *is how Wendy Wysong, far right, describes a downtown gathering of friends for pastry and talk. Her companion, attorney Randy Bell, settled here after providing legal services to the Navajos. He finds "an incredible diversity of people from all over the world and all possible backgrounds."* GORDON W. GAHAN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hand. There is no need in going deep and disturbing our bones."

The heavy flow of people into Santa Fe began in the late 1960s. Most of them were young, with an apostolic sense of life's values, preaching love and peace. Many came in vans and buses, and some set up communes where they planted sweet potatoes and adopted mangy stray dogs. They made jewelry and rugs. Babies were born and given names more suited for roses.

Santa Fe held a special appeal for those caught up in the movement. Perhaps they had constructed an image of a Jerusalem in the high desert of New Mexico. Those who approached from the south, from Albuquerque, followed a fine road—the Spaniards' Royal Road—that carries over the rising reaches of the dusty land as it nears Santa Fe and the mountains. They came on the city at an elevation of 6,989 feet (higher than Denver), and there they found the air gaspingly thin. But the freshness of it—that splashed gratifyingly through the lungs.

They came, and a dozen years later most were gone. There are those here, late to the movement, who continue to play at nonconformity, but they are like children feinting shots at the hoop after the basketball game is over. "There are no more panhandlers, no more people sleeping in the parks," said city manager William Sisneros.

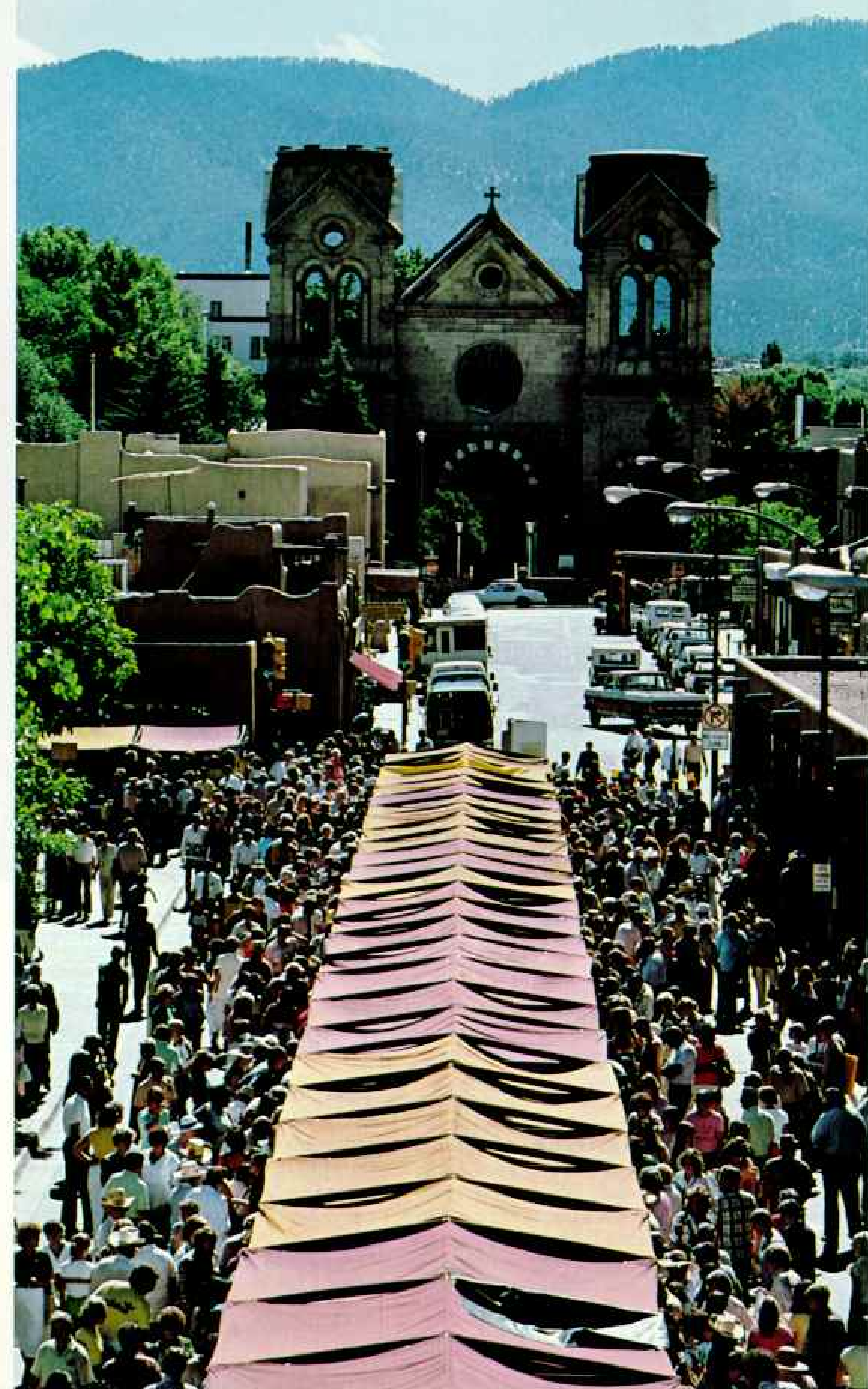
No more of that. Those who are left draw money from home, and if they are all like the girl I met who said her name was Grace, they pass the day sitting in a field near a chaparral of chamiso blazing yellow in the sun, reading Isaac Asimov.

"MOST CITIES are trying to create a pleasant atmosphere," Sisneros said. "We're trying to preserve what we have." The task is not an easy one. In addition to the fake adobe that brings distress to Orlando Romero and many others, there is an ever thickening stand of motels, quick-food outlets, and service stations on the outskirts of the central city. It is pressing inward, advancing on the plaza like a tide of fried-chicken smells and bug-spattered neon.

"Despite that, I believe we have a good grip on land use," Sisneros told me. "Of greater concern is economic development.

ALL BY OTIS IMBODEN

***Taproots,** both Indian and Spanish, have nourished Santa Fe and give it holding power deeper than its current chic. Spaniards were here before the first Pilgrim boarded the Mayflower, and Fiesta, with parades, solemnities, and Spanish dancers (**above**), is an older celebration than the Fourth of July. Before the Spaniards were the Indians, most familiar to tourists as they sell their wares along the plaza (**below**), most numerous during Indian Market in August, which fills the plaza with artists' stalls (**right**).*



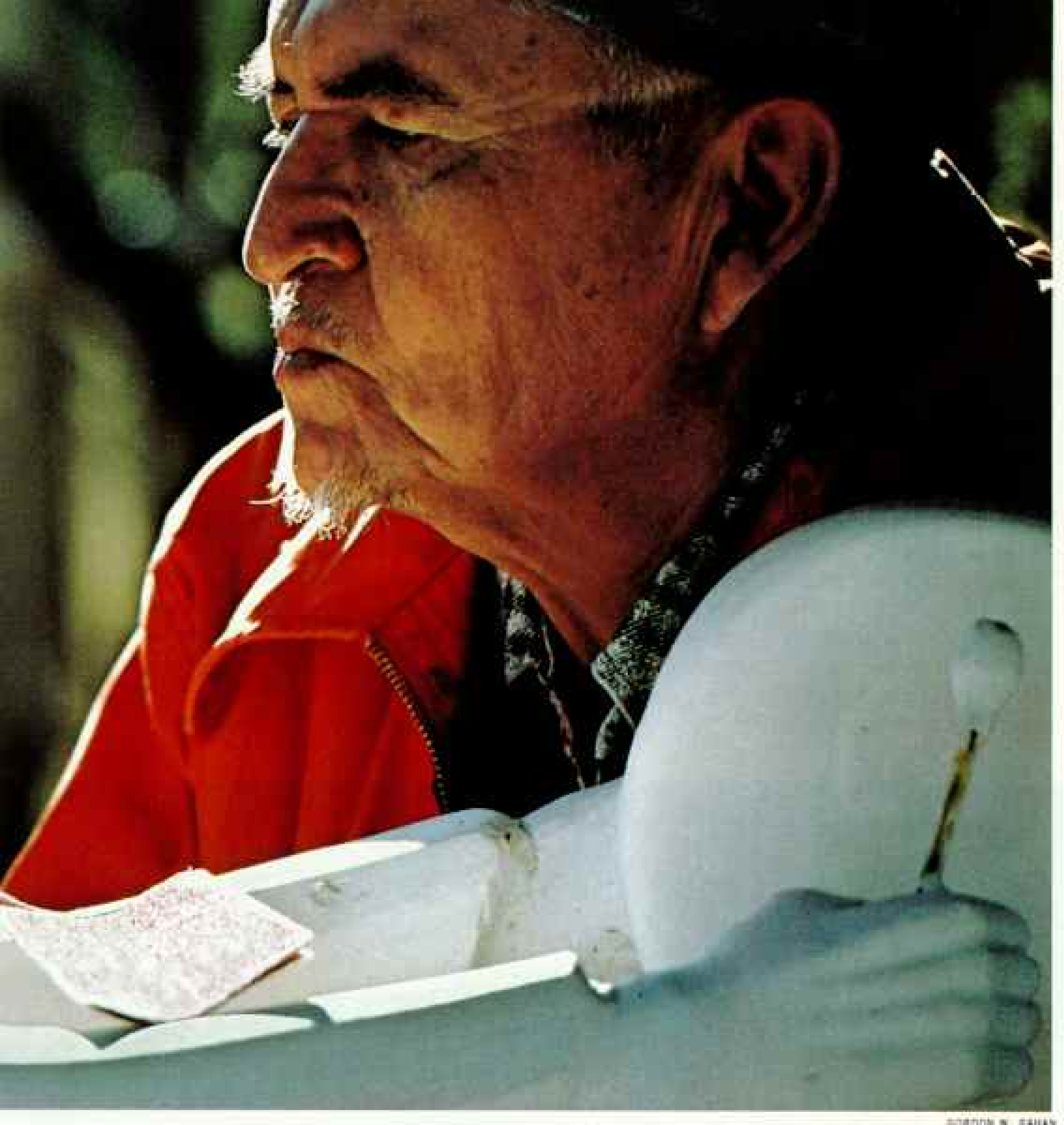
His father rode with Geronimo, *and sculptor Allan Houser remembers: "He and I used to sit every night, and he'd tell me stories." Those traditions filter into*

We have to get employment for our young people." He cited other major concerns, such as water supplies and tax revenues, both troublesomely low in Santa Fe. And with too little money, city services suffer.

"In a way, living here is as close as you can get in the United States to living in a Third World country," I was told by a woman who gave up her career as a news photographer to move here and train her camera on the visual feast of the land. "But Santa Fe is an extraordinary place, and when people move here they make a real statement about their values and the quality of their lives."

It can be said that Peter Gould made such a statement when he moved here in 1970. He came from Athens, Texas, where he made a considerable amount of money selling insurance. It seemed he was destined for tycoon status, a man to build shopping centers and gain control of banks. But the boredom that weighed on his life was too heavy. He had been to Santa Fe once before and, having liked it, decided to return, this time to stay.

The Peter Gould who was president of the Rotary Club in Athens became a user of



GORDON W. GAHAN

Houser's work, such as this "Sunrise Song." Yet he would rather not be called an Indian artist. "If I'm going to compete, I want it to be against all sculptors."

peyote for a time. He meditated and chanted his mantra. His marriage broke up, and it took him five years to get his life on a course that would bring him happiness. Now remarried, Gould has turned to woodworking, a longtime interest, and his pieces of finely crafted furniture have started to sell.

The Goulds live on a ranch they purchased in the town of Galisteo, south of Santa Fe. Their circle of friends is wide. "Once," Peter Gould told me, smiling devilishly, "I introduced John Ehrlichman to Allen Ginsberg, the poet." It was the irony of the meeting that amused him, I suspect, together with the knowledge that had he remained in Athens with his actuarial tables, such a moment could not have come to pass.

IF GOULD abandoned wealth in favor of Santa Fe, Forrest Fenn came here to find it. And he did it by leaping into an arena where the lions and lionesses of tradition sometimes snarl and flash their claws. He went into the art business.

As snow and ski lift are to Aspen, so are painting and sculpture to Santa Fe. More art

is hung in more galleries here than in any other city of its size in the nation, probably the world. It has been that way for more than half a century, since such artists as Joseph Henry Sharp, Will Shuster, Georgia O'Keeffe, and Fremont Ellis were attracted by the benediction of landscapes and the colors laid down on this place.

Outwardly, the art tradition in Santa Fe has been maintained with a certain genteelness. The guardians of some of the better galleries are as unobtrusive as choirboys in a loft. Often, prices of the pieces they have hung are given only upon request; at least one of the shops is *opened* only upon request. No credit-card imprinters clutter the desks on these premises.

Along came Forrest Fenn, restless Texan, ex-fighter pilot (328 missions in Vietnam), and, in his own words, "somewhat of a hustler." He knew little, if anything, about art. "I didn't own a painting," he said, "and didn't know anybody who did."

That was a dozen years ago. Today Fenn is the owner of a publishing company and a gallery housing an inventory of eight million dollars in art. It is a supermarket of paintings and sculpture where sales, according to Fenn, now amount to six million dollars a year. "We probably gross more than any gallery west of New York," Fenn said, "but money has never been a motive of mine."

Nonetheless, some more conservative gallery owners resent the style in which he makes it.

"Some of them have been in business here for years and couldn't make a go of it," he told me, as a bank of television monitors in his office flickered with images of activity in the gallery. "So along comes this kid who never went to college, never studied art at all, never studied business at all, and he's able to come this far. Even I didn't know I was going to grow to where I am."

True, Fenn has not studied art, but he has studied those who buy it. "If someone owns

DAVID STEIN

"The Rake's Progress" *under the stars lights the stage of the Santa Fe Opera, which opened in 1957, burned down in 1967, moved to a gymnasium, was rebuilt, and survived and prospered. The new buildings have "wonderful acoustics for an outdoor house," says technical director Drew Field, with a stage "like a Gramophone horn sliced down the middle." Bringing lavish productions to a city of 50,000 involves such logistics as renting 100 houses for a company of 450.*

a chain of Piggly Wiggly stores in Georgia, I know I'm not going to sell him very much because a unit to him is 39 cents. He is not going to consider a $6,000 painting. If he tells me he's a Cadillac dealer in Dallas, I know that one unit to him is $15,000 or $16,000, and it's easy to sell him a $20,000 painting. The people I love are automobile dealers, contractors, owners of real estate agencies, and insurance executives. They're the top of the line."

The kid from Texas would now like to put up a building in which he would display for sale a million-dollar painting, a vintage Rolls-Royce for $250,000, a 30-carat emerald. "They would all be one-of-a-kind items," he said. But then, with a concession certain to please some Santa Feans, not to mention owners of Piggly Wiggly chains, he added, "That probably will not be realized."

PERHAPS he's being pessimistic. Santa Fe is a festival of eccentricity. There was, for example, the elderly man who walked 15 blocks through the city each Sunday morning, wearing pajamas and a robe, to purchase a newspaper at Zook's Merit Drugs in the plaza. More recently there was The Kicker, a kindly looking woman who sat by the front door of a hotel, smiling at children and eating some yellowish candy from the five-and-dime. When the sun set, she would rise and walk to a nearby metal newspaper dispenser where, as if having partaken of some Jekyllian draft, she would scream *Hai!* and deliver a kick that nearly demolished the thing.

And The Singer: Standing by his table in a restaurant and holding his menu as he would the score of Handel's *Messiah*, he ordered breakfast by singing in a tenor voice that rattled the glasses. His favorite aria was "Short stack, sausage, and coffee."

It is not an unsettling of the mind, I think, that prompts such behavior here. Rather, Santa Fe, a city one in terra-cotta tone with the earth, comes on to the human spirit like a bracing wind, freshening our fantasies until the kicker in us kicks and the singer sings.

Of course, other tenor voices are heard in Santa Fe, for this city with no major airline and no passenger-train service (the Santa Fe Railroad will *not* bring you here) supports an opera company that has won critical acclaim the world over. It began in 1957, the creation of New Yorker John Crosby. A handsome outdoor theater was constructed in a natural bowl on the outskirts of the city, with views of the mountains and the sky.

By 1967 the Santa Fe Opera was something of an industry, bringing in as much as $1,500,000 to the area each season. On an early July morning of that year, a noise like fireworks was heard. It was cans of hair spray exploding in the dressing rooms; the theater was on fire, and by sunup nothing was left but concrete stairways. A new theater was built, and the company, now in its 26th season, continues to serve as the brightest of Santa Fe's many cultural lights.

Quality prevails in Santa Fe's obsession with the arts. Its Chamber Music Festival group has performed in New York's Lincoln Center. There is also a Festival Theater, a Film Festival, and dance and mime troupes. Serious artists are at work here, and two of them, William Martin and Kentyn Reynolds, are applying science to music to create sounds that echo the contemporary world.

Working with synthesizers, Martin and Reynolds shape sounds electronically, achieving such effects as drum rolls and jangling doorbells and the skirl of bagpipes. "Kent and I can sit here and produce a whole orchestra," Martin said. "You want 36 violins? Listen." His hands worked the electric keyboard with a flurry of action and the sweet sound of 36 violins filled the small studio in his house on Canyon Road.

BEHIND THE HOUSE is an irrigation ditch that was dug in the early 17th century, not long after the 1610 founding of Santa Fe, or, as it was later called, La Villa Real de Santa Fe de San Francisco de Assis ("the royal city of holy faith of St. Francis of Assisi"). It became the first permanent capital city in the United States, and for 200 years Santa Fe stood as a remote but treasured outpost of empire.

It was a glorious era in the history of the Southwest, a time when the character of Spain and things Spanish were imprinted indelibly on the land. Of all the construction, none was more grand than the Palace of the Governors, a building that was the center of the city then as it is now.

***A work in progress** is a 1967 Gran Prix that Arthur Medina, at right, is customizing as a low-rider car. He has begun the intricate paint job with only a spray can, and hopes to have it finished in two to three years. The car will have "hydraulics all around," he says, and an interior of "crushed velvet, red or black—velvet all over."*

Franciscans walked these narrow streets, and from here they set out on their donkeys to bring the Indians of the pueblos into the fold of the church. At the same time, the tribal chieftains were vowing allegiance to the Spanish crown—the chieftains, yes, but not a medicine man named Popé. In 1680 he led the pueblos in a revolt, and the Indians took over Santa Fe after killing 18 priests

GORDON W. GAHAN

and some 400 settlers. Then they cleansed their converted brethren of Catholicism by washing their bodies in yucca juice.

It took the Spanish 12 years to regain control. They restored the Holy Mass, and the city streets once again had the brocaded feel and flavor of finery. And when the empire began to fail, Santa Fe continued to flourish, for others came from the East to seek out this place on the high ground within the basin of the Rio Grande.

Today, Indians sell their crafts on the sidewalk in front of the Palace of the Governors. They sit there, wrapped in their blankets, seldom smiling, contemplating, it seems, the mystery of how they lost control. Although relatively few in number, they give to Santa Fe much of its strength of

character. Without its Indian history, Santa Fe would likely be but mere marginalia in the chronicles of the Old West.

The pueblos still exist. There are eight of them in the Santa Fe-Taos area, ranging in population from 125 to 2,000. Some are distinguished for the pottery made there, others for wood carvings and silverwork. At one time the hack of tuberculosis was heard throughout the pueblos, but the disease is no longer a major problem. Not so alcoholism.

A U. S. Public Health Service hospital in Santa Fe provides medical services for the Pueblo Indians. Demands on its services are heavy, but more than a dozen of its beds remain out of use for lack of federal funding. "It's the political situation," Joseph Moquino, the hospital director, said. "Indians have lost some of their strongest supporters in Congress."

SO THEY DO what they can, and that includes having a Public Health Service nurse, like Margaret Christensen, visit the pueblos each day. She put her medical bag in the backseat of a government-issue car, and we drove off.

"Some of the older Indians are reluctant to seek medical care from anyone but the medicine man," she said. "I let them know that we are available for help after the curing ceremony is over."

Certainly, the two elderly women who were the first to arrive at the clinic at the Pueblo of San Ildefonso were not reluctant to accept flu shots. One said her name was Rose, and the other Olympia. The latter had been having some trouble with her potassium count, and when Mrs. Christensen told her it was still borderline, she just nodded.

San Ildefonso is located along the Rio Grande, 20 miles northeast of Santa Fe. It covers 26,000 acres, and with a population of 500 it is a forlorn place. The cottonwoods are reclaiming land once given over to agriculture; these days, the Indians of San Ildefonso prefer to work at nearby Los Alamos.

Before the day was over, Margaret Christensen had administered several dozen inoculations, taken blood pressures, examined wounds on the mend, and acted as confidante and friend to aged Indians bewildered by the swirl of modern life and grieving for the time when services in the handsome churches in the pueblo plazas were better attended.

The presence of the church, as well as the kiva, in the pueblo was born of the mingling of Spanish and Indian blood. Many of the Indians speak Spanish. There is even a food to be had here called "Navajo taco." The mayor of Santa Fe, Arturo Trujillo, is of both Spanish and Indian heritage.

It is the Anglo, then, who stands more or less alone in Santa Fe's subtle, but sometimes sharp, social division. There is a Santa Fe Chamber of Commerce and a Hispano Chamber of Commerce de Santa Fe. Hispanics dominate on the Santa Fe Fiesta Council, while Anglos have their Santa Fe Festival of the Arts. Mayor Trujillo says "*Bienvenidos*" at city hall, and a few blocks away in the state capitol building Governor Bruce King says "Howdy."

There are few shrill outcries of social protest here. That would be bad form in Santa Fe. Also, it would be difficult to determine who should do the crying. Unlike Los Angeles, with its heavy influx of destitute Mexicans, Santa Fe has a sizable Spanish-speaking elite. In fact, they are in the majority. The Anglos, however, control most of the money. So the anger rightfully belongs to the Indians, the San Ildefonso Indian and the Tesuque Indian and the Santa Clara Indian—all of them who spread their blankets on the sidewalk in front of the Palace of the Governors and lay out their silver and turquoise for inspection by tourists.

When Indians do go to war here, it is at J. W. Eaves's place, and they do it before movie cameras.

In 1969, J. W.—it stands for Jess Willard, after the heavyweight fighter who defeated Jack Johnson for the world championship in 1915—had a set of a western town constructed on his ranch. Since that time Hollywood has filmed dozens of full-length features on the Eaves ranch south of Santa Fe. John Wayne acted here, striding in and out of the saloon with his shoulders at quarter to two, and Henry Fonda and Jimmy Stewart were here too, stuttering their way through *The Cheyenne Social Club*.

J. W. is a tall, handsome man who would surely be cast in a Western movie as the cattle baron married to a beautiful but

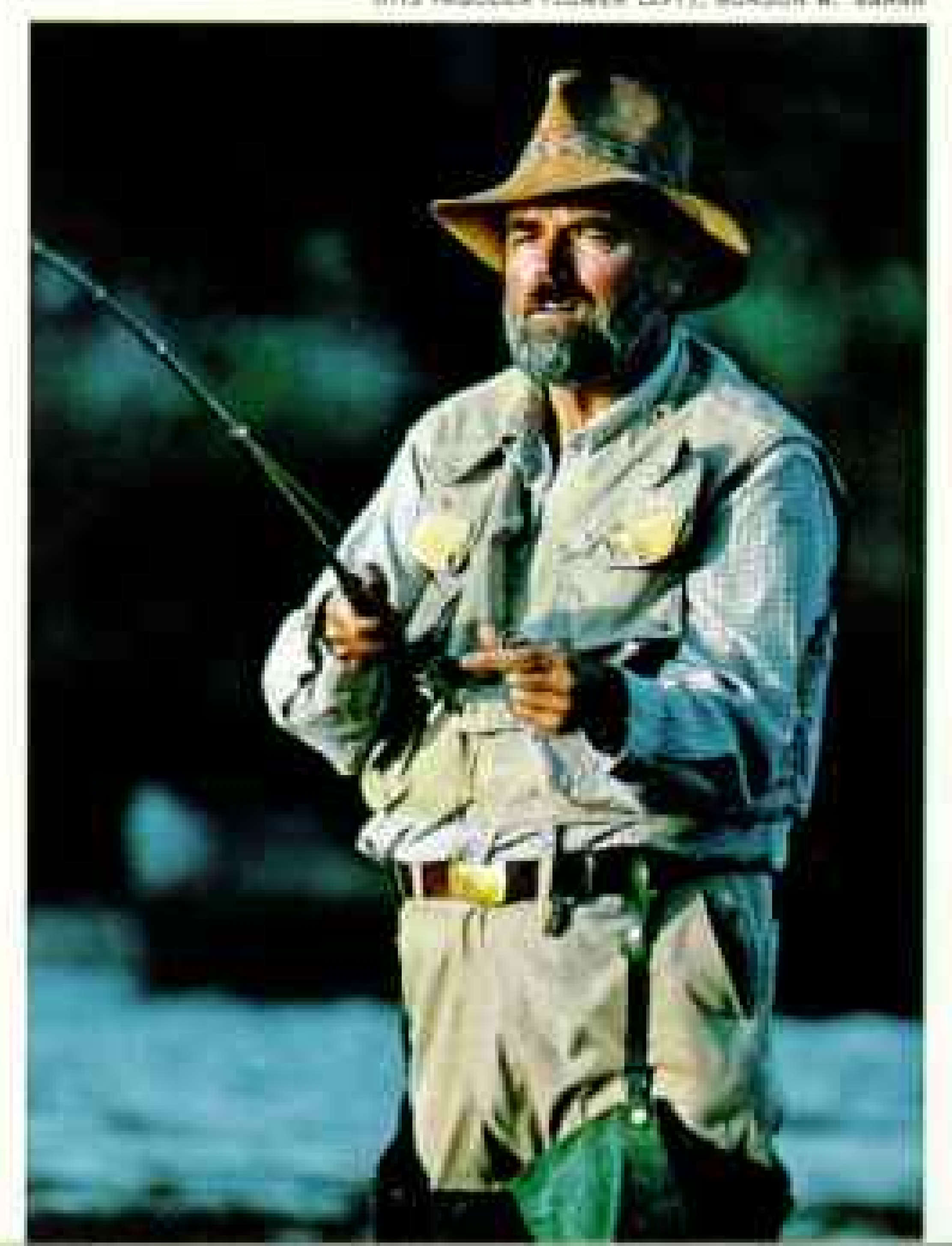
OTIS IMBODEN

Sounds made visible *help teach children at the New Mexico School for the Deaf. Teacher Marcy Hendrix explains that "we blow bubbles to see if they can control their breathing," an important step toward speech for Angelica Caje, a Mescalero Apache girl. Hendrix, who has a master's degree in her field, finds the teaching rewarding, but because rentals in Santa Fe have become prohibitive, she commutes to the school from Albuquerque—a daily round trip of 120 miles.*

OTIS IMBODEN (LOWER LEFT); GORDON W. GAHAN

***"I didn't know anybody,** I had a book to write, and I wanted quiet." Those circumstances brought John Ehrlichman (**right**) to Santa Fe. Fly-fishing has become a primary relaxation, and aside from fish, rewards are "the country, the light, and the peace." After two novels, he has just completed his memoirs, "Witness to Power: The Nixon Years," and will return to writing fiction, next time without a political theme.*

*A premier nature photographer, Eliot Porter (**left**) prepares to work in a grove of aspens, trees that run molten over the mountains in autumn (**above**). A resident since 1946, Porter finds "the climate is nice, the country is nice, but it's getting a little crowded."*



consumptive Mexican named Carmelita. Indeed, he has appeared in several films, as well as in TV commercials for beers and cigarettes. He has also run cattle on his spread, but, having sold off all but 300 of the 1,600 acres, he is now down to three horses and a mule.

"I still have the largest front yard in the country," he said, "and I don't even have to cut the grass." There was nothing, it seemed, between us and the three ranges of mountains rising all around. It is harsh land, though—between 40 and 50 acres to run a single cow.

THE EAVES RANCH HOUSE is now for sale, and, for an adobe construction, it is surprisingly plumb. Older adobe houses usually have walls that meet at a tilt and windows that affront a spirit level. The house is rounded at the corners, like a mound of ice cream slowly melting. And in a way it is, for without frequent repairs the mud covering over the sun-dried bricks will crack and disintegrate.

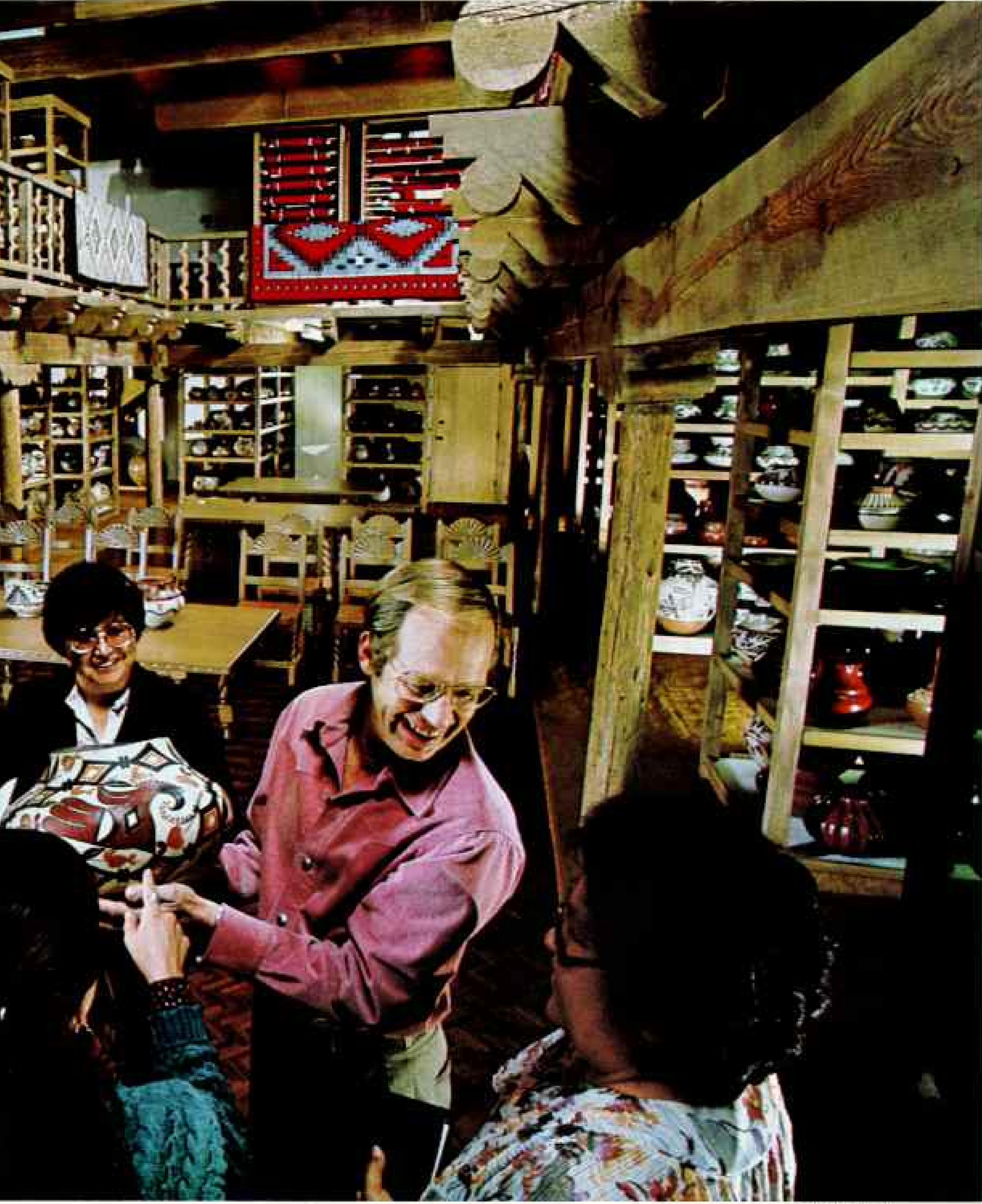
There are few better ways to capture and hold the sun's warmth than through the use of adobe. With sunny days 70 percent of the time, Santa Fe has become one of the leading centers for development of solar energy in the nation. Many solar houses have been constructed here, and Wayne and Susan Nichols are largely responsible.

"We have taken a system used for thousands of years by the Indians and added new technology," Wayne Nichols said as he showed me a house with a fuel bill for last year of only $38 (understand, it snows in Santa Fe). "When the utility company came out to read the electric meter, they thought the thing was broke."

The Nicholses arrived in Santa Fe to stay in 1972, she a mathematician and he with degrees in business administration. Their first solar project was a subdivision of eight houses, each on five acres. Next came La Vereda, with 19 units. "Our goal is to build cities that reflect new forms, new types of energy efficiency. For example, we'd like to build a subdivision where each home buyer will get an electric car."

The houses in La Vereda each have a large south-facing window. The heat that enters can be stored in the floors and walls or, most

Coming full circle, *the pieces of the Indian arts collection at the School of American Research are used by president Douglas Schwartz and*



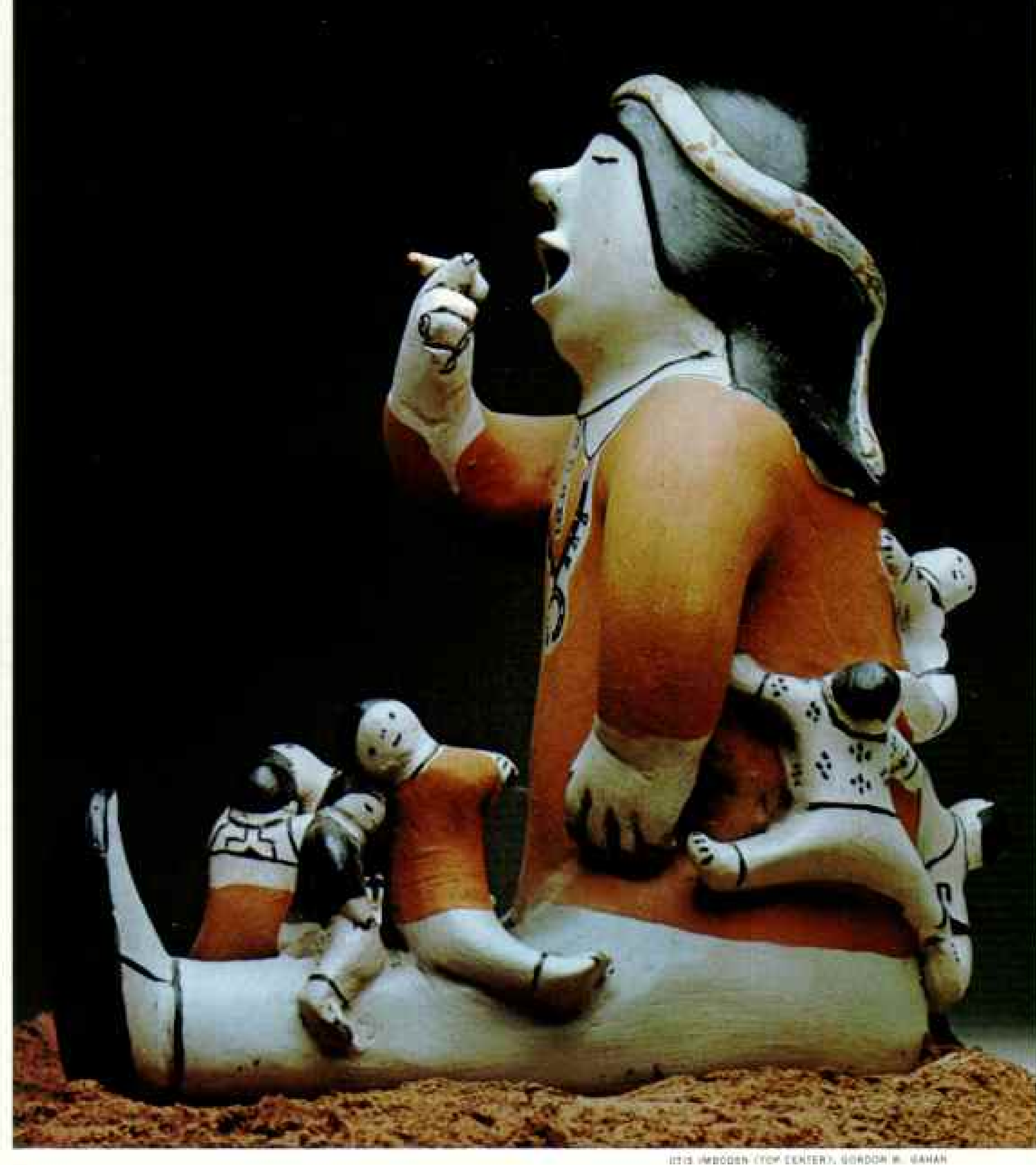
GORDON W. GAHAN

curator Barbara Stanislawski to instruct native American interns. With that knowledge they will return to tribal areas to conserve and interpret their peoples' arts. The school, a center for advanced scholarship, was given the collection by a group of Santa Fe citizens who in the 1920s began systematically to collect Indian art.

A City Expressing Itself Through Art

*"THIS IS a very eccentric place," says Florence Sohn with approval. The former New Yorker makes clothes and evening bags (**above, left**) for exclusive shops, and once had 14 women beading the bags in their homes. "It really was a kind of cottage industry."*

*The lure of the Southwest took hold of Jack Smith when he was a "white boy Indian dancer" in a Kansas troupe. Starting as a jewelry maker in Santa Fe, he has moved to larger pieces such as the marble "Lizard Boot" (**above**). "A*



OTIS IMBODEN (TOP CENTER), GORDON W. GAHAN

lot of my work," he says, "seems to be little monuments—like a clipper ship in a glass case."

Native American Estella Loretto **(top center)** *of Jemez Pueblo works on the clay figure of "Corn Maiden," who, when finished, will be grinding corn in a metate. In her twice-fired pieces made entirely from local materials, the sculptor forms "my interpretations of tradition and symbolic rituals in honor of the natural order of life."*

Years ago there was only one woman in Cochiti Pueblo who knew pottery, and Helen Cordero wanted to learn.

"So I told my friend Juanita: 'Teach me, teach me.' 'All right,' Juanita said, 'we'll start tomorrow.' And we did. I thought of my grandfather, and then I said maybe I should make one after him **(above)**. *He was a storyteller, and everyone here in the village would go to him to ask him for advice. He knew everything that was going on and all that was going to happen."*

His image seems still to know.

successfully, in what is called a Trombe wall of adobe or masonry. And when the sun falls, and a chill sets in the air, the release of the heat into the house has begun.

"We want to perfect passive solar energy here and then take it to other parts of the country, to Los Angeles, Kansas City," Wayne Nichols said. "It's no accident that we're doing this in Santa Fe. If you want to innovate and experiment, it's not scary here."

IT'S TRUE, the unusual surprises no one here: not the College of Natural Medicine with a course on "traditional Chinese medicine." And not the spiral staircase with neither nails nor any visible means of support, built in a chapel by an unknown and mysterious carpenter who then disappeared.

And where else in this country, one wonders, is there an irrigation ditch running through the center of a city and under the supervision of a *mayordomo de la acequia?*

Ah, would that a thousand such ditches were here, each brimful, to meet the demands of the growing city. "If we continue to grow as we are now doing, we'll have to go 20 miles away, to the Rio Grande, for our basic source of water," Mayor Trujillo said. About 40 percent of Santa Fe's water comes from underground sources, the rest from runoff and diversion projects. It is provided by a private utility, and the rates have tripled in four years. They are now the highest in the state and among the highest in the country.

The utility invested 12 million dollars during the years 1971-75 to drill new wells and build a water-treatment plant. When rates were increased, customers cut back on usage, but the necessity of eventually going to the Rio Grande, at great expense, seems certain. Still, Santa Feans want no repeat of the situation in 1971, when householders turned on their faucets and muddy, worm-infested waters spilled into their sinks.

Water and transportation are often cited as the chief drawbacks to industry in Santa Fe. As it stands now, government is the leading employer for the capital city, with tourism running second. Outside of the state government and services, there are few jobs to be had in Santa Fe, and wages are generally low. "It is not," as Mayor Trujillo observed, "a healthy situation."

If anything, Santa Fe is a city for the self-employed—for the successful photographer, as an example. For Eliot Porter.

He has lived in the Santa Fe area for 35 years. A slim, scholarly man who holds a medical degree from Harvard University, Porter has 15 books of photographs to his credit. His studies of nature are classics in our time.

"When we first came here," he said, "the art colony was centered in Taos. But then it moved here, and now Santa Fe is getting too big." He need not worry about the shove of the crowd, for his house is surrounded by the 70 acres he owns. "I don't want anyone around me," he said.

Porter's house sits on high ground—too cold there for rattlesnakes—and there are heavy growths of trees all around through which the sunlight falls and splinters. Together with a camera, the trees and the light are the tools he has used to fashion artistry in photographs. He travels the world now, doing pictures of people and places. He was recently in China, and while he was gone, the Virginia creeper growing on the roof of his studio advanced another foot or two.

And while the creeper grows, the aspens recede. Eventually they will disappear from the sides of the mountains, for the spruce and pine are crowding in, shutting off the sunlight to the fragile trees. Then it will take a fire and a clearing of the forests to bring them back.

Some Santa Feans have spoken to me of a possible parallel here, of the character of their city being crowded into oblivion. It is not that bad. Not yet. Not while Santa Fe continues to lie in a cradle of aspen gold for a few weeks each fall. □

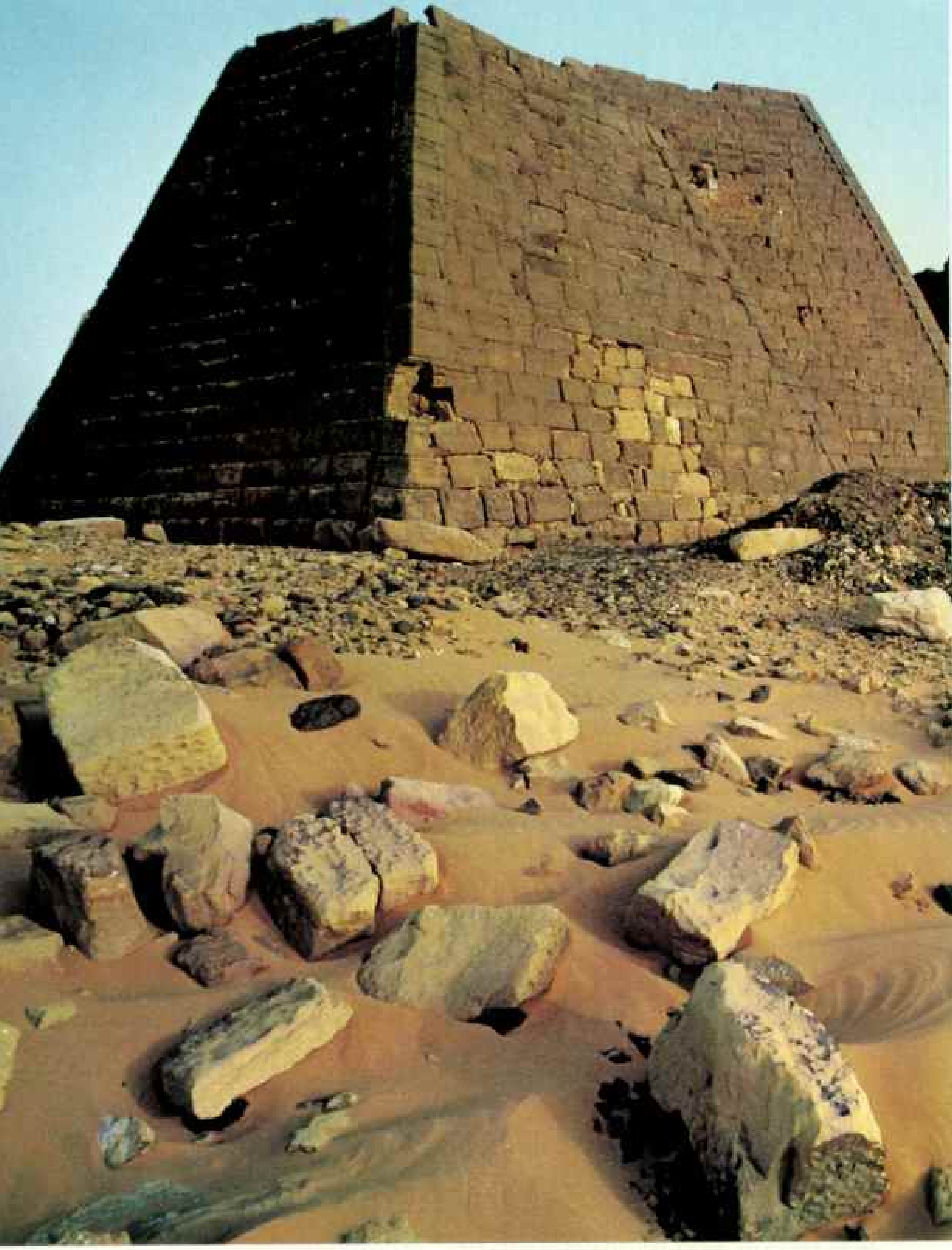
Shot down twice in Vietnam, *Forrest Fenn came to Santa Fe to retire, "but it didn't work out that way," not with a multimillion-dollar gallery and five other enterprises. His philosophy of art as an investment: "I'd much rather have a bad painting by a great artist than a great painting by an unknown artist."* GORDON W. GAHAN

Sudan: Arab-African Giant

ARTICLE AND PHOTOGRAPHS BY ROBERT CAPUTO

Women grind sorghum into flour north of Torit.

This little-known nation, independent for only 26 years, encompasses 967,500 square miles, governs 500 tribes, and mingles Arab and African ways.



***The magnificence of Meroe,** a capital of the Kingdom of Kush that flourished from 800 B.C. to A.D. 350, lingers only in the crumbling pyramids that cover the burial sites of kings. While the historical and archaeological record of Kush, which once ruled Egypt,*

remains incomplete, the problems of the present fully occupy Sudan: a laboring economy, staggering energy costs, a cumbersome bureaucracy, threats of subversion, and lingering animosity between former civil-war enemies—Arabic north and black African south.

Beauty marks stipple *the face of a girl of the Nuers* (**above**), *a tribe of cattle tenders and fishermen.*

The village of Adok (**right**), *in south-central Sudan, perches on a hump of solid ground in the midst of the Sudd, a Nile-fed swamp as large as Maine. The Nuers' thatched dwellings mingle with metal-covered shops run by Arabs from the north, who sell the tribespeople tea, sugar, salt, and beads.*

Chevron Oil Company of Sudan has established a base in Adok for oil exploration in the Sudd, an operation that will offer new opportunities but alter the Nuers' traditional ways.

Mighty swath *cut by a gargantuan earthmover will become the 360-kilometer-long Jonglei Canal. Funded jointly by Sudan and Egypt, the canal will divert part of the White Nile from its present course through the Sudd, where much of the water is*

now lost to evaporation and seepage. This project will provide water for Sudanese agriculture and also increase Egypt's supply. Critics point to possible disruptive effects on nearby tribal lands, wildlife migration routes, and rainfall patterns.

I WAS A PASSENGER on the *Hurriya*, a cumbersome paddle steamer, when with a huge WHUMP! she crashed into the bank of the Nile. Capt. Hasan Nasser, with 20 years' experience on the river, knew just how to negotiate these narrow bends, not ten yards wider than his ship. The crashing was part of the technique. He signaled the engine room, and the big stern wheels pulled us back with a whoosh. Hard right ahead, and we slammed into the bank again, pulled back once more, and on the third maneuver made it around.

The captain sent some of the crew to check cables that hold the barges—one on each side of the steamer and three lashed across the front. Everything seemed all right, and we steamed ahead, north with the current, on the world's longest river.

"It is a lot of work, and it is slow," Captain Nasser said, "but that is Sudan. Someday with hard work, *Inshallah*, we will prosper." Inshallah means "God willing," and that word, along with *bukra* (tomorrow) and *malesh* (never mind), makes an acronym: the IBM system, the code of fatalism by which the Sudanese live.

Mighty River a Thread of Unity

We had left Juba, the capital of Sudan's Southern Region, at dawn, and I had been sitting in the wheelhouse with the captain and his crew watching the vast plains go by beyond the maze of papyrus and water hyacinth lining the river. "Sudan is very big," Muhammad, a pilot, told me. "I think sometimes it is too big. Some people say we should be two countries, the north and the south, but what would that accomplish? This river, the Nile, is the thread that holds us together, and cannot be broken. But it is difficult; we are poor and our steamers are old. Sometimes it takes more than a month to reach Juba from Kosti." Fourteen hundred kilometers separate Juba and Kosti, the northern terminus of the steamer route.

As Muhammad said, Sudan is big indeed, the biggest country in Africa. It is one-third the size of the contiguous United States, almost a million square miles (map, page 357). But only 18,806,000 people live in this vast region—a population density one-third that of the U. S. "Sudan" comes from the medieval term *Bilad as Sudan*, meaning "land of the blacks," and originally referred to everything south of Egypt. The definition is outdated. The modern nation has Arabs as well as blacks and stretches from the harsh, barren desert on the northern border with Egypt through scrub and grasslands to the vast Sudd, a swamp that floods to the size of Maine. Southward along the border with Uganda lie rain forest and high, cool, green mountains. These different environments call for different ways of life, and are home to more than 500 tribes speaking more than a hundred languages.

The steamer was a microcosm of the country. There were the cattle-herding Dinkas decorated with beads, their faces scarred with the marks of their tribe; Lotuko farmers from the Imatong Mountains; and stocky Zandes from the tropical forests near Zaire, once great warriors, now a sedentary people subsisting on the land. There were northerners like Muhammad, whose lighter skins and white *jellabiahs* and turbans testified to Arabic and Islamic heritage.

"Sudan is like America in many ways," President Gaafar Muhammed Nimeiri had told me. "We have both had civil wars and have learned to overcome our differences. Sudan, like America, is huge, with vast agricultural resources, a melting pot of different cultures."

I looked around at the thousand or so people on the steamer, who had staked out bits of space and set up their charcoal stoves, sleeping mats, and mosquito nets. I noticed then and during the next six months, as I drove in a huge circle through Sudan, that the fire is very low under its melting pot. The land dominates; tribes, mostly isolated from each other, must eke out their lives as they have for centuries.

Journey Requires Careful Planning

Getting around Sudan was not easy. I had already spent a month in Khartoum collecting the permissions and arranging for fuel to be cached in various parts of the country. I had also needed several weeks in Nairobi, Kenya, to outfit a new Land Cruiser and take aboard 500 liters of diesel fuel, 95 liters of oil, 100 liters of water, and spare parts. Because fuel is so scarce, I had to be sure of getting from one cache to the next.

The word "road" seldom applies in

Sudan; "track" is more appropriate. On an early trip out of Juba, I wound north on one of these into the open grasslands near the Sudd. This is the home of the Dinkas, who live in scattered huts in the rainy season but congregate in the dry season in cattle camps along the edge of the swamp. I drove cross-country until I ran into a river. Off across the water I could see the smoke of a cattle camp.

Crossing Water Proves Perilous

Some of the people on their way to the camp offered to take me with them, so I packed up my cameras and pulled on my gum boots. The still, swampy waters of the Sudd are infested with a microscopic parasite, bilharzia, that can cause death. All this pest needs is contact with the skin; I hoped the boots would protect me. We set off into the water, but my boots were not nearly high enough to deal with the waist-deep river. Filled with water, they became just a burden dragging through thick bottom mud.

We waded about halfway to the camp and up onto a small spit of raised land. Beyond there the water was much too deep to wade through. To ferry people across the last 75 meters, the Dinkas employed a small hollowed-out palm trunk. Only a few centimeters wider than my hips and extremely round, the trunk was not very steady in the water. Rot had eaten a huge hole in its front, and the hole had been filled with mud, but the river seeped through at a good rate.

A small boy with a paddle sat perched on the back of the log and we started across, water pouring in and the log rocking violently. I could see myself taking a swim with boots on and my cameras clutched in my arms. The Dinkas all thought it terribly amusing—they could not understand why I wanted to go out there in the first place, much less burdened down with my gear.

The camp was a bit of raised ground along the river. On the far side, the *toich*, the grassland exposed after the floods of the rainy season subside, stretched off toward another river in the distance. The earth was bare from the pounding of feet and hooves, short stakes for tethering the cattle dotted the ground, and long poles were bent together and hung with skins to provide some shade during the day.

Dung fires, around which people slept at night, gave off a constant thick smoke, which kept some of the flies and the Sudd's 63 known species of mosquitoes out of the camp and lent an eerie, hazy light to it (pages 372-3). The naked gray figures of the Dinkas moving in the haze, smeared with gray ash to discourage insects, reinforced the feeling of otherworldliness.

When I arrived, most of the young men were out in the toich with the cattle. But there were many men and women sitting around talking and children playing. Some women were gathering dry dung to stoke the fires for the night. My presence caused a stir. Mothers brought out children to show them what a *khawajah*, their word for white man, looked like. Many pulled at the hair on my arms, and even lifted the legs of my jeans to see if I had hair there too. The Dinkas have virtually no body hair and could not believe that anyone with as much as I could call himself a human. Monkeys, lions, cattle have hair, sure—but a person?

"This is the best life," one of the men told me. "Here there is lots of milk, and we are free to spend our time with the cows."

That night I sat by a small fire out in the bush thinking how strange it was that the cattle camps of the Dinkas and the space shuttle could exist on this planet at the same time. In the distance I heard the lonely whoop of a hyena, and drums from a faraway village. Overhead, a satellite arced its way across the sky.

Losing Touch With a Glorious Past

The contrast between the semi-nomadic cattle-keeping Dinkas and the next people I visited, the Zandes, was striking. The Zandes are subsistence farmers who live in compounds scattered in the forest along the southwestern border with Zaire.

Paramount Chief Andrea Zungumbia, great-grandson of the Zande king Gbudwe, holds court in a large cleared space under towering trees near the compound where he lives with his nine wives and twelve children. The whole area was swept clean, and Andrea's chair was at one end, by itself. In front of this chair, about ten meters away, was a raised pole. People wishing to address the chief did so from there.

Another chair was brought and placed next to Andrea's. The man who brought it

Nimeiri: "the glue that holds us together"

BEYOND THE GLARE of the current political spotlight on Sudan stretches a vast, isolated, and ancient land largely unknown to the rest of the world. Last year, after I had completed a six-month journey that included all parts of the country, Sudan became a center of world attention following the assassination of President Anwar Sadat of Egypt, Sudan's neighbor to the north.

PRESIDENT GAAFAR NIMEIRI, RIGHT, TALKS WITH ABDULRAHMAN AL-ATEEQI, THEN KUWAIT'S FINANCE MINISTER, AT THE OPENING OF A SUGAR FACTORY AT KENANA.

Sudan's capital, Khartoum, buzzed with members of the world press drawn by predictions that Libya's leader, Muammar Qaddafi, an avowed enemy of Sudan's President Gaafar Muhammed Nimeiri, would take advantage of the situation to invade Sudan from Chad, then occupied by Libyan troops. Examples of sabotage were displayed in Khartoum to back claims of subversion, and the bombing of villages by planes was reported from the border.

I visited the border area and found few traces of impending conflict. Shortly thereafter, Libyan troops began a withdrawal from Chad, and the crisis dissipated.

It was another in a long series of nervous events that have marked the emergence of Sudan from colonial status over the past 26 years. When Britain and Egypt gave up rule of the country in 1956, a bloody civil war erupted between Arab north and African south. It lasted 17 years. Many wounds and bitter feelings remain from that conflict, which left 500,000 dead, 750,000 homeless.

The conflict invited intervention. Like Egypt at that time, Sudan became allied with the Soviet Union. In 1969 Nimeiri came to power in a military coup. Two years later a leftist attempt against him failed and he severed the Soviet alliance.

In 1973 U. S. Ambassador Cleo A. Noel, his deputy, George Curtis Moore, and Belgian Chargé d'Affaires Guy Eid were slain by Palestinian terrorists in Khartoum. A later coup, in 1976, charged by the Sudanese against Libyans, also failed, and Sudan began to improve relations with the West.

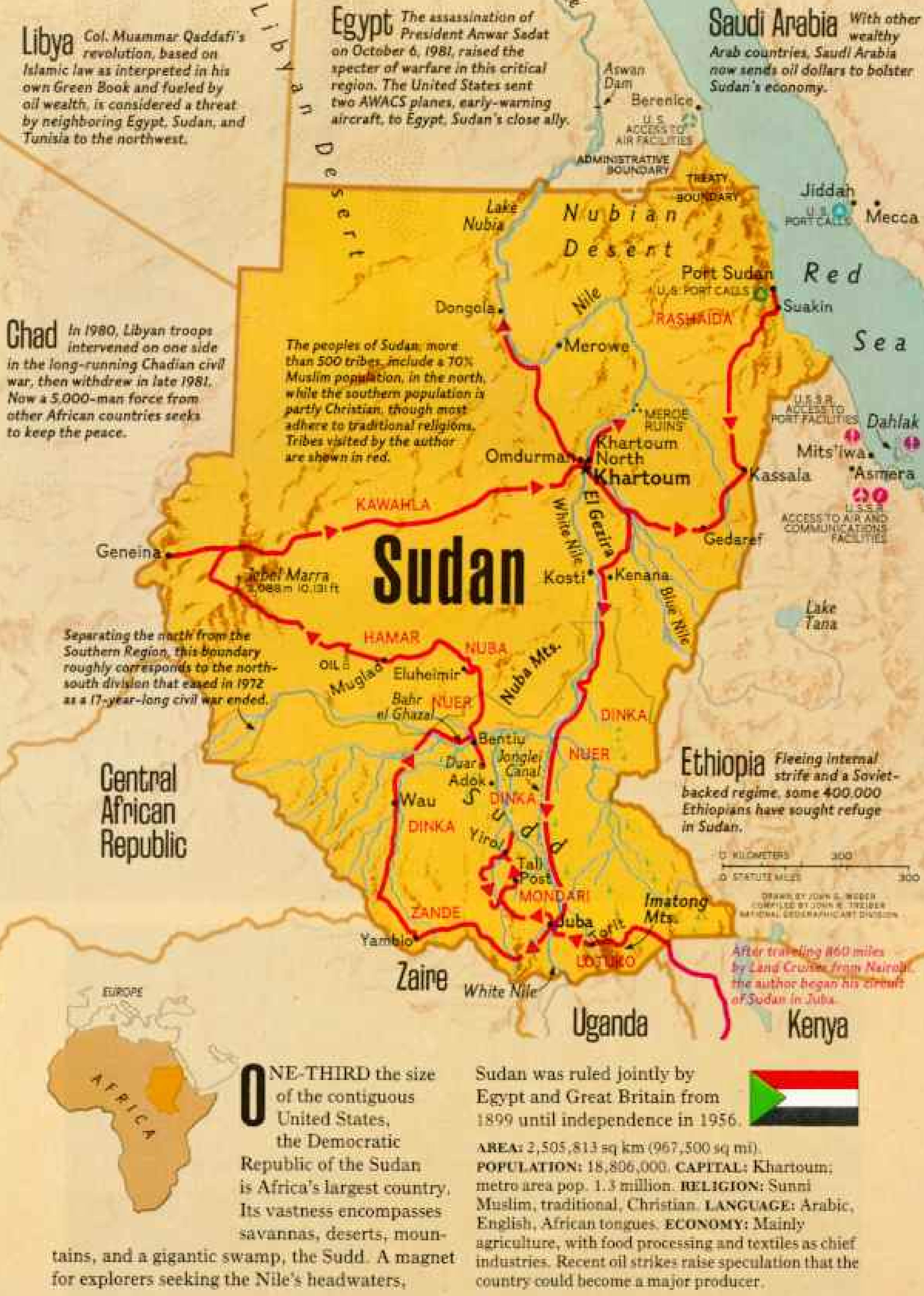
Recently, Nimeiri was one of the few Arab heads of state to support Sadat in the Camp David peace process. Only days before he was assassinated, Sadat sent his vice president—now Egyptian president—Hosni Mubarak to talk with U. S. President Ronald Reagan about strengthening Sudan's defenses.

I interviewed 51-year-old President Nimeiri in his spacious office overlooking the Blue Nile in Khartoum.

"I was overwhelmed with grief and sadness, as were the entire Sudanese people, by the tragic and untimely death of our dear brother Anwar Sadat, who was a symbol of the unity of the Nile Valley," he told me. "Sadat used to lend me sincere and fraternal advice. His brotherhood was warm in good times and even warmer in difficult times."

Nimeiri elaborated on what he regards as Sudan's peril. "Libya's occupation of Chad was but a new approach by Qaddafi to try to dominate all Africa, especially Sudan and Egypt. But note Qaddafi is working with Soviet arms and Soviet, East German, and Cuban experts. Sudan is facing not only Qaddafi but also the Soviet Union."

Like Sadat in Egypt, Nimeiri has held a fractious country together by the force of his personality. "If something happens to Nimeiri, there may be more fighting," one southern politician told me. "He is the glue that holds us together."



ONE-THIRD the size of the contiguous United States, the Democratic Republic of the Sudan is Africa's largest country. Its vastness encompasses savannas, deserts, mountains, and a gigantic swamp, the Sudd. A magnet for explorers seeking the Nile's headwaters, Sudan was ruled jointly by Egypt and Great Britain from 1899 until independence in 1956.

AREA: 2,505,813 sq km (967,500 sq mi). **POPULATION:** 18,806,000. **CAPITAL:** Khartoum; metro area pop. 1.3 million. **RELIGION:** Sunni Muslim, traditional, Christian. **LANGUAGE:** Arabic, English, African tongues. **ECONOMY:** Mainly agriculture, with food processing and textiles as chief industries. Recent oil strikes raise speculation that the country could become a major producer.

Sweet success. *Cane cutters at the Kenana sugar estate* (**above**), *one of the largest in the world, earn four dollars a day, about three times the per capita daily wage. Most of the cane is cut by mechanical harvesters. The refinery* (**left**), *which opened last year, is expected to reach an annual capacity of 363,000 tons by 1983.*

The project was funded mostly by Arab petrodollars as part of an Arab dream—to make Sudan the breadbasket of their world. There's still a long way to go. Of the country's 200 million arable acres, only 15 million are now cultivated.

approached from the front, knees bent and head lowered. He retreated backward, with much bowing, until he reached the pole, then turned and walked back to me. "The king calls you," he said. It was obvious that Andrea's position still carries a lot of weight with his people, though his traditional authority has been eroded by modern notions of national government.

Before the turn of the century the Zandes had a highly developed military empire, which had swept into Sudan from the Congo basin. King Gbudwe's defeat by the British in 1905 destroyed not only the empire but the foundations of their culture as well.

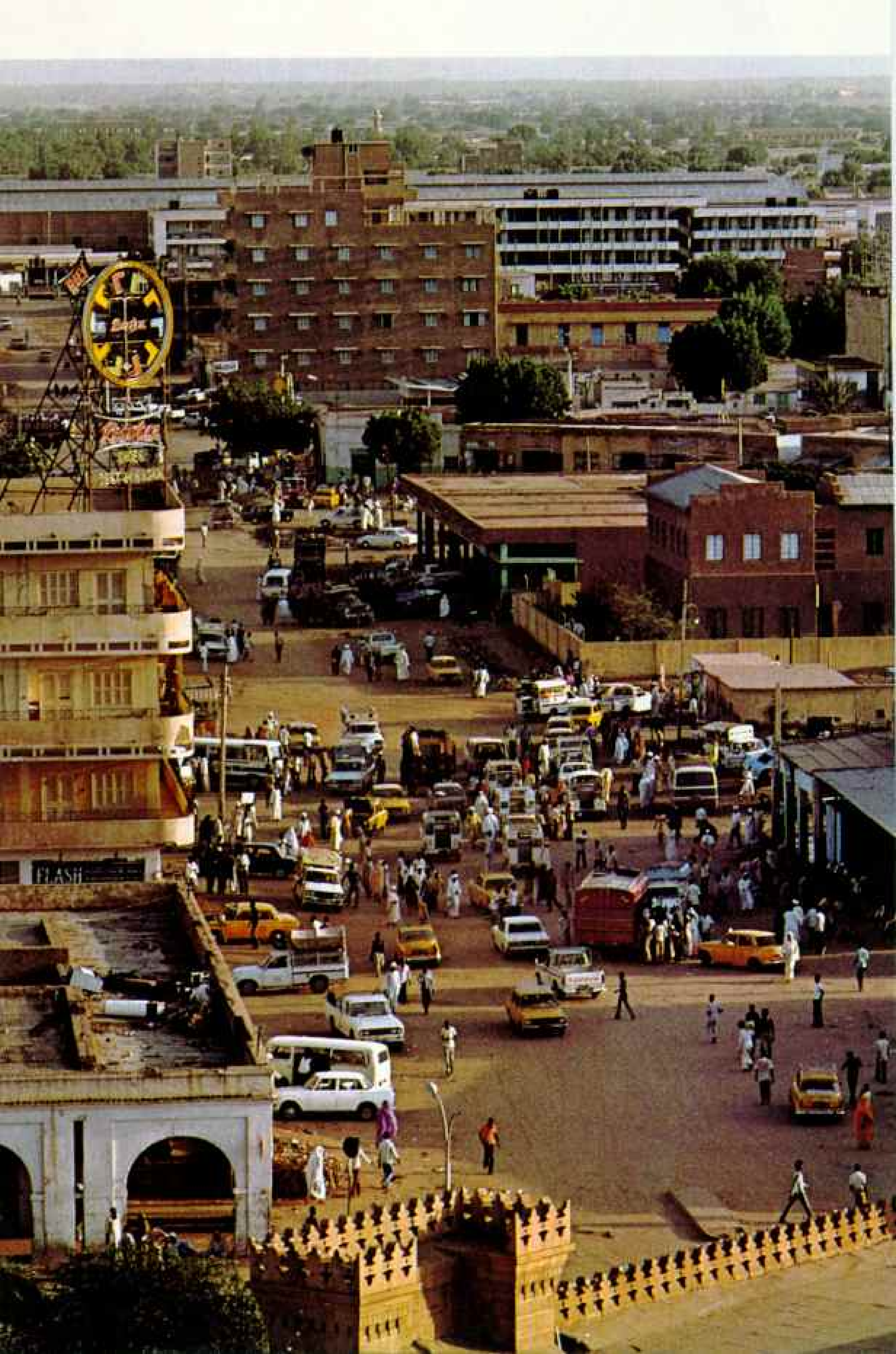
"When I was a child, I had to stay with my father near the fire, up to twelve o'clock by night," Chief Andrea told me in English. "It is good that children go to school and learn things, but that is not all. They should be like boys in former days, and listen to the stories of their fathers, and see how their fathers make the drums and the baskets and the pots. If they are just going to read books, their culture will die."

The Zandes' culture is dying, symbolized by a declining birthrate. Knowledge of their glorious tradition is fading. At the tomb of King Gbudwe in the nearby town of Yambio, the writing can no longer be read on the stone grave; a termite mound is growing over it. The tomb is surrounded by thick grass and vines; there is no path any more, no care for the greatest king they ever had. Like the spirit of the Zandes themselves, it is being swallowed up by the land they once conquered and ruled. Chief Andrea sees it disappearing. His people would rather wear synthetic cloth bought at great price from Arab merchants than the beautiful bark cloth they no longer know how to make.

Just before I left Andrea's court, he had his lute brought to him and played a song:

All my relations have died
What shall I do in this world?
All my relations have died
What shall I do in this world?
Oh, what shall I do in this world?

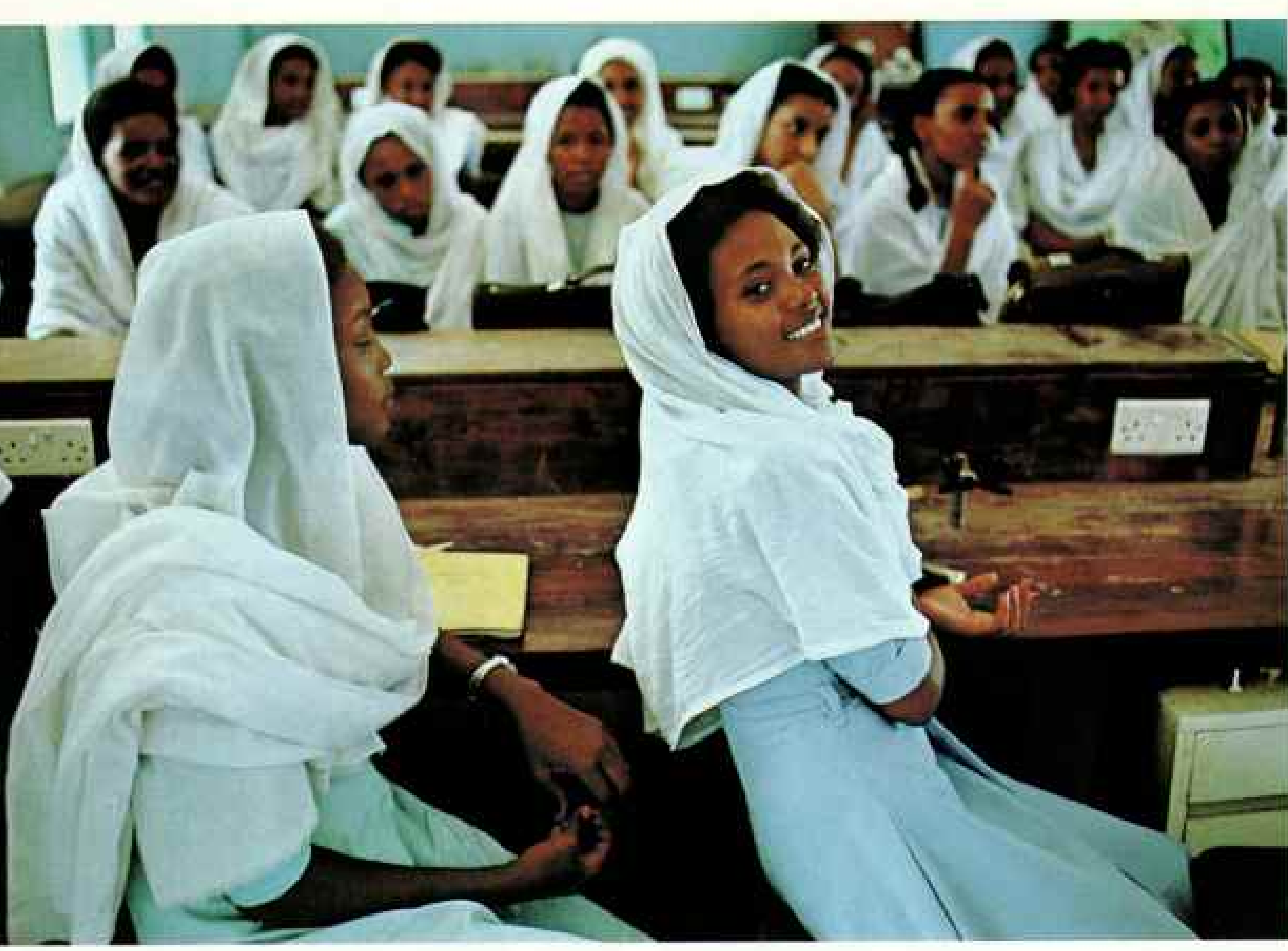
Leaving the dark forests of the Zandes, I drove north, following the slope of the land down toward the open plains, to Wau, a large town in Dinka country. As in all the towns, the suq, or marketplace, was the


FLASH

***Late afternoon skirmish** between cars, trucks, and pedestrians chokes a Khartoum intersection (**left**) under a minaret of the central mosque. But subversion from outside is a more serious threat to civil peace. Saboteurs, who had infiltrated from Chad, were publicly displayed in chains (**below**) after they bombed the Embassy of Chad in Khartoum.*

Absorbing a torrent of job seekers from the countryside, Khartoum and its sister cities, Khartoum North and Omdurman, have doubled in population to 1.3 million in the past decade. Residents face queues for bread, gas, and goods and frequent power shortages.

Meanwhile, at least 300,000 skilled workers and professionals have left the country for better paying jobs elsewhere.



center of activity. At the stalls the Arab merchants, who monopolize trade throughout Sudan, sold spices, tea, sugar, plastic shoes, cloth, and many items from the World Food Program, which are supposed to feed the needy but all too often end up in the merchants' hands. Another section of the suq resounded with the noise of Dinka blacksmiths fashioning spears, knives, and hoes from old Land-Rover springs.

In this part of Sudan I found many development projects. Some are viable, like the rural water project that drills boreholes in remote villages and the German Leprosy Team hospital that treats patients and teaches Sudanese how to deal with this terrible disease. But an American AID effort to teach the Dinkas to use their oxen to plow their fields has had only marginal success. It is a good idea, better than schemes to get Sudanese to use tractors that they do not have the experience, fuel, or spare parts to handle. The snag this worthy project hit was the difficulty of getting people to change the ways they think about their lives.

"Asking a Dinka to use his ox to plow," a development worker told me, "is like asking an American to use his Mercedes-Benz as a Rototiller." Cattle bring respect and status; putting one to work would be unthinkable.

A number of big projects, because of bad planning and misguided sentiment, have proved a waste of money. The multimillion-dollar brewery that sits idle on the edge of Wau will probably never turn out a bottle of beer, because Sudan cannot afford to import hops and barley.

North of Wau I crossed vast grasslands dotted with *Borassus* palms and the scattered wet-season huts of the Dinkas. The track was a rough causeway raised above what must be a marsh during the rains.

The land was laced with rivers, crossed by old metal ferries, but one river was served only by a raft made of ten oil drums lashed together. I almost lost the car on this one. It

__The gate of opportunity__ opens but slowly for women in Sudan's male-dominated society. For young women at a secondary school in Khartoum (__left__), the key is education. Though the country had an illiteracy rate for women of 96 percent at the time of independence in 1956, Khartoum now has a smattering of women lawyers, doctors, and civil servants.

The white tarhahs worn by the schoolgirls, like the longer tobes, traditional dress of northern Sudanese women, are regarded by some as symbols of inferior status.

At a Zande village near Yambio (__right__) a technician trained in a Belgian aid project takes blood from a boy to check for trypanosomes, sleeping-sickness parasites. The roster of deadly diseases that sweep the backcountry creates a high rate of infant deaths and reduces life expectancy to the mid-40s.

was so heavily laden that the clay embankment gave way just as the front wheels got onto the raft. It took three hours of hot, sweaty work to get free. When the car was finally aboard, the raft almost sank from the weight and listed heavily.

Miraculously I managed to cross and was greeted by the entire population of the village there. They had all been sitting in the shade watching, waiting to see whether the car and I would make it.

"We just built that landing," one of the men told me. "You are the first person to use it, and we did not know if it was dry yet." Now they knew!

I was in the land of the Nuers now, another Nilotic cattle-keeping people, who move between plains and swamps with the seasons. Scattered around the vast yellow grasslands were their wet-season homes, looking like huge chocolate drops of thatch.

The track changed dramatically as I neared Bentiu, a small town on the southern bank of the Bahr el Ghazal, a tributary of the White Nile. Here I joined a wide, smooth, graded dirt road coming from the north, compliments of the Chevron Oil Company of Sudan, which is drilling for oil in this part of the country.

For centuries the Nuers have been isolated in their swamps. Now there are Chevron trucks, bulldozers, planes, and helicopters scurrying around their land. It will never be the same again.

"Some of these guys working on the rig just walked in one day, stark naked, carrying a spear and a shield, and asked for a job," one of the American drillers told me. "Now they could be working on any rig in the world."

It was strange to see the tribal scars of the Nuers under the hard hats, but I found these rig hands were still thinking some traditional Nuer thoughts.

"It is good that Chevron is here," Simon Mut, a roustabout foreman, told me. "We

Bombed by neglect and decay, *Suakin was the gateway to the Red Sea for 500 years until Port Sudan opened in 1909. The city's crumbling shops and homes were built of coral, probably by Turkish traders. Muslim pilgrims thronged to Suakin en*

route to Jiddah, and 1,000-camel caravans departed with goods for Khartoum. Here British soldiers survived repeated siege by Mahdist forces, including the famed Fuzzy-Wuzzies, who, as Kipling wrote, "cut our sentries up at Suakim."

were very poor before they came, but now we can make money to buy cows and so make our herds big. Without the money it would take a long time to get many cows." As a foreman, Simon makes 140 Sudanese pounds ($175) a month.

Chevron has three drilling rigs exploring its Nevada-size Sudan concession. It has found some oil, and plans are moving ahead for the construction of a refinery and pipeline. The reserves are not yet known, but since Sudan now spends 80 percent of its export earnings to buy oil, even if there is only enough oil for the country's needs, that will free money to spend on development.

In Bentiu, not far from the rig, I met an old Nuer named Peter who offered to "give me some words" about his people. He took me to a place they call Duar, south of Bentiu, to the tree where man was born.

"This is the place where our first ancestor, Dja-gay, came up out of the ground," Peter said, pointing to the sacred ground by the tree. "And here, do you see these holes? This is where the first woman knelt when she bore the first child."

Peter and I sat in the welcome shade of the tree, hung with bracelets and bunches of tobacco, offerings to the ancestors.

"In March," Peter explained, "all the people gather here. Too much *marissa* [beer] is made, and many cows killed when people gather from all over to think about *Maneh*, God. If they do this, everybody will be healthy. And we do dance very much at this time, and when we finish dancing, we can come and sleep here under the tree and no anything can come and eat you."

Peter also explained the Nuers' initiation scars to me, the six lines cut across the forehead of males at puberty. "If my head is not yet cut, if the men come and beat me, I can cry. If they cut my head, you can beat me and even kill me, but I cannot cry. How could I cry? It is just a woman who can cry. You become a man."

When they are adolescents, the Nuer boys and girls also decorate their faces and bodies with small round scars, which are useful in courtship. "They are for the girls," Peter explained, "so they will like you." These scars, like the beads the Nuers wear, are to make themselves more beautiful.

Hills Shelter a Vanquished Tribe

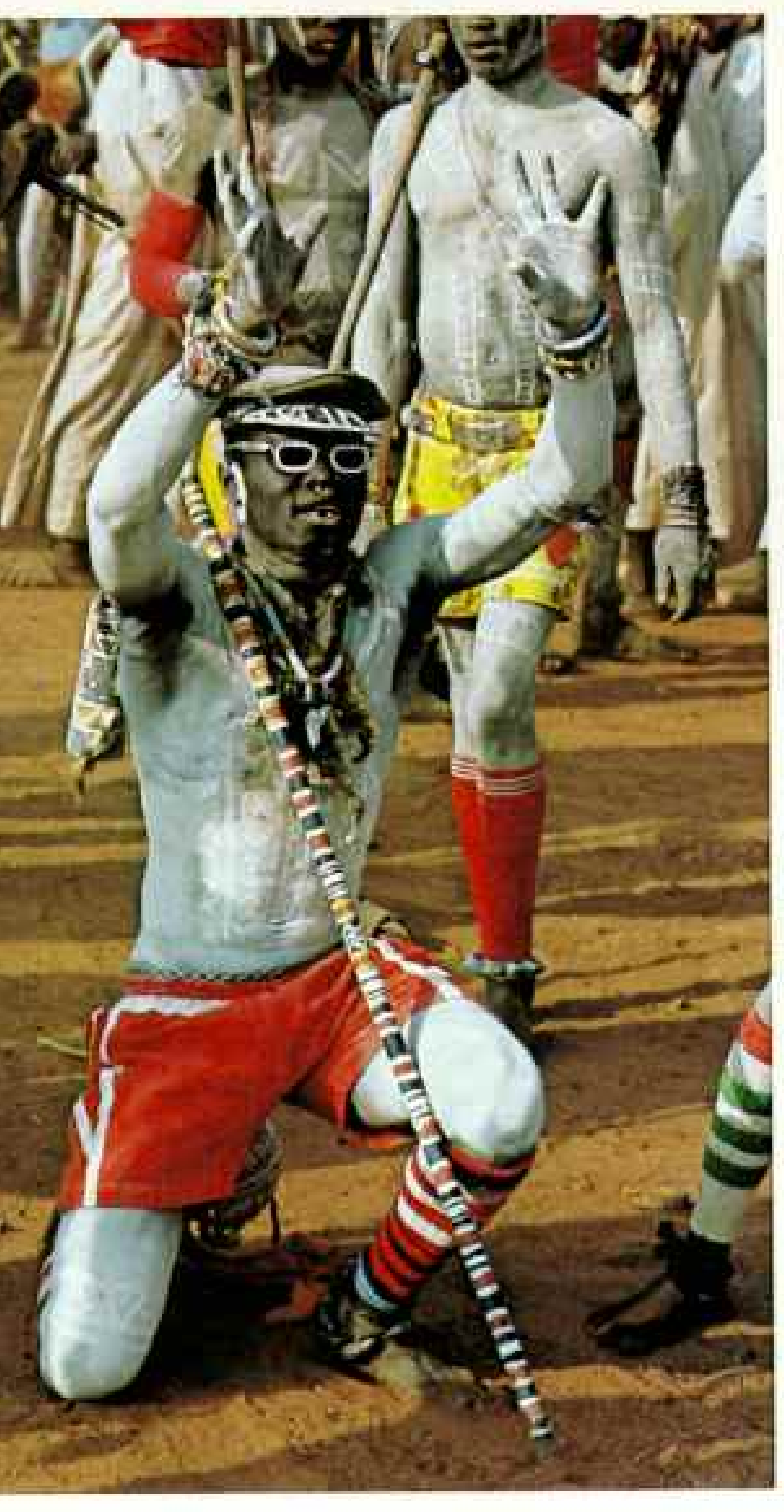
As I drove north from Bentiu, the flat grasslands of the Nuers gave way to woodlands, and the black clay turned red and sandy. I crossed the regional boundary that separates north from south and entered the Nuba Mountains. The Nuba people are remnants of several indigenous tribes that once spread through central and western Sudan but retreated to the hills five centuries ago to escape the Arab invasion. They now live isolated on their hills, keeping some cattle and growing *dura*, sorghum, which is the staple food of Sudan, on terraces and the plains below.

I arrived at the end of the harvest, a festive time for the Nubas, and joined a gathering of 2,000 in a field near the little suq at Eluheimir. All had come to watch the wrestling and were improving the occasion by drinking freely of marissa and dancing in long snaking lines.

The teams of wrestlers came from different hills, all dressed in garish colors, with bodies painted white. The matches seemed to happen spontaneously all over the field, the crowd forming a circle around the combatants, who went through a stylized challenge. The idea is not to hurt your opponent, but just to throw him to the ground, thus proving the superiority of your tribe (following pages). When a wrestler was thrown, the crowd surged in as the victor's mates hoisted him onto their shoulders. He was carried around in victory, followed by a group of dancing cheerleaders—young girls dressed in beads, their bodies glistening with oil. Throughout all this, the victor assumed an air of total boredom.

Dog-tired from battling the crowds at the wrestling, I crawled up into my roof tent atop the car. About two in the morning I was

Close-cropped hair *and forehead scars identify a woman of the isolated Mondari tribe in a village south of Tali Post. The star-shaped scar around her navel dates from an adolescent beauty ceremony. Little touched by the 20th century, the cattle-tending Mondaris retain a sense of personal identity and tribal unity.*



***Flurry of limbs** and a thrown opponent signal the end of a Nuba wrestling match at Eluheimir (**right**). Another combatant kneels (**above**) to challenge an adversary. The bouts are part of a harvest celebration that culminates in dancing, singing, and drinking marissa, a low-alcohol beer made from sorghum.*

At two o'clock one morning the author was awakened by a group of dancing Nubas who had encircled his vehicle. He roused himself and joined in.

The Nubas share their name with the mountains of their homeland, where many of their ancestors fled from invading Arabs centuries ago.

Realities of travel in a country where roads range from poor to nonexistent

awakened by drums and singing. Groggily, I peered through the mosquito netting and saw about 200 people dancing in a circle around the car. The oiled girls glistened in the soft light of the moon, and the pale painted bodies of the men looked like spirits from another world. They beckoned me down and pulled me into the dance. I still do not know what it was for, but it made me feel I had found the heart of Africa.

Faith Binds Diverse Peoples

I headed west from the Nuba Mountains and entered what seemed like another nation. Though the tribes of the north are many, they have a unity that is lacking in the south. They are bound together by Arabic culture and the Islamic faith. The men wear long flowing jellabiahs and turbans. The women wrap themselves in a long piece of material called a *tobe*, and are largely segregated from the men. The land changed too, becoming sandy with sparser vegetation; I saw camels for the first time.

At an oil-exploration camp near Muglad, I watched some Hamars, Arab camel herders, get water from a Chevron well. They were watering their stock and filling goatskin water bags, black with age.

Most of the traders and truck drivers I met in this part of Sudan assumed I was working for Chevron—why else would a white man be driving around in the desert by himself? They had all asked me how much oil there was, and when they would be rich like the Saudis. The Hamars, however, were not at all interested in oil. They asked me how long Chevron would be there, and how much water there was.

As I made a big loop through Sudan, I often met market trucks on the tracks. These are the real lifelines of the country, the major means by which people and goods move. Many of the trucks are old, and the tracks very rough, so the drivers have to be expert mechanics. I passed one truck that was

overtake a bus on the desert route from Dongola to Khartoum.

being worked on, the whole gearbox lying in pieces in the dusty track. The passengers were sprawled around in the shade, no doubt practicing Sudanese IBM: Inshallah—it was God's will—they would get to their destination when they were meant to, not sooner and not later.

My loop brought me around Jebel Marra, a 3,088-meter (10,131-foot) mountain in the far west near Chad, and then eastward across the dry semidesert toward Khartoum. It was unbelievably hot and dusty, and I was thankful for the laundry system I had worked out. I put a large sealed bucket filled with my clothes and soap and water in the back of the car, the bounciest place, and while I drove got excellent agitation. Later I would change the water for a rinse and then hang out the clothes to dry while I slept.

A few little "truck stops" lay scattered along this lonely track, a couple of huts serving tea and food. I stopped at one and was invited to have tea with the drivers. Tea, drunk several times a day all over Sudan, is hot and very sweet—four or five spoons of sugar in a little glass—but it is refreshing, and provides a chance to sit and chat.

The truckers wondered why I was driving around out there all by myself, and I showed them my map with all the places I had been. This made them laugh. "*Kharita* [map]," one of them said, "is not necessary. We use the sun by day and the stars by night to go."

Herdsmen Pursue Sparse Rains

Rolling on toward Khartoum, I encountered the Kawahlas about 500 kilometers west of that city. They are one of several tribes of Arab camel breeders who inhabit the western part of Sudan and move north and south with the sparse rains. Their big camel herds were off in the desert near Libya, but some smaller herds, some sheep and goats, and the donkeys the Kawahlas use for labor were gathered near a well field in a dry lake bed. The Kawahla herdsmen were

The wheel of life *for a Dinka man turns around his cattle. Entering adulthood, he takes a new name from a bull calf in his father's herd. With cattle he purchases a*

bride, pays taxes, and buys staples. The cattle provide meat and milk for his family. At a Dinka camp near Yirol smoke from burning dung wards away mosquitoes.

buying water for their stock, brought in from their tented camps not far away.

A Kawahla sheikh, Ali Sharif Abdul Rahman, invited me to his tent for lunch. Sharif is a very rich man, with large herds that his sons look after, and he even owns houses in Khartoum that he rents. He would rather stay here: "Here life is peaceful," he told me. "There are too many people in Khartoum, and it is expensive."

We sat on the sand in his tent and Sharif said: "The Kawahlas and our animals—this is our life, a very old life. Today we work; taking water by hand is hard work, and people get very tired. In summer there is water everywhere. Then there are many pleasures, and there is singing every night—singing about how fat the camels are and how we will get a lot of money for them."

From the tent we could watch the long lines of camels being led into the wells below us all day long. To the nomads this is the only life. Settled life in the village, where people grow dura on the sand dunes, is hateful to them. The villages are made up of poor nomads who no longer have their own herds, and of descendants of the Kawahlas' former slaves, taken in raids on the Nubas and tribes farther south.

"You see that man?" Sharif asked, pointing to a nomad sitting with us. "He is a simple man, but he is very rich with camels, goats, and sheep. Not like the people of the village, the farmers. They are very poor."

Lost in a Sandstorm

Most of my four-day drive from the Kawahlas to Khartoum was through a *haboob*, a sandstorm, which obliterated the countryside and the already vague tracks. The sand got into my eyes, nose, and mouth, and I had to wipe my glasses every minute. At some point I missed the track and found myself stuck in a huge sand dune. After an hour or so I managed to dig myself out, but I had no idea which direction to go.

I sat and waited more than an hour, and then I heard the whine of a truck. I drove toward the sound and came up behind the very same truck that had saved me earlier in the day. I had been about to take a track that would have led me out into the middle of the desert when he came along on the *right* track. I followed him now toward the city.

A glimmer of lights through the haze, then suddenly I was on paved streets amid chaotic traffic. It made me more nervous than I had been during the months of wandering around in the bush. I had entered Omdurman, the old sister city to Khartoum on the west side of the Nile. I picked my way through the traffic, crossed the White Nile bridge into Khartoum, and made my way to an air-conditioned hotel.

It was in Khartoum, in 1885, that Maj. Gen. Charles George "Chinese" Gordon was killed by the Mahdi's followers, ending the reign of the Egyptian khedive. The Mahdi, a religious leader, established the first Sudanese government in Omdurman.

Lord Kitchener, sent out by the British in part to avenge Gordon's death, defeated the Sudanese forces at the Battle of Omdurman (Karari) in 1898, and inaugurated the era of the Anglo-Egyptian Condominium, which ruled until Sudan gained independence in 1956. Kitchener, with grand imperial design, began rebuilding Khartoum in the shape of the Union Jack, a pattern that is lost today in urban sprawl.

One morning Kamala Ishag, the head of the painting department at the College of Fine and Applied Arts, came to pick me up at my hotel. "You know," she said, "things are changing a little, but even today what I am doing is frowned on. If a woman goes by herself to pick up a man at a hotel, people give it another name." I had come to expect the traditional segregation of sexes in the countryside of northern Sudan, but was surprised to see it persisting among the sophisticated people of the city.

Kamala drove me to her studio at the college. Her paintings were large works with bright backgrounds and rows of cubes with contorted faces in them. "I started painting women in crystal cubes to try to show how we are imprisoned. We are enslaved, even though we are paid high in clothes and jewelry. Look at this tobe. It is beautiful, and I wear it because it is our custom, but it is binding. You have to *think* the way you are wearing the tobe—your thoughts are wrapped. But things are changing. The younger girls, especially at the university, are leading different lives. At independence in 1956, 96 percent of the women were illiterate. That is changing. It

is hard to break tradition, it will take time."

Muhammad, an accountant, did not want the change at any time. "It is very necessary to keep boys and girls apart," he said. "When I first went to university, I could not pay attention to my work because there were women sitting next to me. We have a saying in Sudan: 'Keep the egg away from the stone, and the female away from the male.'"

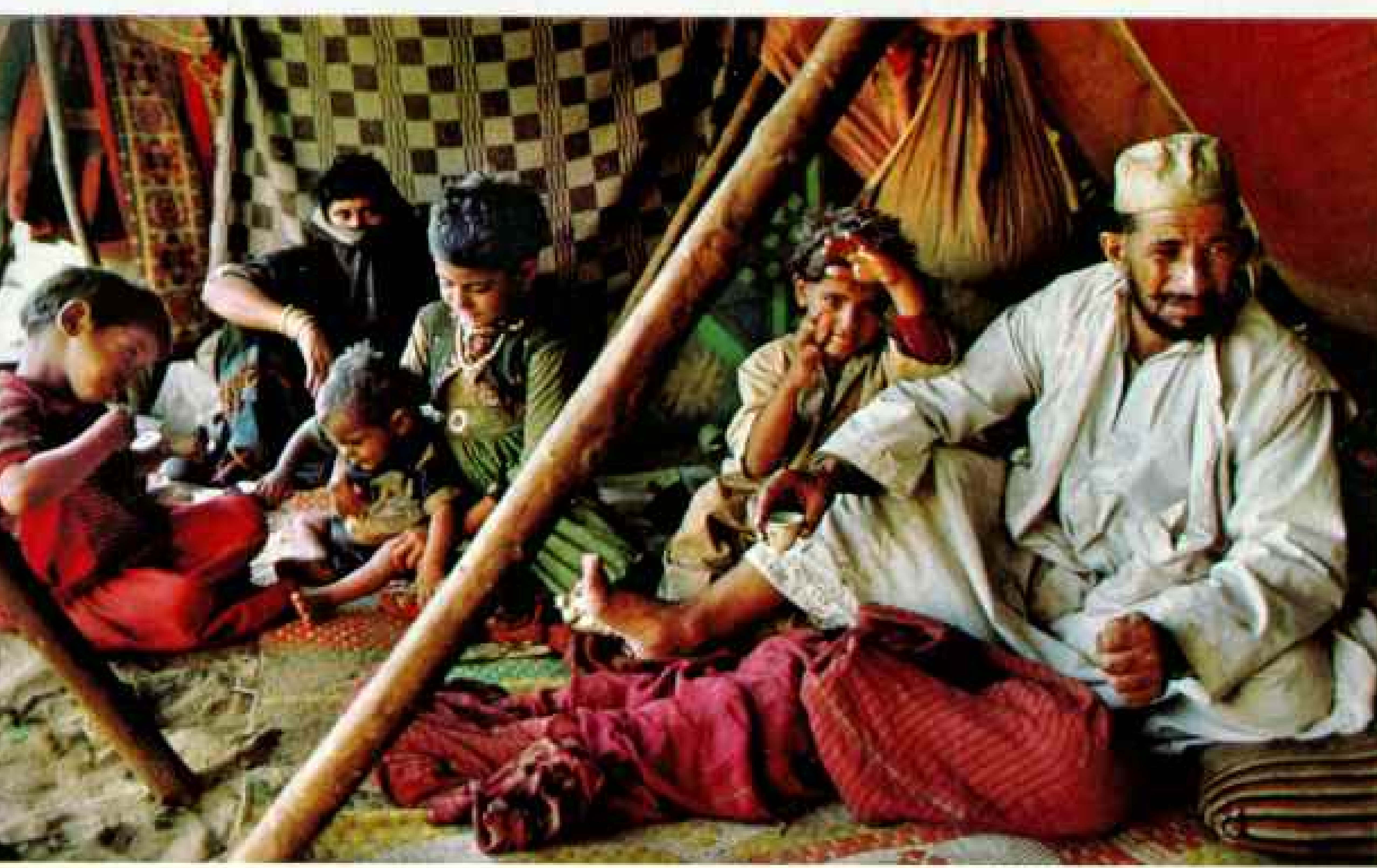
Breadlines and Shortages

Even more urgent than women's rights are the country's heartsickening problems of 40 percent annual inflation, lines for bread and gas, and shortages of just about everything, including power and water. If the economy cannot be put right, there may be trouble for Nimeiri's regime. In Africa it is usually economic troubles, not menacing neighbors, that bring down governments.

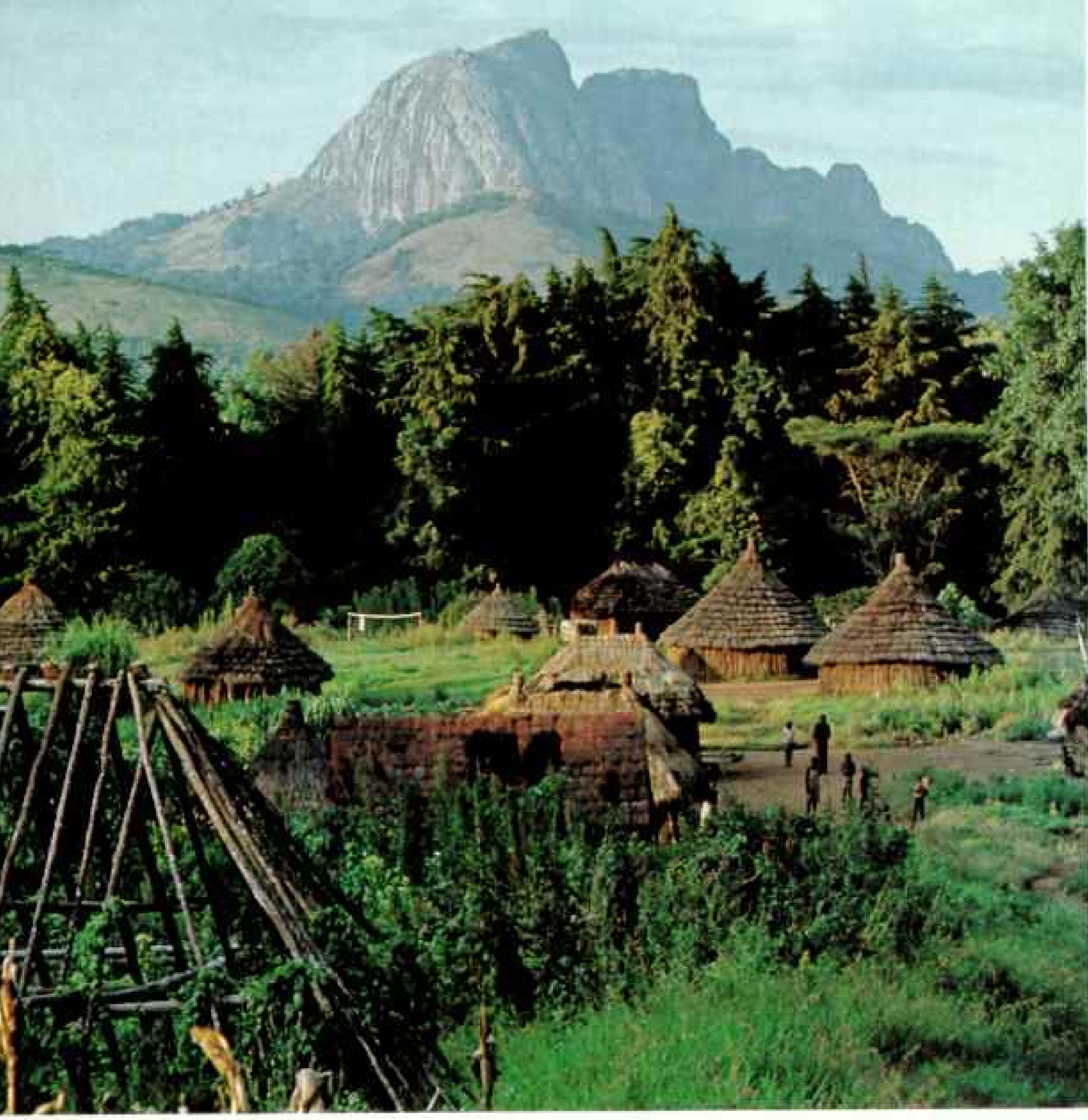
Compounding the economic problem is the emigration of skilled labor. Practically everyone who knows how to do anything leaves Sudan to work in the Persian Gulf states. In a country where only 20 percent of the population is literate, at least 300,000 Sudanese are working abroad.

I met accountants, professors, and taxi drivers who had all been out of the country for several years and would probably leave again. "One month in Saudi Arabia," a clerk named Yahiya told me, "is like two years in Sudan. I just cannot afford to stay." Other Arab countries, even unfriendly ones, exact a similar pull. Last year a Libyan hotelier checked into the Khartoum Hilton as a guest and proceeded to hire away most of the hotel's staff while sitting in his suite.

The brain drain, as well as the lack of infrastructure and money, means that even the few projects already in place are sliding downhill. El Gezira, a region that lies between the Blue and White Niles, is said to be the world's largest irrigated farm—2 million *feddans* (2.1 million acres)—growing most of Sudan's major export, cotton. Today it



The noonday inferno—*110°F is not unusual—finds a Rashaida family seeking shade in their tent not far from Suakin. The Rashaidas, nomads who emigrated from Saudi Arabia about 200 years ago, roam the eastern deserts. They have a reputation for breeding fine riding camels, which they convoy to Egypt for sale.*



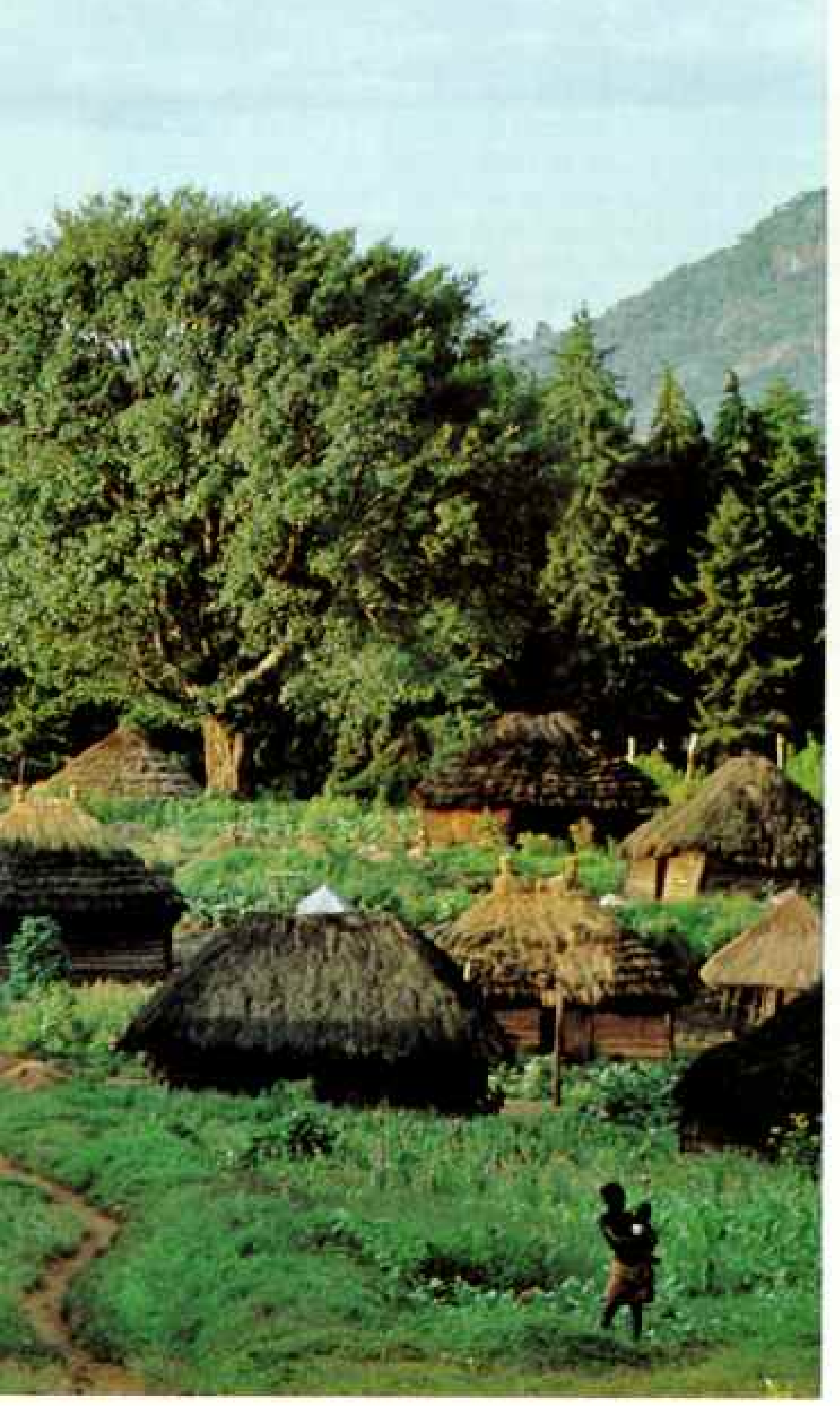
produces only a fraction of its capacity.

Still, there are a few positive signs. The Kenana Sugar Company Limited, which opened in March 1981, south of El Gezira, is working well. In uninhabited bush, 81,000 feddans have been planted with sugarcane, and a town of 50,000 people has sprung up (pages 358-9). Sudan's long-term thinkers hope that by combining the country's resources, Western technology, and Arab petrodollars (Kenana got most of its capital from Kuwait and Saudi Arabia), Sudan may yet become the "breadbasket of the Arab world," recently a favorite slogan.

The Jonglei Canal is another promising project, though controversial. When finished, the 360-kilometer canal (pages 352-3) will divert part of the White Nile from the Sudd, making communications and transport easier and bringing irrigation to the great plains that are bone dry half the year.

Barrier to Wildlife and Nomads

But the canal will have an impact on the ecology of the Sudd by reducing the flood area. It will interfere with the migrations of wildlife and the migratory cattle herding of the Dinkas and Nuers. Some southerners



Canopy of green *rims a forestry camp not far from the Uganda border. Here desert and swamp give way to lush highlands dominated by 8,000-foot Mount Garia in the Imatong range.*

In an aid project sponsored by the British, the Sudanese learn the techniques of planting and harvesting trees. Their efforts promise to diminish the country's dependence on high-priced lumber imported from Kenya.

Many of the camp workers were members of the Anya Nya, a southern guerrilla force that fought in the civil war. The men were guaranteed such jobs as part of the peace settlement.

"Before, we lived in the bush," the president of the workers' union and a former soldier in the Anya Nya told the author. "No food, no medicine, no place to sleep. Now it is good. We don't have to live in fear any more."

fear that the canal will spell the end of their way of life.

Atem Yaak, a Dinka who is editor of *Southern Sudan* magazine, said, "At first I was bitterly opposed to it. I believed it was just so the Arabs would benefit, and it would do nothing for the south. Later I became convinced it will help us. It will generate revenue, increase communications, and enable us to grow more food. It may even help to unify the nation."

It was some comfort to recall that other nations had thrived and become unified long ago in this land of Sudan. The ruins of the ancient city of Meroe, once capital of the Kingdom of Kush (flourished circa 800 B.C. to A.D. 350), lie a short trip along the Nile from Khartoum. Ruins of temples, baths, homes, and workplaces cover a large area. Some excavation has been done, but Sudan just does not have money to explore its past while its present needs are so pressing.

To the east of the city are the royal burial pyramids (pages 348-9). It was strange to think about the time, 2,000 years ago, when this land was alive with bustling activity—kings holding court, people gathering at the temples, hundreds of workers shaping the

stones for the pyramids, and scholars carving their history into stone in the ancient and still untranslated Meroitic language. Today the land is desert. I stood in the lee of one of the pyramids and watched as the sand swirled around the ruins and covered the work of long ago.

It was well into April now, and I had to leave Khartoum if I wanted to get back to the south before the rains made the only track impassable. But I wanted to try a real road before I again struggled with the hinterland tracks. So I sortied in the opposite direction, northeast to Port Sudan on the Red Sea along one of the two paved roads in the country. Opened in October 1980, this 1,200-kilometer road should ease the terrible bottleneck at the port, which the old railway cannot handle.

Into a Land Teeming With Life

I drove back to the White Nile, meeting it at Kosti, and headed south. The land changed again. I was moving back into "Africa." The semidesert gave way to thick bush. The palm, tamarind, and acacia trees became taller, and monkeys played in their branches. An abundance of birdlife appeared on the river, which was now clogged with grasses and reeds, so unlike the open river that makes its way through the desert in the north.

The people changed too, becoming more African. The men still wore jellabiahs but without turbans, and there were no more tobes covering the women. Slowly, the closed walled compounds of the north gave way to the open clusters of beehive huts.

Farther south the land changed still more: a vast plain of waving yellow grass. I passed several people thatching their huts, hurrying now because the rains had started to fall. I drove into a cracking storm, the driving rain just beginning to penetrate the hard soil. The road was slippery, but it had not been raining long enough to close it down. How wonderful to see rain! I got out of the car and stood in it, reveling in its coolness.

I was not the only one in a good mood: A group of Dinkas came by singing and joking, and no wonder. The rains had arrived, the long, hot dry season was over. The trees were green, the birds singing, and the new green growth of grass had sprung up in the barren land. I saw a huge herd of antelope making its way east, away from the swamp.

"Rain!" one of the Dinkas exclaimed. "New grass, lots of milk."

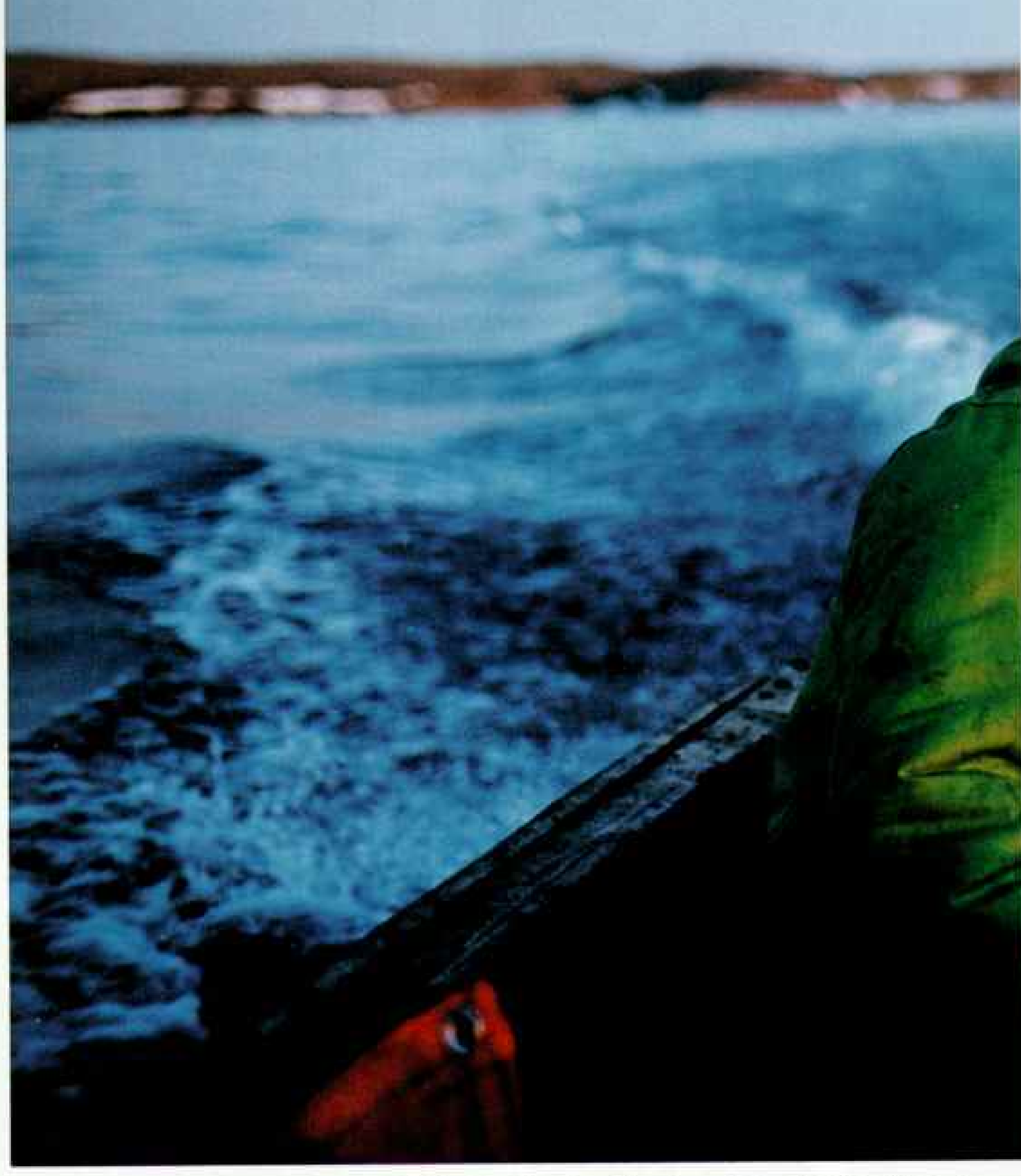
Isolation Hinders Quest for Unity

The last night of my long journey, a 16,000-kilometer circle that had carried me through the many worlds of Sudan, I pulled up in a papyrus marsh beside the Nile. Next day I would be back in Juba. I thought about all the enormous projects Sudan is pursuing to bring itself into the 20th century, and of the problems it faces. I thought about its role in the Horn of Africa and world affairs, about Qaddafi's menace, and about the memories and fears left from Sudan's own troubled, divided past.

But most of all I thought about the people I had met living, as they have for centuries, isolated from each other in this varied, giant land. For the Nuers in their swamps with their cattle, for the Kawahlas in the desert with their camels, and for the Nubas perched on their hills in between, the only concerns are that there will be enough rain and pasture. Inshallah, there will always be.

I woke up that last morning before dawn had come to the swamp. In the otherworldly light I saw from my tent a Dinka man, his tall, naked, dark figure against the green reeds, running through the marsh. He suddenly stopped and froze, acting like the heron he was trying to catch. He moved forward again, and then froze, and finally made a lunge at the bird. The heron, though, was too quick and took off into the sunrise of the new day. The Dinka laughed, retrieved his spear, and wandered off into the marsh. □

Carrying memories on his chest—*British campaign medals for service in World War II—a Zande man near Yambio recalls days of valor. But for his proud tribe, which once burst out of the Congo basin to establish an empire in southern Sudan, the days of decline have set in. Ravaged by sleeping sickness, a declining birthrate, and the inroads of modern life, Zande society and traditions slowly slip away.*



Warming the August chill with affection, Charlie and Kautjak Tarkik hunt

Henry Hudson's Changing Bay

By BILL RICHARDS Photographs by DAVID HISER

and fish in the great bay that opened Canada to exploration 400 years ago.

RATTLING NORTH toward Hudson Bay, the *Muskeg Express* rolls like a ship in a heavy sea. The seven-car train cants with a sickening lurch as we cross each dip and swell in the frozen tundra at a steady 15 miles an hour.

My breakfast companion is Rick Peterson, a young trainman on the 910-mile line from Winnipeg to the railhead at Churchill, halfway up the bay's western shore. He searches for a bright side to our swaying journey through the Canadian north.

"At least," he says, "you get a chance to see the scenery at this speed." He pauses as the conductor, wearing a pair of beaded slippers, totters past. "And it gives the polar bears a chance to get off the tracks before we run into 'em."

Outside, a thin March dawn has turned gaping patches of open snow to pale lavender, and the last spruces before the tree line are blackened miniatures. To the northwest lie central Canada's Barren Grounds. A person could, if he dared, cross 600 miles of

desolation there and not meet another soul.

To the north and east is Hudson Bay—320,000 square miles of green water and luminescent blue-green ice that has lured and terrorized mariners for centuries (map, page 385). In 1610 Henry Hudson steered his ship into this treacherous mix. After a winter of short rations, his crew mutinied and cast him adrift to die there.

Stretched around the northern bay like beads on a poor girl's necklace, a scattered strand of tiny settlements maintains a fragile hold on this uninviting land. Thirty years ago the villages didn't exist. Eskimos around Hudson Bay were nomads, living in igloos and skin tents while the space age was taking shape to the south.

Change Comes to a Changeless Land

Today these people prefer their own words Inuit—"the people"—and Inuk—"a person"—to the white man's Eskimo. To me the titles are gentle reminders that enormous changes are taking place in Canada's north.

Some of these changes are blatant—motorized squadrons of Inuit on snowmobiles instead of on dogsleds. Some are more complex, like the preparations for a new Inuit-dominated government here.

Some are downright unsettling. I watched an Inuit television crew prepare a film for satellite broadcast across the north. It offered a graphic demonstration of how to finish off a caribou during a hunt by bashing in its head with a rock.

"There are too many changes to keep up," a young Inuk fisherman complained sadly to me. Povungnituk, his village in far northern Quebec, has fewer people than my block in Washington, D. C. Yet it has been confronted by cars, telephones, jukeboxes, and video cassettes in little more than a decade.

It takes patience to discover the secrets of

The weather's fine *in Eskimo Point when the temperature rises to minus 10°F and the sun shines for 12 hours, as on this April Sunday. Known as Eskimos to many outsiders, the Inuit of the Hudson Bay region lived as nomadic hunters until the late 1950s. Now many have settled in a string of communities that dot the shore. But the caribou herds still call, and a packed sled awaits a hunter.*

a land like this. The Inuit have a name for this kind of patience—*qinutuinniq*.

With qinutuinniq, then, came many discoveries during the months, winter and summer, that I traveled through Hudson Bay country: abundant life where no living thing seemed to exist; mineral riches in the midst of empty plains; a northern desert carpeted for the briefest of summers with miles of blazing wild flowers; and a people caught in an uneasy quickstep between the old and new lives of the far north.

None of this was evident when I first arrived in Churchill, in winter. I stood on the empty main street searching for a sign of life.

The town presented an extraordinary architectural amalgam. A Tudor-style hotel next to a frontierlike trading post. Quonset huts and California-modern apartments. A sprawling old-fashioned railway station. Boxy prefabricated houses. A two-story wooden tepee.

Inuk entrepreneur *and member of the territorial legislature, Tagak Curley hopes the Inuit Development Corporation he heads will ensure that changes in the region will "benefit local communities, people who have continued to use the land." The wolfskin, he says, "reminds me of my outdoor side."*

The only movement was the wind-driven snow hissing around my boot tops. Another winter visitor, I recalled, had once described Churchill and its surroundings as "miles and miles of nothing but miles and miles."

Others see the place with a different eye. Diane Erickson was the first white girl born in Churchill. Now 45, she is a meteorologist with a ringside seat for the spectacular auroras that pulse across the sky here on clear winter nights. "When I go south, I get nervous," she said. "All those trees closing in."

Brief Summer Yields to Polar Cold

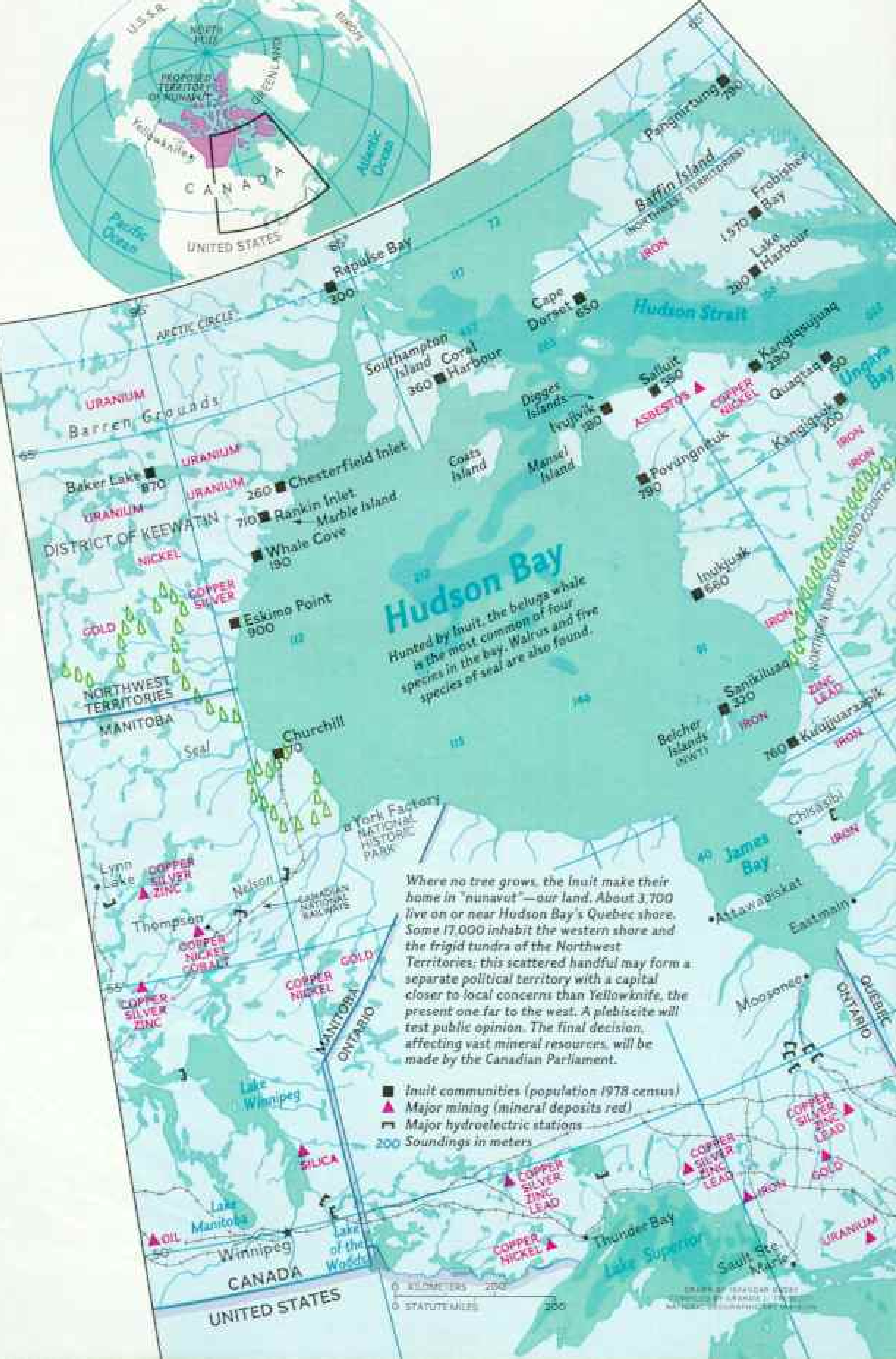
During World War II an air base was built outside Churchill by the United States government. After the war the base was used for arctic research. The town boomed briefly then, but began to fade when the base closed in the mid-1960s. It is still fading. The postwar population of nearly 5,000 has dwindled to about 1,200 people, mostly whites, with a few Inuit and Cree Indians.

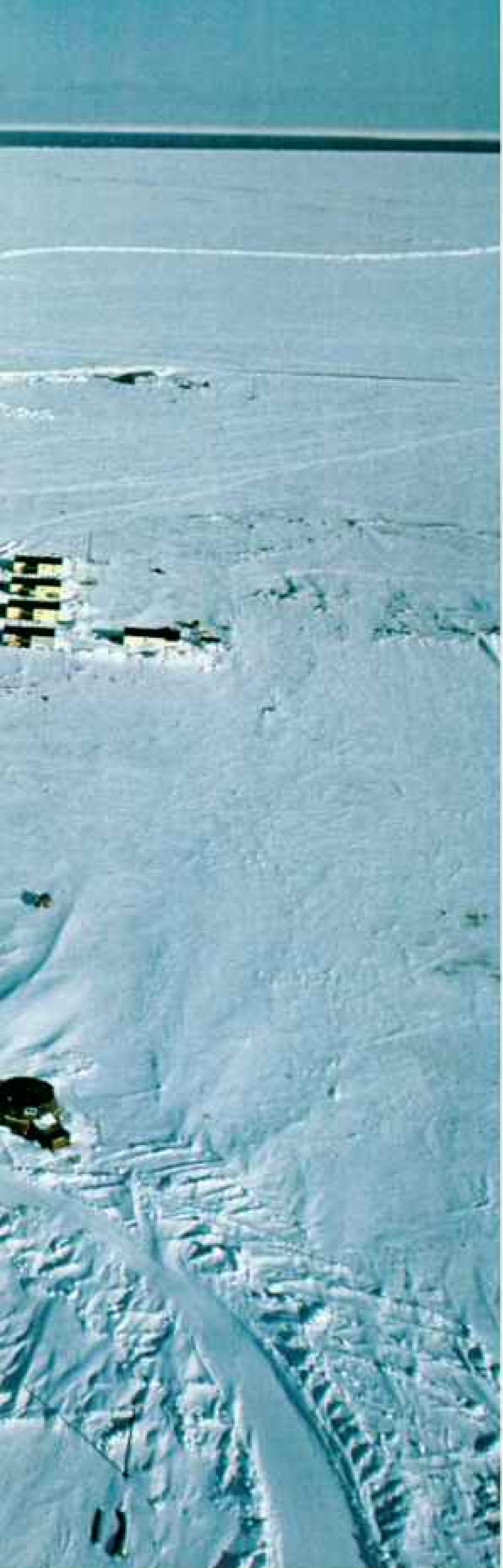
Summer brings a spurt of activity. Tourists arrive to see beluga whales in July and August and polar bears in fall. Birdwatchers flock in, some traveling as far as the birds themselves. More than 150 species of birds have been sighted around the town.

When the ice clears off the bay in early July, giant barges churn north from Churchill, rushing a year's supplies to isolated villages. Ships from northern Europe make their way here through Hudson Strait to load up with grain. For short weeks, while sailors wander the streets speaking Russian or Polish, the town turns cosmopolitan.

But in winter Churchill draws into itself, huddling under the wind blasting off tundra and bay. The wind turns Churchill into one of the iceboxes of the north, with temperatures near those of the North Pole, 2,000 miles away. It gets so cold some days that exposed human flesh freezes in 30 seconds.

On such a day I boarded a helicopter to search for polar bears at the invitation of zoologists Dennis Andriashek, of the Canadian Wildlife Service, and Malcolm Ramsay, a graduate student at the University of Alberta. We were to fly past Cape Churchill to where the two researchers were briefly capturing and marking bears. The area south of the cape is empty of humans but in autumn is home to nearly 500 bears, one of


U.S.S.R.
NORTH POLE
PROPOSED TERRITORY OF NUNAVUT
GREENLAND
EUROPE
Yellowknife
CANADA
Atlantic Ocean
Pacific Ocean
UNITED STATES
Hudson Bay
Hunted by Inuit, the beluga whale is the most common of four species in the bay. Walrus and five species of seal are also found.
Where no tree grows, the Inuit make their home in "nunavut"—our land. About 3,700 live on or near Hudson Bay's Quebec shore. Some 17,000 inhabit the western shore and the frigid tundra of the Northwest Territories; this scattered handful may form a separate political territory with a capital closer to local concerns than Yellowknife, the present one far to the west. A plebiscite will test public opinion. The final decision, affecting vast mineral resources, will be made by the Canadian Parliament.
Inuit communities (population 1978 census)
Major mining (mineral deposits red)
Major hydroelectric stations
200 Soundings in meters
Pangnirtung 780
Baffin Island
NORTHWEST TERRITORIES
Frobisher Bay 1,570
Lake Harbour 280
IRON
Repulse Bay 300
Cape Dorset 650
Hudson Strait
Kangiqsujuaq 290
Quaqtaq 50
Ungava Bay
ARCTIC CIRCLE
Southampton Island
Coral Harbour 360
Digges Islands
Salluit 550
Ivujivik 180
ASBESTOS
COPPER NICKEL
Kangiqsuk 200
URANIUM
Barren Grounds
Coats Island
Mansel Island
Povungnituk 790
Baker Lake 870
Chesterfield Inlet 260
Rankin Inlet 710
Marble Island
DISTRICT OF KEEWATIN
Whale Cove 190
NICKEL
COPPER SILVER
Eskimo Point 900
GOLD
Inukjuak 660
NORTHERN LIMIT OF WOODED COUNTRY
NORTHWEST TERRITORIES
MANITOBA
Seal
Churchill 170
Sanikiluaq 320
Belcher Islands (NWT)
ZINC LEAD
Kuujjuarapik 760
York Factory NATIONAL HISTORIC PARK
Chisasibi
James Bay
Lynn Lake
COPPER SILVER ZINC
Nelson
CANADIAN NATIONAL RAILWAYS
Thompson
COPPER NICKEL COBALT
Attawapiskat
Eastmain
COPPER NICKEL
Moosonee
MANITOBA ONTARIO
ONTARIO QUEBEC
Lake Winnipeg
SILICA
COPPER SILVER ZINC LEAD
Lake Manitoba
OIL
Winnipeg
Lake of the Woods
Thunder Bay
Lake Superior
Sault Ste. Marie
CANADA
UNITED STATES
KILOMETERS 200
STATUTE MILES 200



the largest concentrations of these animals in the world.

We spotted two bears loping along an offshore ice ridge, and pilot Cal Ross swung the chopper in a tight circle just 30 feet over their heads. The bears moved with a silky grace, fat under their coats after a winter of seal dinners. With his rifle Malcolm fired darts loaded with a tranquilizer into the bears. The female dropped immediately. But the 800-pound male was still pawing the air angrily as he sank to the ice.

"How can you be sure he's asleep?" I asked as we climbed out of the helicopter.

"The best way is to pull his tongue," Dennis said with a grin.

I watched from a distance while they worked. A tooth was extracted from the female to determine her age. She was given a radio collar so that the zoologists could track her later when she went inland to have her cub. The male had been in a fight and had a torn ear. He received a shot of penicillin.

"Grab hold," Malcolm yelled, struggling to roll the male over and measure him. Dennis took the bear's head, Malcolm grabbed his hind quarters, and I got the middle. The bear sighed deeply as we grunted and shoved in the subzero cold.

With a thump he rolled onto his back. Suddenly I found myself sprawled on his warm stomach, on a bearskin rug with a live bear still inside. The bear just snored and stared through sightless eyes.

There was a small tattoo under the male's lip. Dennis consulted his logbook and laughed. "We caught him last year," he said, "while a film crew was making a movie for the National Geographic Society about polar bears around Churchill."*

The National Geographic bear and his mate were still sleeping peacefully on the ice when we took off.

Just north of Churchill, Manitoba ends and the Northwest Territories (NWT) take

*The television special "Polar Bear Alert" will be shown on PBS Wednesday, March 10.

***Island of life,** Eskimo Point hugs the Hudson shore, frozen in for nine months of the year. An open channel lies two miles offshore. Road in the foreground goes only to the town's reservoir.*

Technology comes north *to ease the Inuit's adjustment to settled life. When they followed migrating herds of caribou across the Barren Grounds, they were themselves stalked by disease and famine. Now the government provides houses, medical care, and unemployment assistance, but the people still hunt for some food and clothing. Oblivious to a TV videotape, Theresa Tartak and Pelagie Kubluitok* (**left**) *prepare caribou skins for outerwear.*

An arcade at Chesterfield Inlet (**above**) *draws youngsters after school. Manager of the Hudson's Bay Company store, Marcel Mason, at left—like traders before him—married an Inuk woman. The cash he pays for furs often buys snowmobiles and all-terrain vehicles like that driven by a mother in Rankin Inlet* (**right**).

Premier trade fur *of the bay, arctic fox becomes a jacket at the Arctic Sewing Center (**left**), the only factory in Churchill. Here métis women—part Indian, part European—make clothing for store and catalog sales.*

*A supply center for points north and the bay's western railhead, Churchill with its 1,200 residents was denied its dream of becoming a bustling metropolis by high costs and low temperatures. October winds whip snow across the main street (**below**), crowded on a Friday payday. Automobiles come by train, the Muskeg Express.*

over Canada's endless stretch into the Arctic. In winter the coastline of Hudson Bay here merges land and water under a wind-whipped cover of ice and snow.

This faceless country is called Keewatin, one of five administrative subdivisions of the NWT. With approximately 230,000 square miles, it covers an area nearly the size of Manitoba across Canada's geographic center. But mentioning Keewatin doesn't bring a flicker of recognition from many Canadians. I once asked a bureaucrat in the Northwest Territories' capital of Yellowknife, 650 miles west of the bay, what lay out in that vast Keewatin region.

"Nothing," he replied.

In fact, nearly 4,500 people, most of them Inuit, live here in an archipelago of seven small villages along the northwest bay. I confess, though, that as I flew into Eskimo Point, at the southeast end of Keewatin, I was amused by a sudden thought. If I wanted to go to the movies or get a suit dry-cleaned, I would have to travel 450 miles south to do it.

Donald Suluk smiled when I raised this point. He didn't miss the movies, and *his* winter suit was made of caribou skins. When it got too dirty, he simply threw it out and replaced it.

A small but powerfully built Inuk of 56 years, Donald was raised in nomad camps. He works as an adviser at the Inuit Cultural Institute in Eskimo Point, today a community of 950 Inuit and a handful of whites.

"The old traditional survival skills are still important to people here," he explained through an interpreter, speaking in the guttural Inuit language called Inuktitut. "Young people here are learning to build igloos, set traps, kill caribou. Maybe what I teach will help them survive someday."

To see some of these vital skills, photographer David Hiser and I joined Donald and another Inuk, Matthew Akaralak, on a hunting trip into the treeless wilderness west of Eskimo Point. The Inuit call this region simply "the land."

The temperature was below zero and the wind was building as we left, riding behind the Inuit's snowmobiles on 12-foot sleds called *qamutiik*. Lashed to each was a bundle of rifles, machete-like snow-cutting knives, caribou skins, Coleman stoves, and pouches of dried caribou meat and tea.

Two hours later, sore from thumping across snow ridges blown hard as concrete, our little caravan halted. Donald grabbed a long-handled shovel and began scraping away snow and chopping a fishing hole. Somehow he had found a lake in this blank, white landscape. Soon we were feasting on pan-fried trout.

An hour later an igloo had been built. With their long knives our companions carved three-foot blocks out of the packed snow. Each block was carefully beveled and shaped, then laid in a nine-foot circle that curved upward course by course. Each layer of blocks tilted inward farther until they formed a dome.

When a herd of caribou appeared on a nearby hillside, the Inuit shot three. The bitter cold had built a fierce hunger in all of us. Greedily we ate fresh caribou meat—gnawing at half-frozen raw pieces and boiling a tongue. Then dessert: buttery-textured marrow from a cracked leg bone.

Afterward I questioned the hunters about disturbing reports we had heard from government biologists. Overhunting, it was claimed, had seriously depleted the once mighty Kaminuriak caribou herd here. At the current kill rate the herd would be virtually extinct in another eight years.

Donald looked troubled. "The caribou have disappeared before and always have returned," he said. "True, snowmobiles and modern rifles have made it easier to kill. We need Inuit game wardens who know the land to control hunting. But the caribou will always be here."

I hoped he was right, as we settled down for the night amid warm caribou robes. The roof of the igloo seemed to glow against the dark. We were secure in an environment that would quickly kill us without the knowledge and skill of the Inuit. Yet I wondered if their mastery of the old ways could match the threat of the new.

NWT Split Would Benefit Inuit

In the Inuktitut tongue *nunavut* means "our land." I saw the word everywhere in Keewatin—on posters in living rooms, in government reports, scrawled as graffiti on walls—a constant reminder of change.

Momentum is growing to split the Northwest Territories. The NWT Legislative Assembly approved the idea in 1980, and a plebiscite will be held this year. The division would cut the 1.3-million-square-mile NWT on a rough diagonal, following the tree line. The west, with a white majority, would keep Yellowknife as its capital. The eastern wedge, its population about 85 percent Inuit, would get its own territorial government, capital, and name—Nunavut.

It is a heady prospect. According to an NWT proposal, establishment of Nunavut (final approval must be granted by the Canadian Parliament) would give the Inuit mineral royalties from an area about three times the size of Texas, with large gas and oil resources in the high Arctic and uranium and gold in the Barren Grounds.

"Some people think when Nunavut comes, Inuit will be the instant OPEC of the north. But it won't be that easy," Tagak Curley told me when I visited him in Rankin Inlet, on the northwest corner of the bay.

At 37, Tagak is part of a new generation of Inuit leaders. Fluent in Inuktitut and English, he is on the road eight months a year as a member of the NWT Legislative Assembly and president of the Inuit Development Corporation. While we talked, he was packing for a 300-mile, week-long wolf hunt.

Great white hunters, *polar bears rule Cape Churchill in October and November when they migrate onto the frozen bay to stalk ringed seals. From 1,200 to 2,000 bears roam the western bay; in the late 1960s biologists discovered one of the world's largest polar bear denning sites about 40 miles southeast of Churchill.*

Federal approval would still leave the new territory heavily dependent on Ottawa for money, with almost no tax base of its own, Tagak pointed out. Nunavut would have but two high schools, one in Rankin Inlet and another, along with a hospital, far to the east on Baffin Island. Jobs in many eastern arctic communities are scarce.

Where jobs are available, Tagak went on, few Inuit apply: "The government has made it too easy for our people to stay in their villages and live off hunting and assistance payments. We have a hard time getting Inuit to go where there is work."

If life here for Inuit is comfortable now, it has not always been so. Visiting Baker Lake, with a 1981 population of 1,100 and the only inland village in Keewatin, I walked up a low hill outside town to the cemetery. Cairns were piled haphazardly on rows of coffins, many child-size, laid on the impenetrable permafrost.

This is a harsh land. But at the end of my winter journey I was certain of one thing—it was not the simple, lifeless desert I thought I saw when I arrived.

Any Port in a Storm

Charlie Tarkik looked worried. Several of the thwarts on his 24-foot canoe had snapped, the gunwales were splintering, and now the outboard motor was acting up. On this blustery August day there was pack ice in Hudson Strait, at the north end of

***Unbearably savory aroma** of frying bacon lures a brazen panhandler to a wildlife tour vehicle (**left**), here used by a National Geographic Society television crew filming a polar bear documentary. Tourists book Churchill's four hotels months in advance for the Polar Bear Alert during October and November. Waiting for the bay to freeze, bears invade the town and scavenge its nearby dump (**below**). Biologists use dye to identify chronically aggressive bears; three to five repeat offenders must be destroyed every year. Lucky Number 13, a subadult male, avoided the dump last season.*

A compromise solution will provide holding pens until freeze-up for as many as 16 problem bears. Meanwhile, "A safe polar bear is a distant polar bear" remains Churchill's commonsense slogan.

Preserved by permafrost, *timbers outline vanished buildings* ***(above)*** *where the Hudson's Bay Company's York Factory was a strategic base for the giant trading concern off and on from 1682 until the late 1800s. Later stations were established on new inland routes to Canada's west. The last warehouse, background, was abandoned in 1957, when Indians were relocated in settlements less remote than this one.*

In Baker Lake ***(right)*** *a school helps swell population to a current 1,100, almost wholly Inuit. A few work for government agencies based here, but most live off the land.*

Hudson Bay. The swells were running five feet, and our Inuk guide's canoe was being slapped around by the wind and the waves.

"You scared?" Charlie mouthed the question into the wind, grinning nervously in my direction. No question about it, I was. A few minutes in this icy water would finish us. This was not what I expected when I headed north to enjoy summer in the Arctic.

The propeller pin snapped as Charlie rounded a low island. We grabbed paddles and thrashed toward shore. We had been headed from Ivujivik, a community of 200 Inuit at the northern tip of Quebec, to Digges Islands, home of Canada's largest seabird colony. Now the two islands rose out of the strait ten miles away. It might as well have been a thousand. With the shattered

boat and the screaming wind, we weren't going anywhere.

We landed on a small island, and Charlie said cheerfully, "No problem. There's a fishing camp on the other side. We'll stay there."

In the unwritten law of the north, strangers in need are never turned away. The three Inuit families at the camp welcomed us and set out a meal of freshly caught arctic char.

In halting English, Moses Naluiyuk told me that his grandparents, his parents, and other Inuit from Ivujivik had come here every summer for years. Beluga whales and bearded seals often swam in the little inlet in front of the camp, and he was teaching his son to hunt there.

"Someday I hope he will teach his son, just as my father taught me," he said.

The rack of whale meat drying outside his tent attested to Moses' hunting skill. But he made his living as a carver. Proudly he showed me a foot-high chunk of soapstone he was chiseling into an intricate scene: two men struggling over an Inuk woman.

Tea was served, and we talked of children, fishing, carving, and this peaceful island. "In the evening my wife and I walk here," Moses said. "Our parents are nearly all dead now. But we can remember them by the things we see here."

The wind had died when we set out again with a patched boat and borrowed motor. Ahead, the cliffs of Digges Islands rose more than 600 feet above the strait. No humans live on Digges; the chief occupants are murres, seabirds resembling diminutive

penguins, with a cry like a maniacal laugh.

In September, after hatching their chicks on the narrow ledges of the islands' cliffs, the entire Digges Islands colony migrates. More than 500,000 murres swim 1,500 miles through the Hudson Strait, down the coast of Labrador, to the waters of the island of Newfoundland. It is an astonishing journey, one of the longest bird migrations of its kind. Murres go farther by water than any other species of bird, and some murres go even farther than this particular group.

We found a team of ornithologists encamped on one of the islands, studying the murres. The colony was safe here in Hudson Bay, the team's leader, Tony Gaston, told me. But outside, he said, fishing nets and oil spills were killing many murres. Tony and his crew were trying to count the colony before it dispersed on the water. "If there's a really big spill someday," he said, "we want some accurate data on the birds to calculate the damage."

It was time to head back to the mainland. I could hear the murres cackling and chuckling over the buzz of the outboard motor. Behind us the towering cliffs reverberated with their laughter: Digges Islands sounded like the fun house of an old-fashioned amusement park.

Quebec Inuit More Isolated

Ten thousand years ago the Hudson Bay region was squashed by a mile-thick ice sheet. The entire area is rising today at about two feet a century. Along flat parts of the coast the tundra is marked by wavering lines of detritus from old beaches, now far from the water.

But northern Quebec's shore is different. Here, granite from the ancient Canadian Shield scales abruptly from the water's edge in scarred, gray hills, patterned with black and orange lichens. Inuit villages here seem different too from those I had seen on the western shore. They are smaller, poorer, less tidy and—perhaps the reason for all the above—more isolated.

Canada turned what is now northern Quebec over to the province in 1912. But until the 1970s, when the massive James Bay hydroelectric development project was begun along La Grande River, arctic Quebec was largely ignored by its provincial parent. (See following article.) The region is forgotten no more. Hydro-Québec has already sunk billions of dollars into the James Bay project. It plans to spend ten billion more in the next decade. Longer range projects, extending into the next century, are under discussion for areas north of the 55th parallel.

New dams would go up, rivers would be rerouted, whole towns created, a web of transmission lines woven—all in an area the

***Tall tales** follow a caribou hunt. Donald Suluk (**facing page**) holds forth after a feast in an igloo built by him and his partner Matthew Akaralak (**above**). Biologists say herds are dwindling and suggest controls on unrestricted harvesting by the Inuit.*

size of France with only 5,500 people now and not a single paved road.

At Hydro-Québec's skyscraper headquarters in Montreal I had been assured that the present construction would barely be felt in the Inuit villages along the bay. If anything, an official said, the development would bring badly needed 20th-century changes to the Inuit. In tiny Ivujivik I could feel the changes taking place already.

Village Spurns James Bay Pact

You could fit all Ivujivik into a medium-size shopping center and still have parking space to spare. It is a village without cars or television, where fishing and soapstone carving are the major occupations, and each house is marked by a pile of "honey bags" waiting for the sporadic pickups that serve in place of a sewage system.

In 1975 Ivujivik was one of three Inuit villages in the north that refused to sign the James Bay agreement. The pact, which cleared the way for hydroelectric development, was completed without their signatures. It awarded the Inuit of northern Quebec 90 million Canadian dollars. The Cree Indians farther south around James Bay got 135 million. Cree and Inuit villages also received a total of 5,400 square miles of land and exclusive hunting, fishing, and trapping rights to 60,000 more. In return, the Inuit and Cree dropped their aboriginal claim to the rest of northern Quebec.

Davidi Mark, an intense man of 25, was president of the Ivujivik village council that turned the James Bay agreement down. "It was written in English, which most Inuit here don't understand. Besides, the land is part of us, not something you can buy and sell. That is what we believe."

With or without their signatures, the agreement stands. It has clouded the future for his village, Davidi declared. "Ivujivik is growing, but there is little room to build here. Some of us may have to start a new village someday. But where do we go? Nobody is sure what land is ours any more."

August had turned warm as I flew across the bay once more, back into Keewatin's barrens. The northern Quebec story was repeating itself here: more energy development, more confusion.

Prospecting outfits from Canada, the

Whale-watcher's delight, *the bay offers summer sightings of belugas, such as this pod of 12-foot adults with several young at the mouth of the Seal River. A warmer tide of fresh water*

may draw the whales to feed on capelin and other fish. Biologists, who estimate the bay's beluga population at a healthy 9,000, need to know more about the interaction between river and whales, and how the belugas may be affected by increased damming of estuarine rivers. Inuit and Indian hunters harvest about 200 belugas annually, mainly for a skin-and-blubber treat called muktuk.

***Old secrets of self-sufficiency** must be passed from one generation to the next, says Andy Mamgark. Warm in caribou skins, he teaches his ten-year-old son, Taukijaa (**right**), to set a trapline for arctic fox, an animal harvested solely for trade. After scooping a hole for the trap, Andy cuts a disk of snow to conceal it (**above**) and then scrapes the lid paper thin. Whale blubber baits the trap.*

Andy's older son graduated from high school on Baffin Island but could not find a job—or his way around the barrens—so Andy took his younger sons out of school for home instruction. "If we want to own the land," he says, "then we should live on the land."

United States, West Germany, Japan, and elsewhere were combing the barrens west of Baker Lake. A uranium lode had been discovered and a decision on whether to mine—a costly and risky undertaking in the far northern wilderness—would come within a few years.

In the village a torrent of uncertainty poured from Mayor William Noah. Would the mines drive away the caribou? Would radiation from mine tailings harm animals or humans? What effect would hundreds of miners from outside have on the village?

"I'm not saying that this is a holier-than-thou place, but we are a pretty quiet town, and we like it that way," said the mayor. "We were here first, and we'd like a chance to decide our own future."

Inuit have hunted on the Barren Grounds for at least 3,000 years. Ironically, the village of Baker Lake started as an outsider's commercial venture. The Hudson's Bay Company established the site as a trading post in 1925.

300 Years of Trade

It would be difficult to travel anywhere in the Canadian north without recognizing the imprint of the world's oldest surviving trading company. It was chartered in 1670 by Charles II to his cousin Prince Rupert and a group of investors as "The Governor and Company of Adventurers of England Trading into Hudson's Bay."

The five parchment pages of the king's charter remain carefully preserved by the company. As well they should be, for they granted rights of "sole trade and commerce" to a land covering 1,486,000 square miles, a private empire stretching from Labrador to the Rockies, rich in furs and resources beyond even a king's wildest dreams.

It was not until 1870 that the "Company" (an unadorned title it still holds in much of the Canadian north) ceded "Rupert's Land" to Canada. Even then, it took 56 more years to complete the land transfers.

Today the Hudson's Bay Company no longer trades for furs, though it still buys and sells them. But much of the company's fur stock now comes from the United States, and its business interests have expanded to real estate and oil and gas development as well as merchandising.

Still, the Hudson's Bay Company flag (bearing an imprecise Latin motto that translates roughly, A Skin for a Skin) flutters over 130 company stores across northern Canada. In some communities the flag remains the symbol of broad local authority.

"We're the town bank, the nutrition class, the check-cashing service, the fur market, and the local grocery all rolled into one," Marcel Mason told me, when I visited his tiny wooden store in Chesterfield Inlet on the northwest corner of the bay. Although he is just 21—and looks younger than some of his teenage customers—Marcel is the arbiter who decides whose credit is good in this little Inuit community of 200 people.

"In the old days the company manager was banker, doctor, and town manager," Marcel said. "That's changed. But in a town this size you're still an important person."

At Fort Prince of Wales, near Churchill, I visited a remnant of the Hudson's Bay Company's pioneer days. In the 18th century it took company artisans nearly 40 years to build the fort. Its thick granite walls and 40 cannon were intended as a remote haven for a corporate fleet that sailed its own sea under its own flag.

The scheme was a resounding failure. A French naval force seized the lonely bastion in 1782 without firing a shot.

Prior to that ignoble loss, the Hudson's Bay Company had been able to dispatch its merchant-adventurers north and west to establish a powerful hold on the Arctic. The most tragic of those ventures was headed by 80-year-old James Knight.

In 1719, after establishing a wilderness post—where the fort would rise later—Knight sailed north into oblivion with the frigate *Albany* and the sloop *Discovery*. His orders from company headquarters in London were ambitious: "To find out the Streight of Anian [the Northwest Passage], in order to discover Gold, and other valuable Commodities, to the Northward, &c."

After 48 years of silence, traces of the little expedition were discovered by whalers on Marble Island, near the north end of the bay. Inuit in the area told another company adventurer, Samuel Hearne, a sketchy tale. Knight and his crew had starved on the island, their boats wrecked, their chests still empty of gold.

Island Legend Gains a Convert

Two hundred and sixty-two years later I pointed for the uninhabited shores of Marble Island. On the chartered trawler *Windy Bird*, Robert Tatty steered us across 25 miles of open water and tricky currents between Rankin Inlet and the island. I listened to Tatty's son Paul, 31, recite old Inuit legends about the place. Once an iceberg, it had turned to stone, Paul said. "The old people still believe if you don't crawl on your hands and knees during your first visit to the island you will die in a year."

The island loomed before us out of the bay, a pearly quartzite monolith nearly devoid of vegetation and shot through with streaks of rose, tan, and gray. It was easy to understand how legends had been born of this deserted ground.

I counted 23 mounds of stones marking whalers' graves on a small spit of land off the island's western shore. In the 19th century two whaling ships, the *Ansel Gibbs* and the *Orray Taft*, were wrecked nearby. The island had taken its toll.

As the *Windy Bird* cruised east along the seven-mile island, we watched a polar bear scurry nervously into the rocks. Near the east end Paul shouldered his rifle, and we went ashore.

On a shelf we found the weathered remnants of a stone hut. That was all. The bay lay unbroken before us as it had when the last of Knight's doomed crew waited hopelessly for rescue from this ghostly, gleaming rock. Had they waited patiently to the end on this shore? Or cursed the empty horizon?

I dropped to my knees. Someday I wanted to return to this mysterious, alien land and its magnificent inland sea. There was no sense in taking chances. □

***Lights dance in the cold dark sky** when solar particles strike the earth's upper atmosphere, touching off the aurora borealis. Beneath an observation bubble in Churchill, researchers wait for the right moment before dispatching rockets laden with instruments to probe the phenomenon, still not fully understood.*

Quebec's Northern Dynamo

Text by LARRY KOHL
NATIONAL GEOGRAPHIC STAFF
Photographs by OTTMAR BIERWAGEN

TAMED AND HARNESSED, the rivers of northern Quebec are being put to work in the most monumental hydropower project ever undertaken in North America. As visitors from Montreal look on, spillover from a giant new reservoir cascades down a man-made canyon at LG 2, largest of three colossal dams along La Grande River. Not blessed with the oil and gas of Canada's western provinces, Quebec has turned to its vast subarctic wilderness for a source of clean, renewable energy. Billions of dollars and armies of workers are involved. New industries and jobs and electricity sales to neighboring provinces and the United States are expected payoffs.

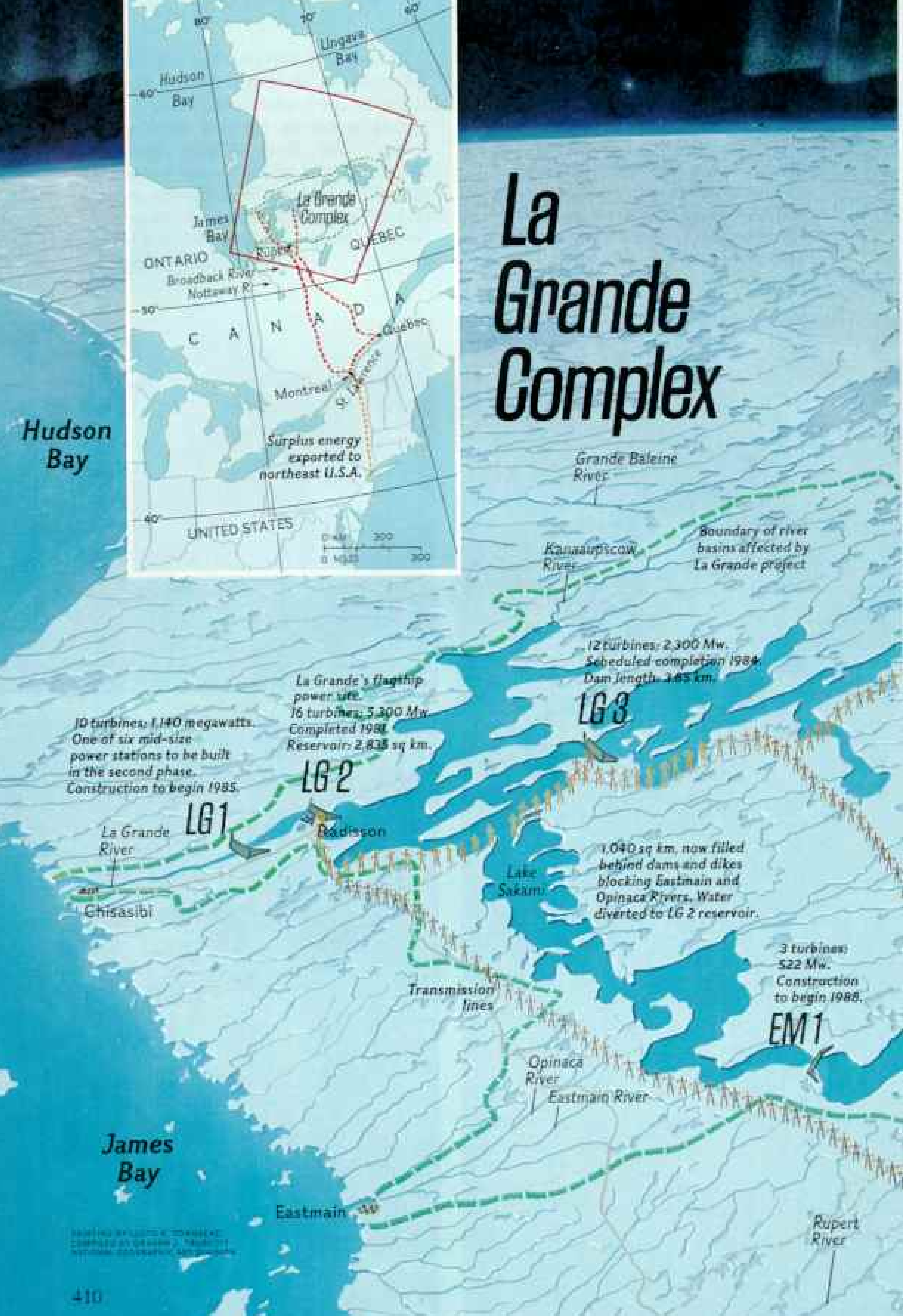
ELECTRIFYING MOMENT for all concerned, a 600-ton rotor is eased into its generator at the world's largest underground powerhouse, blasted out of solid rock at LG 2. The huge electromagnet will spin at 133 rpm, turned from below by turbine blades catching the surge of water that has fallen 180 meters (590 feet) through intake tunnels from the reservoir above.

Inaugurated in 1979, when four of its 16 generators were activated, the 483-meter-long powerhouse has a capacity of 5,300 megawatts—power enough for four million people. By the turn of the century, 63 turbines in nine powerhouses will produce 13,700 megawatts from La Grande Complex—itself but the beginning of a long-term plan to exploit Quebec's water wealth.

During the short days of the northern winter, when temperatures as low as minus 40°

are not unusual, workers in the LG 2 powerhouse often felt like human moles, arriving and leaving in darkness, seeing the sun only on Sundays. Roughnecks, like this driller at LG 4 (***right***), find that big earnings and low expenses soften the rigors of living in the bush. Long hours with overtime pay make weekly earnings of $800 (Canadian) common. Free food, housing, and recreation enable many to bank their pay.

At each of La Grande River's damsites a spillway controls reservoir level. Huge steps along the LG 2 spillway (***bottom***) slow rampaging water to prevent erosion downstream. For these mighty excavations 127,000 tons of explosives are being used—enough to warrant their on-site manufacture. Nearing completion, phase one of La Grande Complex is both ahead of schedule and within its 15-billion-dollar budget.


La Grande Complex
Hudson Bay
Ungava Bay
James Bay
ONTARIO
QUEBEC
La Grande Complex
Rupert
Broadback River
Nottaway R.
C A N A D A
Quebec
Montreal
St. Lawrence
Surplus energy exported to northeast U.S.A.
UNITED STATES
Grande Baleine River
Kanaaupscow River
Boundary of river basins affected by La Grande project
12 turbines: 2,300 Mw.
Scheduled completion 1984.
Dam length: 3.85 km.
LG 3
La Grande's flagship power site.
16 turbines: 5,300 Mw.
Completed 1981.
Reservoir: 2,835 sq km.
LG 2
10 turbines: 1,140 megawatts.
One of six mid-size power stations to be built in the second phase.
Construction to begin 1985.
LG 1
La Grande River
Radisson
Chisasibi
Lake Sakami
1,040 sq km. now filled behind dams and dikes blocking Eastmain and Opinaca Rivers. Water diverted to LG 2 reservoir.
Transmission lines
3 turbines: 522 Mw.
Construction to begin 1988.
EM 1
Opinaca River
Eastmain River
Eastmain
Rupert River

Caniapiscau River

3 turbines: 312 Mw. Construction to begin 1985.

LA 2

Brisay

Now a water-regulating dam. Construction to begin in 1985 on a 2-turbine 400-Mw powerhouse.

4,275 sq km, now filling behind dams and dikes blocking northward flow of Caniapiscau River. Water diverted to La Grande.

Lake Caniapiscau

La Grande River

LA 1

6 turbines: 770 Mw. Construction to begin 1983.

LG 4

9 turbines: 2,700 Mw. Scheduled completion 1985.

Eastmain River

2 turbines: 250 Mw. Construction to begin mid-1990s.

EM 2

Boundary of river basins affected by La Grande project

Transmission lines

NORTH

WATER runs wild across the Canadian Shield, primordial bedrock of upper Quebec. Cree Indians and Inuit have fished the north for centuries, but this abundance of water has otherwise gone virtually unemployed. Then, in 1971, Quebec formed the Société d'énergie de la Baie James (SEBJ), now a subsidiary of Hydro-Québec, to wring maximum megawatts from La Grande River.

In phase one the dams of LG 2, 3, and 4 will create three reservoirs and provide 10,300 megawatts. Phase two will add six smaller power stations and another 3,400 megawatts.

With the harnessing of the Grande Baleine River to the north and the Nottaway-Broadback-Rupert system to the south, perhaps by the year 2000, the energy equivalent of 25 or 30 nuclear plants will fill southbound transmission lines.

LATENT POWER, the reservoir at LG 3 fills behind its new dam (***below***), longest in the complex. The spillway, incorporated into the dam, will be able to release a flow of water equal to that of the St. Lawrence River at Montreal. Normally, however, water will fall through intake tunnels to the powerhouse, nearing completion at the right of the dam.

The crest lengths of phase one's 206 dikes and dams will measure 209 kilometers (130 miles). All are being constructed of natural materials quarried at the sites—some 15 million truckloads, hauled and dumped,

from the broad bases to the narrow crests.

Two factors dictate waterpower potential: volume and fall. The relatively flat terrain of northern Quebec is rich in the former, poor in the latter. To compensate, surveyors combed the landscape for damsites that would offer the maximum water flow and fall. To boost the volume factor, three rivers nearby were cut off in their upper reaches and diverted to La Grande. Eighty kilometers from its mouth, the Eastmain once flowed wild and free (***upper left***). Today, with its upstream flow diverted north to the LG 2 reservoir, it barely trickles (***above***).

CITIZENS OF THE NORTH, the Cree Indians of upper Quebec are facing their second, and perhaps greatest, tradition-testing encounter with the white man. For thousands of years their forebears lived as nomads, garnering scarce resources from far and wide across the taiga. Then, with the coming of fur traders and the Hudson's Bay Company about 300 years ago, outposts along James Bay gradually became their permanent homes. But their livelihood has remained in the bush, where they still work traplines far into the interior. Therefore they contested Quebec's grand design for transforming their ancestral lands. In 1975 a compromise was worked out. The Crees, joined by most of Quebec's Inuit, relinquished claims to the province's northern territories in return for 225 million dollars and 14,000 square kilometers (5,400 square miles) of native land reserves. They were also granted exclusive hunting, fishing, and trapping rights to 156,000 square kilometers, including much of the land near the new reservoirs.

Later, SEBJ agreed to move the Cree village of Fort George from an island near the mouth of La Grande River to Chisasibi, a new site upriver. Among the reasons: The island's sandy base was hampering the town's

water and sewage development, and erosion caused by spring floods threatened to get worse with new flow patterns of the regulated river. A few residents, like Alice Louttit—here with her grandson (*left*)—have refused to leave, willing to accept the hardships of isolation. With most homes moved to the mainland, Fort George (*below*) resembles a tornado path.

Natives receive hiring priority on the SEBJ project, accounting for about 3 percent of the work force, which peaked at 17,000 in 1978. For the white majority, life at James Bay has meant an uprooted existence in a string of prefabricated towns along the river. For this huge mobilization of men and materials, more than 1,000 kilometers of road and five airports had to be built. Some 1,500 flights a year—most aboard SEBJ's fleet of propjets—shuttle workers south every two months for family visits at company expense. When finished, all three power stations of the complex's first phase will be run by computer by a few hundred personnel at LG 2, with only a few maintenance workers needed at LG 3 and 4. Now that Quebec's north country has been penetrated, however, its abundant mineral wealth may eventually draw permanent populations from the south.

SEBASTIAN BEARSKIN, one of the first born in the new Cree community of Chisasibi, rocks gently to sleep with help from a family friend. Resembling a metropolitan suburb, Chisasibi (***lower right***) boasts a new hospital, a community center, and a modern school. Many high-school students come from far-off Cree villages and live in foster homes during the school year—a situation contributing to discipline problems.

On a bush call, 600 kilometers east of James Bay, Dr. François Lette examines Sam Rabbitskin in the trapper's tent (***below***). An SEBJ work-camp physician, Dr. Lette reached the ailing trapper, on the headwaters of the Caniapiscau River, by helicopter. Sam and a few other Crees had been flown into the remote area to harvest beaver, caribou, moose, and other animals imperiled by the slowly filling reservoir—soon to be Quebec's largest body of water. Company biologists had determined that beaver, the area's most commercially important fur-bearing animals, would have great difficulty in reestablishing new territories. It was decided, therefore, to concentrate trapping efforts in the doomed areas, allowing beaver populations elsewhere to increase. All told, reservoirs of La Grande Complex will expand the area's water surface from the current 15 to about 22 percent.

POWER FOR THE PEOPLE of Quebec began flowing south from James Bay in 1979 along gleaming suspension towers, high above the scrubby black spruce of the lonely taiga. When completed in 1984, some 12,000 towers will carry five high-voltage transmission lines, the longest such system in North America. The lines, each a conduit to serve some 1.5 million people, will pass along corridors approximately 1,000 kilometers long.

Unlike the water that produces it, this electricity cannot be stored. Turbines must be turned on or off according to demand. In Quebec, where electric heat is common, peak usage occurs in winter. In much of the U. S., demand peaks during the summer, when air conditioners are humming. Since power exports to the States enable otherwise idle turbines to turn profits, talks are under way with U. S. utilities for new or increased sales, especially in New England. But the prospect of added industry, attracted by the cheap power, is more important to the Québecois, for whom the 15-billion-dollar James Bay project represents a per capita investment of $2,300.

New large-scale hydro schemes like Quebec's are probably not in the future of the United States, where water and land are now bitterly contested resources. But many nations, rich in untapped waterpower, might learn—indeed are learning—from the James Bay experience. □

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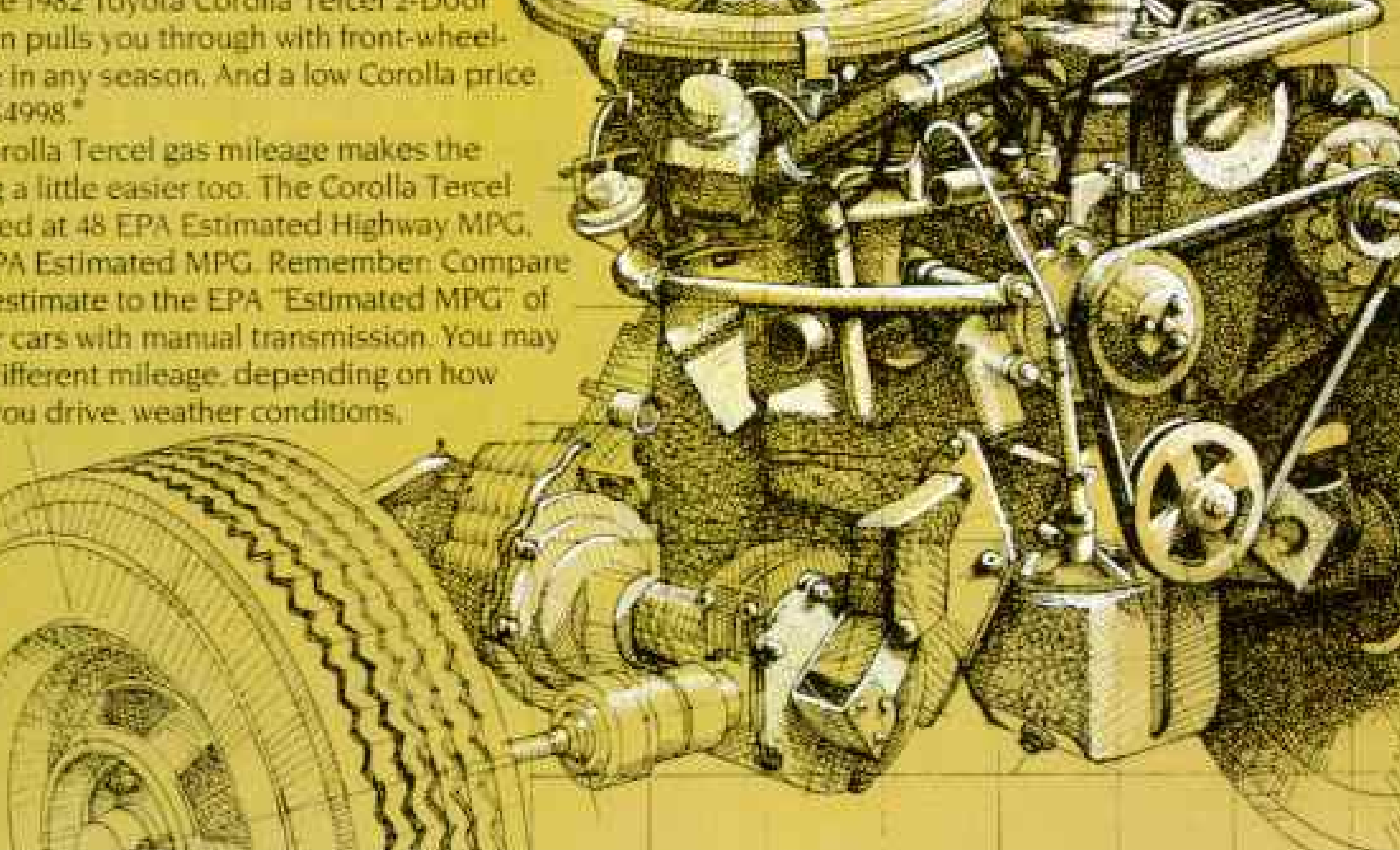

The world as it happens

NATIONAL GEOGRAPHIC teams of writers and photographers bring you the life of the past as well as history in the making. Here, atop the "hitching post of the sun" at Peru's famed Machu Picchu, photographer William Albert Allard, left, and GEOGRAPHIC writer Harvey Arden visit the awesome Inca ruin discovered in 1911 by Yale University Professor Hiram Bingham and explored and revealed to world view under grants from Yale and the National Geographic Society.

For this month's Peru article, Allard captures with his artist's lens a varied portrait of an important nation that takes upheavals—natural or man-made—in stoic stride. Terrorist bombings and disruptive strikes marked the GEOGRAPHIC's visit, along with several earthquakes. A major quake last Good Friday struck the Ayacucho area while the two were there.

Arden rates this second on his list of terrifying experiences while covering the world for GEOGRAPHIC. Number one: the assassination of Egyptian President Anwar Sadat near Cairo last October 6. Arden's eyewitness account will appear in a forthcoming article on Sinai.

Share the world and its events as they happen. Nominate your friends and relatives for Society membership on the form below.

WILLIAM ALBERT ALLARD

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Members Forum

PANDAS

Congratulations on your "Pandas in the Wild." Having been in China two years ago and photographed the pandas in Tianjin (Tientsin) Zoo, I was delighted with every beautiful picture and word in the article.

Mary (Noecker) Clark
Berryville, Arkansas

My deepest compliments on Schaller's feature. The combination of his photographs and succinct captions provides both a dramatic and informative view of free-living pandas.

Dian Fossey
Division of Biological Sciences
Cornell University, Ithaca, New York

In "Pandas in the Wild" there is a photograph on page 739 showing panda damage done to the bark on a tree. The panda may be after the basal cambium layer. While doing mapping on black bear damage in the Olympic National Forest, I observed scores of trees similarly stripped of bark and scratched with claws and teeth. The black bears would rip some bark off with their claws and then sample the cambium layer.

Richard A. Fritz
Anchorage, Alaska

Analysis of panda droppings indicates a primary diet of bamboo. Perhaps we will know more when Dr. Schaller completes his studies.

ACID RAIN

The large-size pointed head and the spotted back suggest that the fish pictured on page 661 is a lake trout, not a brook trout as stated.

Robert A. Behrstock
Houston, Texas

The Cornell University scientists conducting the experiment identified the brook trout as temiscamie, a Canadian variety.

The article on acid deposition in the November issue presents one of the most comprehensive and objective examinations of the phenomenon that I have read. As the article notes repeatedly, much remains to be learned about the causes and effects of acidic deposition. Yet there is growing danger that Congress may prescribe a quick fix on the basis of guesswork.

Ralph E. Bailey
Chairman and Chief Executive Officer
Conoco Inc., Stamford, Connecticut

ORANGE COUNTY

According to Airport Operator Council International, the country's four busiest airports in 1980 were: Chicago's O'Hare International, Atlanta's Hartsfield International, Los Angeles International, and New York's Kennedy International. This differs from your December article. What accounts for the discrepancy?

Carnzu A. Clark
Santa Barbara, California

We were careful to state that John Wayne Airport in Orange County is the "fourth busiest . . . in total takeoffs and landings," as verified by the Federal Aviation Administration. The airports you list are the busiest in terms of passengers served.

It would have been nice to have read about all those wonderful old-timers who were the originators of Orange County, rather than all those developers who are ruining the land with their overbuilding. They are the people who have driven the orange groves out and the cost of housing up.

Lawrene Nixon Anfinson
McLean, Virginia

OCEANS

I was extremely disappointed in Jacques-Yves Cousteau's comments on aquaculture in the December issue. Carp have been cultured for centuries in Asia and provide an excellent source of protein.

James P. Monaghan, Jr.
Fisheries Biologist
Carbondale, Illinois

Carp farming, particularly by the Chinese, was discussed in the accompanying article "New World of the Ocean," by Samuel W. Matthews.

The article in the December issue was another great success. You are getting to know so much about oceanography and the earth sciences that it is getting hard to put it all in one article. This is certainly an exciting time to be working in these fields!

James R. Heirtzler
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts

The photograph on page 814 of "New World of the Ocean" was taken in my laboratory. The "white airfoil shape" you mention is not a shark's tooth but probably a bone fragment.

Ronald K. Sorem
Department of Geology
Washington State University
Pullman, Washington

Our apologies to Professor Sorem. Mr. Boswell

The Easter Seal is a symbol of help for men, women and children with disabilities caused by birth defects, illnesses or accidents.

The Easter Seal Society helps them to live their lives according to their capabilities by providing direct rehabilitation services. It takes money. That's why Easter Seals must count on you.

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took seven color photographs that were correctly identified by Professor Sorem. Somehow we mixed up the identifications.

Page 806 discusses the Coriolis effect and makes the statement "In the Northern Hemisphere, motion is deflected clockwise; in the Southern Hemisphere, counterclockwise." As a matter of fact, cyclones turn counterclockwise in the Northern Hemisphere and clockwise in the Southern. The same is true of water draining out of a bathtub.

Bryant W. Pocock
Perry, Michigan

Our diagram depicts the basic theory of the Coriolis effect, with no influence from such forces as atmospheric pressure. Dr. Pocock is correct about the direction cyclones turn. Bath water can spin either way, say scientists.

MOUNT ST. HELENS

Thank you for the second splendid article on Mount St. Helens. I live near it, but I cannot see the volcano from the closeup viewpoints available to photographers and news media.

Marian Dinwiddie
Graham, Washington

I believe the picture on foldout pages 710-712 in the December 1981 issue has been reversed. I am a retired Eastern Airlines pilot and have viewed the panorama shown many times. The peak on the right looks very much like Mount Rainier.

Capt. R. D. Smith
Fayetteville, Georgia

The transparency is not reversed. The crater of Mount St. Helens faces due north. Therefore, Rainier is properly identified at the top of the photograph and Adams to the right.

ATLANTIC SALMON

Your November article informed the reader of the present problems of the salmon. I am writing to tell you what's being done on the Exploits River of Newfoundland to solve some of these problems. Two salmon ladders aid in the salmon's struggle upriver. Also the paper mill at Grand Falls has spent extreme amounts of money to try to purify its waste input into the river.

Between 1980 and 1981 the commercial fishery has increased by threefold, and the anglers' catch has increased by 45 percent.

Kenneth Rideout
Aguathuna, Newfoundland

I read with great interest the article about Atlantic salmon and how they find their way across enormous distances to their destination. One navigational aid is not mentioned in the article. We use it in aircraft and indeed in many other vehicles. I am thinking of the inertial-navigation system, which in principle is the simplest and yet the most accurate self-contained navigation system we know of today.

C. Laulund
Høn, Norway

"Mysteries of Bird Migration" in the August 1979 NATIONAL GEOGRAPHIC mentions a kind of inertial-navigation system. However, experiments with birds proved inconclusive. Continuing investigation into the homing instincts of both birds and salmon may help solve these mysteries.

SCIENCE IN SPACE

In both of your articles concerning the space shuttle, you mentioned metals that will combine in space and drugs that can be made in space but not on earth. What are they?

Calvin N. La Frence
Rock Island, Illinois

There are plans to combine lead and copper, lead and zinc, and aluminum and indium in space. Other space shuttle experiments will involve human cells, enzymes, and hormones. Some of the possibilities for research are pancreas cells that stimulate insulin production, and clotting agents that hemophiliacs need. Long-range possibilities include combining complex chemicals for drugs.

WORLD MAP

On "The World" map I happened to notice that you mark Zhenjiang on the north bank of the Yangtze River, which is wrong. Zhenjiang is on the south bank.

L. S. Chen
Abernathy, Texas

You're right. We'll cross the river the next time.

Your world map in the December 1981 issue was magnificent! My two children thought so too—they haven't stopped fighting over which of them it belongs to. Where may I get another copy?

Mrs. H. W. Nelson
San Mateo, California

"The World" and "World Ocean Floor" maps are available separately on plastic-coated paper for $4.00 each from the National Geographic Society, Washington, D. C. 20036.

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

Photographed by Gerald Cubitt. ***Coquerel's Sifaka:*** ***Genus:*** *Propithecus* ***Species:*** *verreauxi coquereli*
Adult size: *Head and body: average 46cm, more than 1m standing on hind legs; tail: average 56cm*
Adult weight: *Average 4.5kg* ***Habitat:*** *Forests in northwestern Madagascar*
Surviving number: *No estimates; destruction of natural habitat has seriously depleted population*

Indian Ocean
AFRICA
MADAGASCAR
Coquerel's Sifaka Habitat

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

Lemurs are found only on Madagascar and the Comoro Islands, and among the rarest of these is the endangered Coquerel's sifaka. If it disappears, there is no way to bring it back.

Photography can record the Coquerel's sifaka for posterity, and it can actually help save it and the rest of wildlife.

Information is essential for saving the Coquerel's sifaka, but fastidious with its vegetarian diet, this primate is extremely difficult to keep in captivity. One has to study it in the wild, and there photography is the handiest and most versatile scientific research tool.

Photography can also influence the way people in general feel toward nature. It could, for instance, show the sifaka's unique habit of sitting up on a tree and facing the morning sun with arms raised. And whether one believes or not in the legend that this is because the sifaka is a sacred sun worshipper, the photograph would certainly help us better understand nature.

And understanding is perhaps the single most important factor in saving the Coquerel's sifaka and all of wildlife.

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We still don't think it's a sports car.

But if you insist.

No matter what the auto experts say, the Honda Civic GL simply wasn't designed to be a sports car.

However, the car does have the basic performance features of one. Such as 4-wheel independent suspension, rack and pinion steering and steel-belted radial tires.

The Civic GL is certainly fun to drive. With a peppy 1488cc engine to keep things lively. Front disc and rear drum brakes bring everything to a stop. They're power-assisted and self-adjusting too.

There's front-wheel drive for better traction and a smooth shifting 5-speed transmission. There are also aerodynamic improvements. Which helped the Civic GL pass its mileage tests with flying colors.

EPA estimated [35] mpg and 46 highway. Use 35 mpg for comparison. Actual highway mileage will probably be less. Your mileage may vary because of weather, speed or trip length. California figures will be only one mile per gallon lower.

The interior does nothing to deny a sporty image, either. Instruments include a tachometer and quartz digital clock. There are reclining front bucket seats and a 4-spoke sport steering wheel. And a remote control outside rearview mirror.

Is the Civic GL a sports car? There's only one way to settle this. And it isn't here.

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On Assignment

DENNIS ANDRIASHEK (ABOVE) AND WILLIAM BAKER

HOW DOES IT FEEL to be a caged animal? Photographer ***David Hiser*** got a taste on the Hudson Bay assignment when he folded his six-foot-six frame into a four-foot-square observation cage while polar bears sniffed and pawed at his shelter.

"I didn't have cold, raw fear, but I felt awe and excitement such as you get scaling a sheer cliff," says the avid mountain climber. "The bears were curious and persistent, not frenzied. But I had no doubt that if they wanted to, they could have torn the cage apart."

A veteran of 13 years of National Geographic assignments, the dedicated outdoorsman is now in southwestern Tasmania, one of the most remote wilderness areas in the world.

JUST GETTING AROUND in Sudan was an achievement for author-photographer ***Robert Caputo***, here riding a rickety ferry across the Wau River. One-third the size of the contiguous United States, Sudan has but 800 miles of paved roads—which made Caputo's four-wheel-drive vehicle indispensable on his 10,000-mile travels. He saw more of Sudan than perhaps any other modern journalist has—more than most Sudanese themselves.

But getting around has been his business; in 11 years in East Africa, he has accompanied anti-poaching patrols in Kenya, covered mercenary troops in the Comoros, and was arrested and interrogated by Idi Amin's notorious State Research Bureau in Uganda, an experience he walked away from safely.

"I speak a smattering of Arabic and some Swahili, which helped," says Caputo of his African assignments. He also willingly curls up with villagers beside cow-dung fires and dines on camel meat and goat stomach.

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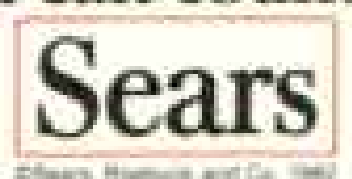

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	EST. HWY.	EPA EST. MPG
2.5 Liter L-4	40	25
3.0 Liter V-6	33	21
4.3 Liter V-6 Diesel*	42	26

Use estimated MPG for comparison. Your mileage may differ depending on speed, distance, weather. Actual highway mileage lower. Estimates lower in California. Some Buicks are equipped with engines produced by other GM Divisions, subsidiaries, or affiliated companies worldwide. See your Buick dealer for details.

*Buick projection of 1982 EPA V-6 Diesel estimates. See your dealer for actual EPA estimates.

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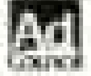

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