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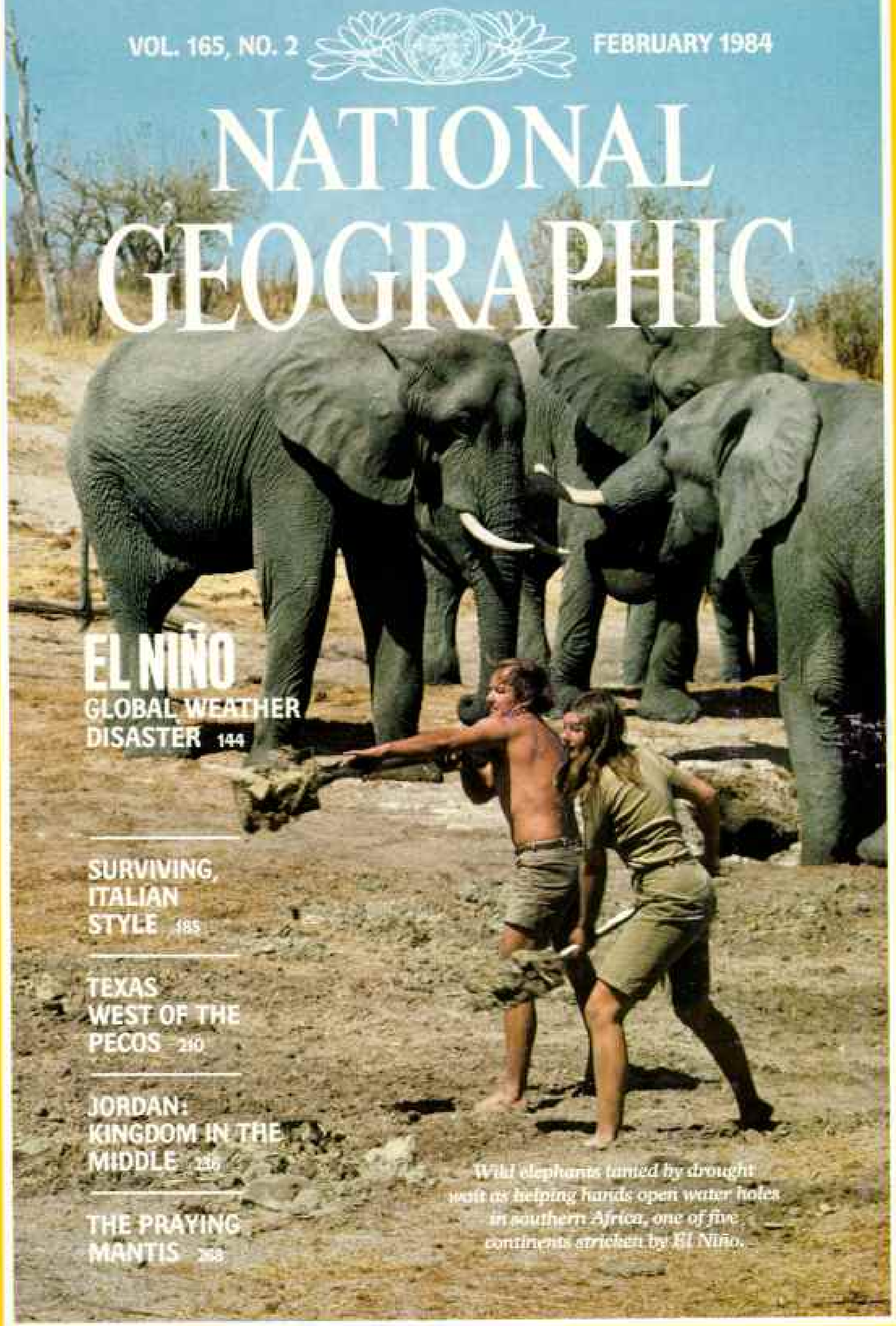

Wild elephants taunted by drought wait as helping hands open water holes in southern Africa, one of five continents stricken by El Niño.

SEE "LOVE THOSE TRAINS" WEDNESDAY, FEBRUARY 8, ON PBS TV

THE PRECIOUS LITTLE BOOKLET called the passport is never so needed as when it is missing. Last year some 10,000 Americans learned that lesson the hard way when their passports were stolen.

Travelers have always needed or wanted the protection that the passport requests—literally a "pass for the port." The first recorded request for a "passport" by a traveler appears in the Old Testament, in Nehemiah 2:7. About 450 B.C. Nehemiah, who had just been appointed governor of Palestine by the king of Persia, wrote: "If it please the king, let letters be given me to the governors beyond the river, that they may convey me over till I come into Judah."

Until the Middle Ages, passports were given to a privileged few. In 1215 the Magna Carta established that "All merchants are to be safe and secure in leaving and entering England."

One of the earliest U. S. passports on record was issued in France in 1778, signed by Benjamin Franklin, Arthur Lee, and John Adams. A photograph of the bearer was required on the U. S. passport after 1914. Originally a single sheet of engraved paper, it assumed the present booklet format in 1926.

With today's massive movements of refugees, a U. S. passport, real, forged, or altered, has far more value to a noncitizen than to the rightful bearer. Last year, of 16 million valid American passports, four million were used in international travel, a 32 percent increase in five years and a bull market for thieves.

State Department stolen-passport statistics reveal that U. S. consulates in Italy are among the busiest in replacing stolen passports. One in 1983 belonged to Virginia Bachant, head of our National Geographic travel office. A pair of purse snatchers mounted on a moped punctured a tire on her rental car at a stoplight in Naples. When Mrs. Bachant stopped, one thief opened the car door, shoved her aside, snatched the purse from between her feet, jumped on the moped, and the pair sped away.

Although this happened in tourist-rich Italy (see article, page 185), similar experiences can be found anywhere. With vast tourist travel, no government can totally provide the service the passport historically requested—safe passage and protection under the law.

Since travel is so vital to better understanding of our fellow man and hopes for peace, the answer is not less travel but more individual vigilance.

Wilbur E. Garrett

EDITOR

NATIONAL GEOGRAPHIC

February 1984

COVER: *Safari-camp operators Lloyd Wilmot and June Anthony can barely dig water holes fast enough for thirsty wild elephants in Botswana. Photograph by Thomas Nebbia.*

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EL NIÑO'S ILL WIND

By THOMAS Y. CANBY
ASSISTANT EDITOR

PHILIPPE MAZELLIER

More bomb than storm, a 1983 cyclone blasts Polynesia, sending Arutua atoll residents staggering toward safety. Theirs was but one price paid when El Niño, a dislocation of the world's largest weather system, flung high winds, rampaging floods, and the misery of drought around the globe.

ECUADOR *Strung with utility and conveyor lines, the abutments of a bridge washed out between Guayaquil and Salinas stand loaded with supplies and passengers awaiting makeshift ferry service. Warm water pushing against the coast triggered floods and landslides that killed scores of Ecuadorians and caused about 400 million*

THOMAS NEBBIA

dollars' worth of crop and property damage. The culprit was a Pacific warming that takes its name from a local current called El Niño, for the Christ child, affecting the coasts of Peru and Ecuador at Christmastime. In 1982-83 it came early and stayed late, leaving a costly consolation—scientific data for better understanding and prediction of future Niños.

AFRICA *Grazed to the nub, denied rain, and blown by dust, the village of Rakops in north-central Botswana seems lifeless but for a few trudging figures. Southeastern Africa had already suffered two dry years before El Niño blocked the deliverance of returning rains. For Botswana, a nation of cattle herders, the effect was*

THOMAS NEBBIA

devastating. Livestock by the thousands died of thirst and hunger. Those losses along with crop failures sharply aggravated malnutrition in a country where nearly one child in four already was undernourished. Many men were forced to leave their homes in search of work, while their families remained to cope as best they could.

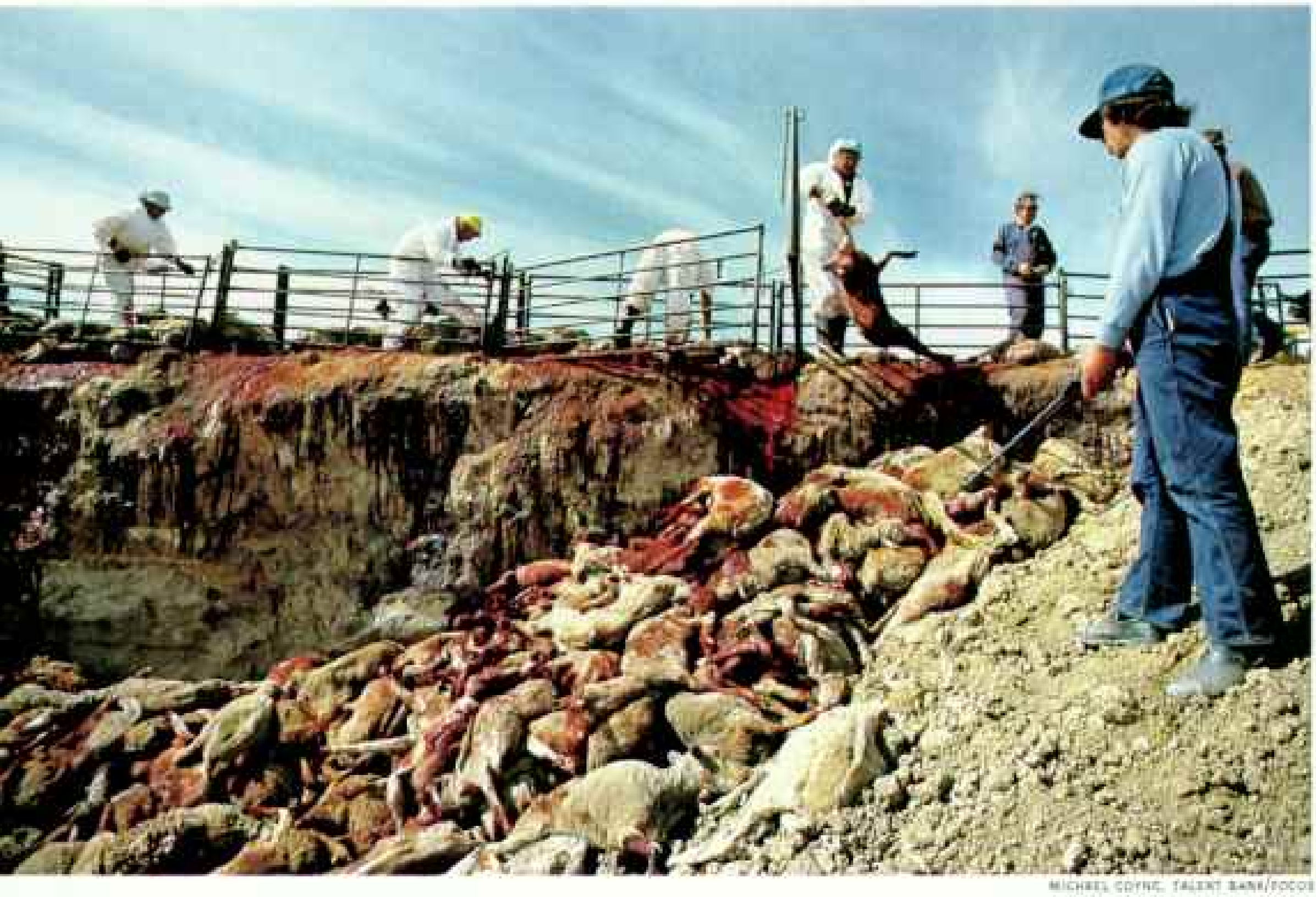
AUSTRALIA *An escarpment of advancing dust, part of a storm thousands of feet high and covering 77,000 square miles, bears down on Melbourne in February 1983. Mid-afternoon darkness brought terror to residents, as thousands of tons of topsoil smothered the city. For reasons still unknown, weather systems that normally dominate*

ROBERT KING, PIERRE'S PHOTO LAB

the tropical Pacific changed intensities, strengthening a high-pressure cell that hovered over southeastern Australia and bringing pitiless drought. At the same time, an enormous low-pressure cell invaded the mid-Pacific, spawning storms and floods. The atmospheric shift was the severest on record, making this Niño one of the most destructive climatic events in modern history.

NATURE ON A RAMPAGE

***Humane end** to a horrible dilemma comes as government workers shoot and bury thousands of Australian sheep, unsalable on a glutted market. Ranchers could not afford to feed and water the animals, denied sustenance by drought, and chose a quick end for them rather than starvation.*



MICHAEL COYNE, TALENT BANK/FOCUS

PETER O'BRIEN had done things right on his rolling Australian farm. Few would say it was his fault that drought had turned his fields into a dust bowl, that his sheep had to be shot so they wouldn't starve, that the family finances were in disarray.

The O'Briens were caught up in one of history's most disastrous climatic events, a shattering of normal weather patterns that inflicted drought, flood, and fire on every continent except Antarctica and, probably, Europe. The cause was a periodic heating of the equatorial Pacific Ocean known as El Niño, The Child, an allusion in Spanish to the Christ child, because South Americans often feel its warm ocean current about Christmastime. This Niño fell hardest on the eastern half of Australia, where the O'Briens operated their 2,500-acre farm.

Peter O'Brien began preparing for one of Australia's frequent "dries" as soon as he moved onto the farm in 1979. He deepened his livestock ponds, which Australians call dams; he strengthened fences damaged by marauding kangaroos; he asked local officials to draw up a plan for soil conservation. "Our aim was to make ourselves drought-proof," recalled the slight, fortyish farmer.

Autumn of 1982 brought favorable rains, and Mr. O'Brien sowed heavily and confidently. This would be a wheat year.

At that moment ominous signals appeared on barometers in Australia and in distant Tahiti. There meteorologists detected decay of a large high-pressure system that normally blesses that isle with idyllic weather. At Darwin, in Australia's tropical north, rising pressures announced a weakening of the northern Australian-Indonesian low,

whose torrential rains produce a caldron of climatic turbulence likened by some to the Great Red Spot of Jupiter. These signs meant that earth's great red spot and the high-pressure cell centered east of Tahiti had begun the swing of the great climatic seesaw known as the Southern Oscillation—sure sign of El Niño.

For Peter O'Brien and for tens of thousands of other farmers, rising pressure over Darwin portended disaster. During normal times most of Australia basks beneath a high-pressure ridge that makes it the driest of continents, yet nevertheless admits occasional rainstorms beating in from the Indian Ocean. Rising barometric pressure at the seesaw's western end would divert more rains from Australia's marginal wheatlands, just sown with such high hopes.

"The rains stopped the moment we planted," Mr. O'Brien recalled. "Some of my wheat sprouted, but most of it just sat in the ground, too dry to germinate. Before long, winds came and dust storms kicked up, and seed flew right out of the ground.

"In a few months the forests dried up too, and the kangaroos came out, looking for food. They scratched up 40 acres of wheat seed near the forest. Then they ate the wheat that had sprouted. What they didn't eat they trampled and rolled on until it was ruined. In the process they got tangled in the fences and ripped them apart.

"The sheep suffered terribly. At the outset I had 730 fine merino ewes, and they lambed beautifully—650 of the little fellows. But then the ewes had nothing to eat, and my lambs couldn't grow. I was forced to sell $20 animals for $2.50 a head.

"Soon I had to sell the ewes too, but the market had collapsed. A bloke bickered for a week and finally offered 10 cents a head. I'd have lost money transporting them.

"I did something other farmers were doing but you think will never happen to you. I called the shire government and registered to have the ewes shot. The officials asked if I had a place to bury sheep—if they could use my place for shooting other beasts in the shire. I had an old dry dam they could use, and they came. A fellow herded 600 of my ewes into a chute, another man shot them, I threw the bodies into the dam, and a bulldozer covered them. We put down 1,800 sheep that day, six or seven thousand altogether in the shire.

"Thank goodness we got good winter rains this year," said Mr. O'Brien. Our eyes roamed the farm's gentle hills, alive again with new wheat and reviving grass. "We've lost almost everything we had, and it will take years to rebuild the soil and the herd. But we're not going to walk off our land."

THE CLIMATIC EVENT that tested the O'Briens and so much of the world occurs frequently, though usually in milder form.

"There've been eight significant El Niños since World War II," explained Dr. Eugene M. Rasmusson, a diagnostics expert for the National Oceanic and Atmospheric Administration and a leading authority on the phenomenon. "They occur on average every four or five years, but irregularly—they can be two years apart, or as many as ten. The last was in 1976-77, when the eastern United States experienced its most bitter winter and California its worst drought."*

"This Niño was a maverick: It behaved differently from recent predecessors. That's one reason we didn't recognize it. Another reason was a trick of nature. When it was first stirring in spring of '82, the Mexican volcano El Chichón belched an immense volume of dust into the atmosphere. The alien material misled our satellite sensors, thereby producing unreliable Pacific Ocean temperature readings.

"When El Niño arrived, it was awesome. The Tahiti-Darwin pressure anomaly registered the strongest ever. The trade winds faltered, and the equatorial current reversed direction across the entire Pacific. Sea-surface temperatures rose as much as 14°F above normal, until a great tongue of warm water stretched 8,000 miles along the Equator. It was a historic Niño."

It spread a swath of devastation that left more than 1,100 dead, damage estimated at 8.7 billion dollars, and human suffering beyond calculation. Its vivid wake led me around the world.

A crucial battleground of man against Child lay close at hand, in the Deep South of

*The author wrote of this event in a December 1977 NATIONAL GEOGRAPHIC article, "The Year the Weather Went Wild."

the United States. Here it had spawned low-pressure systems that brought torrential rains, and a bloated Mississippi River clawed at its levees in near-record flood.

A critical Louisiana levee began to give way, but alert sandbag brigades filled the breach. Concern focused upstream at the U. S. Army Corps of Engineers' Old River structures, two ponderous control works diverting 470,000 cubic feet of water a second into the Atchafalaya River. If one of these gave way, as almost happened during a similar flood in 1973, the Mississippi would escape and begin to scour a new path to the Gulf. New Orleans, the nation's busiest port, would be without commerce and drinking water.

"We're holding," said Fred Chatry, the corps' district chief engineer, "but we also worry about runaway barges colliding with the structures. An auxiliary spillway will ease the strain by 1985. We hope it beats the next Niño."

TO THE WEST, Californians were shrugging off a winter more tumultuous than any in memory—violence attributed in part to El Niño.

The Child set the stage for trouble in the summer and fall of '82, when a great slosh of warm water from the western Pacific raised the sea level eight inches and swept north to southern Canada.

With the warm water came creatures from the subtropics: barracudas prowling off Portland, small red crabs strewing San Diego beaches. Cold-water salmon abandoned the fishery off northern California and the Northwest, and idled fishermen watched helplessly as creditors repossessed their boats. Conservationists at California's Point Reyes Bird Observatory recorded unprecedented mortality among seabirds that breed on the offshore Farallon Islands.

High tides, probing the coast for weak points, joined forces with a procession of violent storms, and giant waves smashed seafront houses, plucked away piers, erased the very beaches themselves. Record rains mangled crops and lubricated hillsides until slides bore collapsing houses downslope like slow-motion conveyors. When the violence abated, Californians counted an estimated 10,000 homes *(Continued on page 160)*

EL NIÑO'S GLOBAL IMPACT 1982-83

THE WORST of it was the loss of human lives to floods, fires, and starvation, which no accounting can reckon. Yet the mounting statistics of crops destroyed, of livestock killed, of birds and marine life vanished, lengthened the ledger of misery. There was some solace; massive El Niños are not prone to develop in close succession, and the century's most destructive seemed to be dissipating.

		DAMAGE *in millions of dollars*
AUSTRALIA	*Drought is the worst of the century, killing stock and spawning dust storms. Bushfires whipped by high winds kill 75 and devastate property.*	$2,500
INDONESIA, PHILIPPINES	*Crops fail due to drought; in Indonesia 240 starve.*	750
INDIA, SRI LANKA	*Drought destroys crops; Indian water shortages raise fears of jaundice outbreak or other epidemics.*	150
PACIFIC STORMS	*A rare hurricane slams into Hawaii. Six tropical cyclones strike French Polynesia, leaving 25,000 homeless in Tahiti alone.*	280
MARINE AND BIRD LIFE	*High ocean temperatures ruin South America's anchoveta industry and force eviction of island nesting birds, 17 million from Christmas Island. Coral reefs die across the Pacific.*	
WEST COAST STORMS	*Flooding, snowmelt, and mud slides destroy crops, homes, and roadways in coastal states and along the Colorado River.*	1,100
CENTRAL AMERICA, MEXICO	*Dry conditions reduce crop production. Water supplies and grazing lands are severely affected.*	600
GULF COAST	*Driving rains hit the Gulf states and Cuba for five months; 65 die, and crop and property damage reduce agricultural output.*	1,270
ECUADOR, NORTHERN PERU	*Floods and landslides leave 600 dead.*	1,000
SOUTHERN AFRICA	*Adding to the miseries of two dry years, drought reduces crop production by 40 to 70 percent, spreading disease and malnutrition.*	1,000
		TOTAL $8.65 BILLION

ECONOMIC DATA BASED ON
INFORMATION FROM AIDAB'S ASSESSMENT
AND INFORMATION SERVICES CENTER

NAVARRETE II PROJECTION
DRAWN BY ROBERT CROWAR
COMPILED BY MARGUERITE B. HUNTER
NATIONAL GEOGRAPHIC CARTOGRAPHIC DIVISION

BILL NATION, SYGMA (ABOVE); DAVID CORNWELL, BLACK STAR (BELOW)

UNITED STATES

Storms and floods

Sand-castling in earnest, residents of Sunset Beach, California (**top**)*, prepare their battlements against a January storm that thrashed the coast. Mammoth waves washed as far as four blocks inland, flooding roads and undermining foundations. February: Bright skies give no solace as waves thunder at seawalls in Rincon Beach* (**above**)*. March: A storm-generated tornado smashes shops and a mission* (**right**) *near the Watts section of Los Angeles. April: To the east, heavy rains loosen a mountainside that slides into a valley and dams the confluence of two creeks, creating a lake* (**left above**)*, erasing Thistle, Utah, and drowning a highway and rail line.*

Though El Niño drew blame for disasters everywhere, it was not proved guilty of 1983's Midwest drought and may actually have suppressed hurricane formation in the Caribbean.

LOVERETT BRADLEY, AFTER IMAGE (ABOVE); RICK BROWNE, PICTURE GROUP (BELOW)

Surf's up—and up and up—*and clawing at a community of mobile homes in Pacifica, near San Francisco, California. The owner saw his 800-foot seawall disappear—followed by 25 percent of his property. No lives or homes*

National Geographic, February 1984

JAMES A. SUGAR, BLACK STAR

were lost here, but residents, some of 20 years' standing, were forced to evacuate. While this Niño hurled storms that ripped away beaches and dumped record rains, another in 1976-77 left California dry.

(Continued from page 154) demolished or damaged and farm losses totaling half a billion dollars.

The storms also brought a precious gift. Half the state's water flows from wells, and their levels rose with the rains.

Still heavy with moisture, the storms boiled eastward to whiten the Sierra, then pressed on to dump a record snowpack on the Rockies. Later the melt would turn streets into rivers in Salt Lake City and flood vast reaches of the lower Colorado River.

Why did this Niño bring record moisture, whereas the 1976-77 visitation inflicted unprecedented drought? "California and much of the West lie in a twilight zone," said Dr. J. Michael Wallace of the University of Washington in Seattle. "It's possible that each Niño affects the region differently."

FROM SOUTH AMERICA, cradle of El Niño, came reports of appalling flood damage. I headed south, past drought-stricken Mexico, and alighted on the soggy soil of Guayaquil, Ecuador.

Three months before Christmas a colossal slab of warm water 450 feet thick had arrived off Ecuador and Peru, smothering the cool ocean surface. Coastal fishing ceased, and the simmering sea brought rains that threatened to wash Ecuador into the sea.

"Areas that normally measure precipitation in inches have had ten feet," said Jimmy Aycart, polite but preoccupied director of emergency relief for the Guayaquil area.

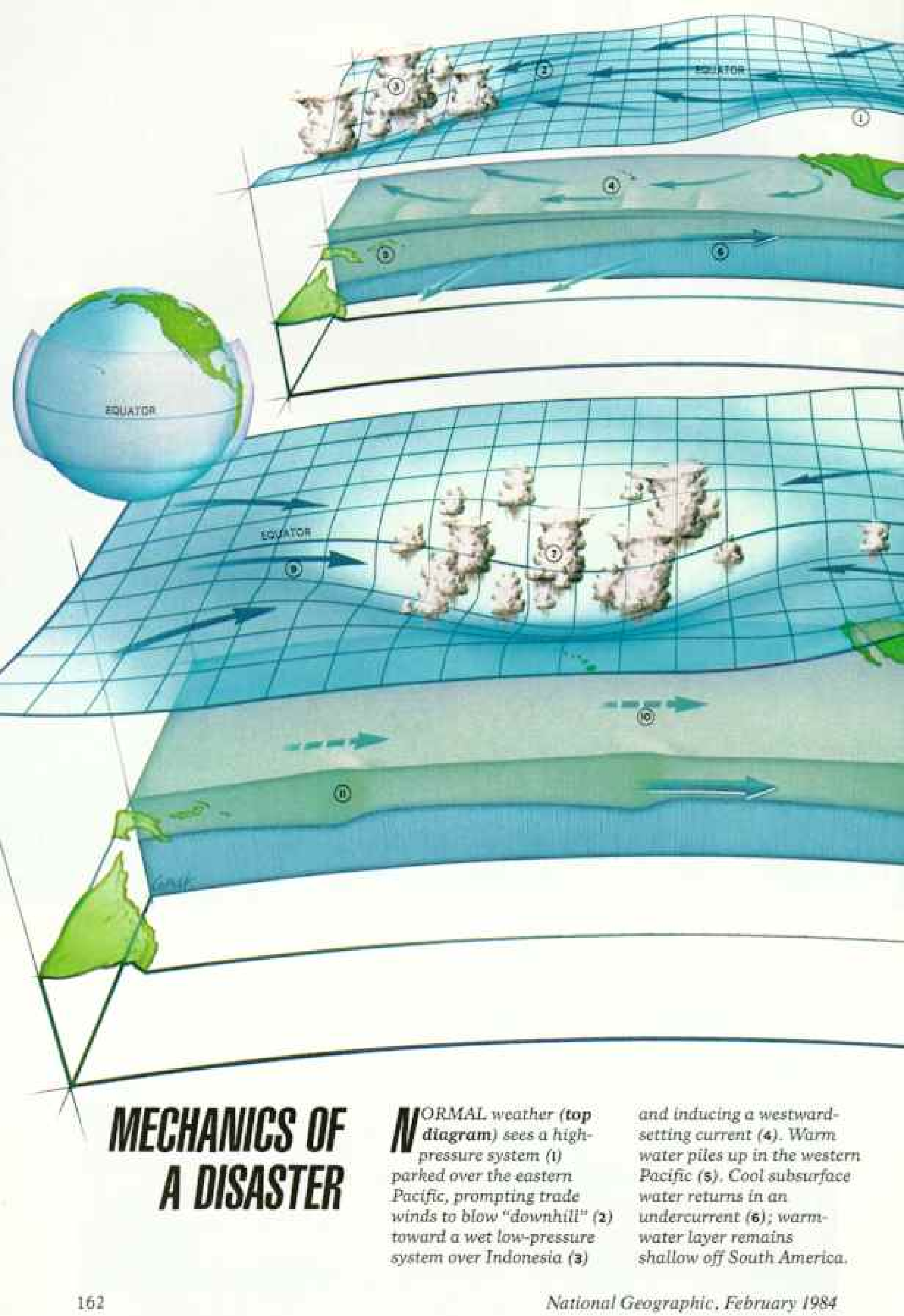
Before a wall map an engineer recited the nation's woes: "The prime banana area and much of our rice bowl—knocked out by floods. Houses sliding down slopes in Guayaquil and Durán—thousands knocked out. Eight hundred coastal houses knocked out, including my own. Scores of roads and 14 bridges knocked out, some twice."

With Ecuadorians Jaime Pinchevsky and Roberto Lopez, I drove through a land awash. Cacao and banana plantations thrust up rows of drowned, leafless sticks. Cattle waded brisket-deep in flooded pastures, and herds clogged the roads on drives to high land. Many animals tottered on hooves flaking away from foot rot, caused by long immersion. At the poultry farm of Francisco Lopez, Roberto's father, El Niño's humidity (Continued on page 167)

Riffling snowmelt, *offspring of last winter's heavy burden on the slopes of the Wasatch Range, courses down State Street in Salt Lake City (**above**), as if an extravagant civic diversion were issuing from Utah's Capitol.*

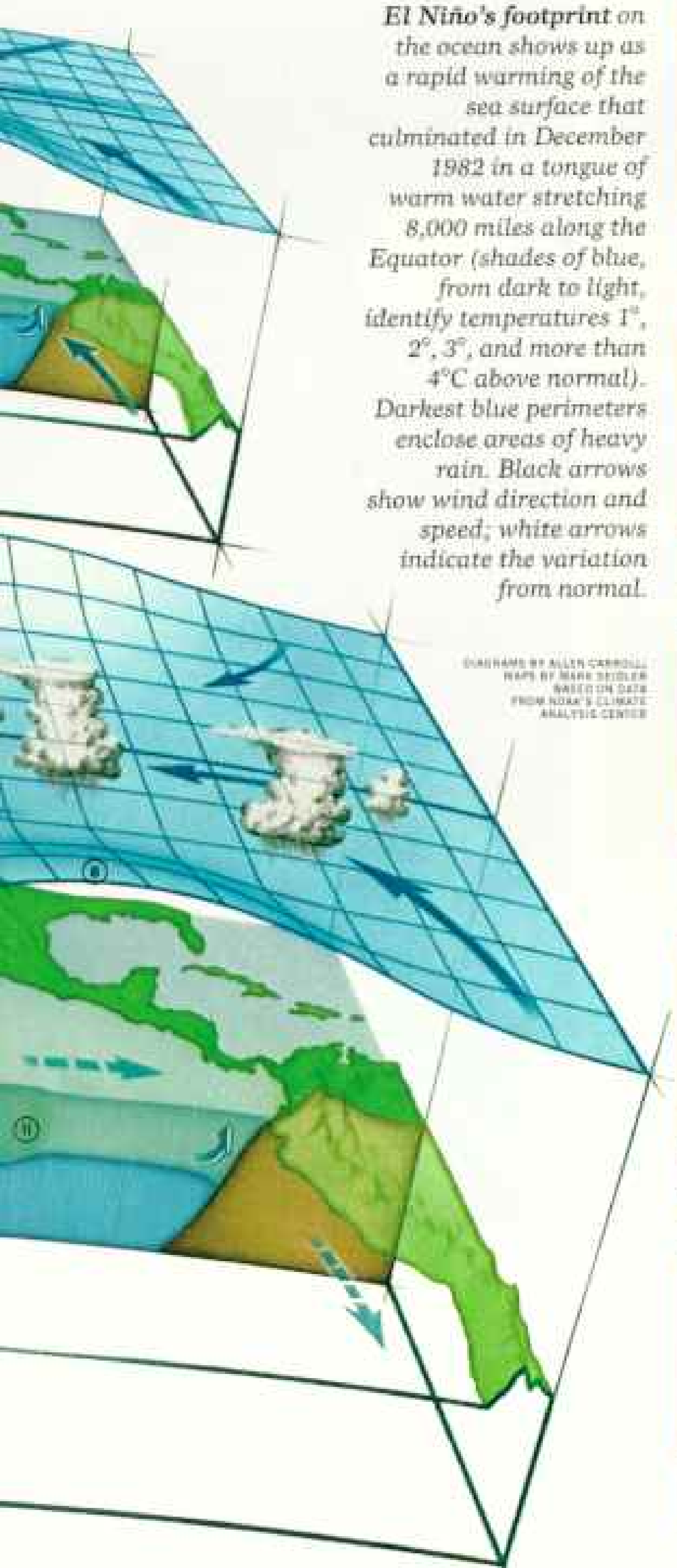
*Hauled for riprap to protect the banks of the Green River in Utah, junked cars (**right**) became dune buggies in fact. Sometimes, when danger has passed and there is nothing to be done, a sensible reaction is to shrug it all off with a little clowning.*

MARK KAUFFMAN (ABOVE); PETER TOOKER



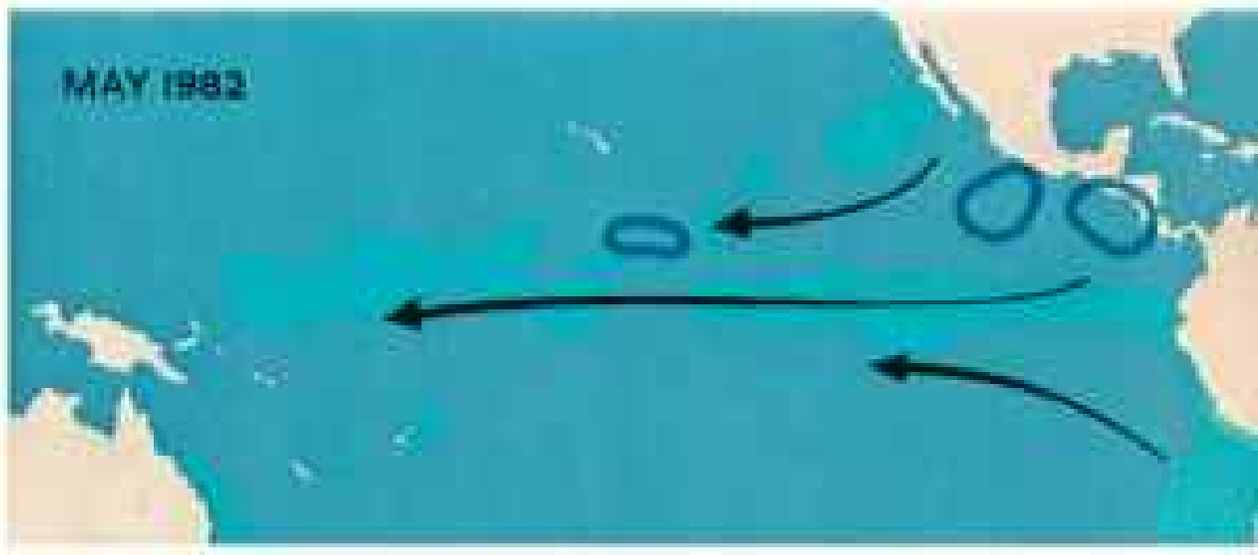
MECHANICS OF A DISASTER

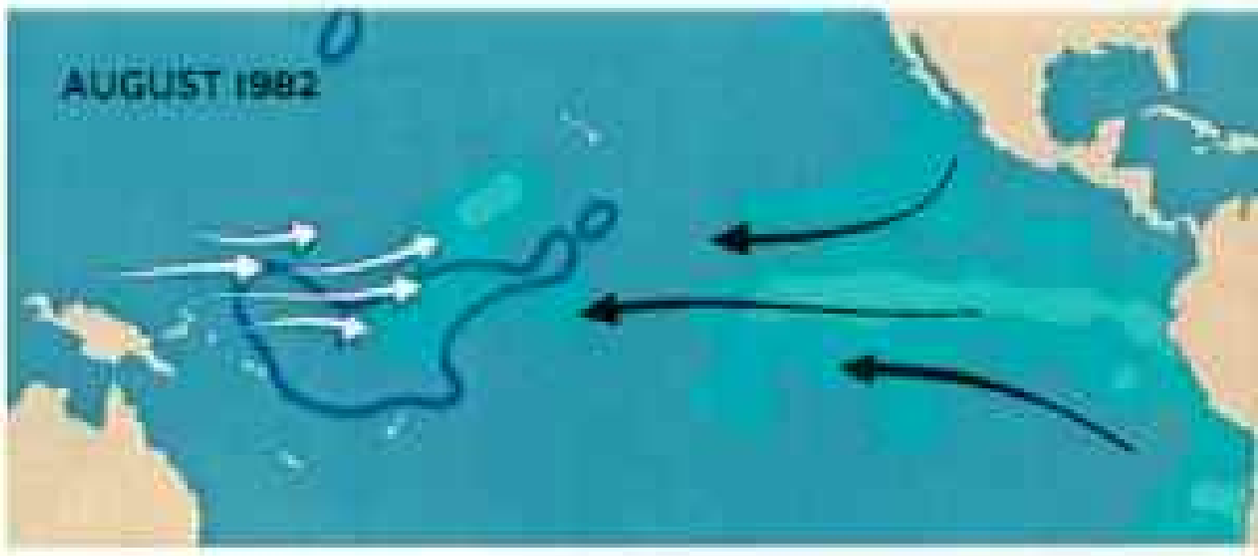
*NORMAL weather (**top diagram**) sees a high-pressure system (1) parked over the eastern Pacific, prompting trade winds to blow "downhill" (2) toward a wet low-pressure system over Indonesia (3) and inducing a westward-setting current (4). Warm water piles up in the western Pacific (5). Cool subsurface water returns in an undercurrent (6); warm-water layer remains shallow off South America.*

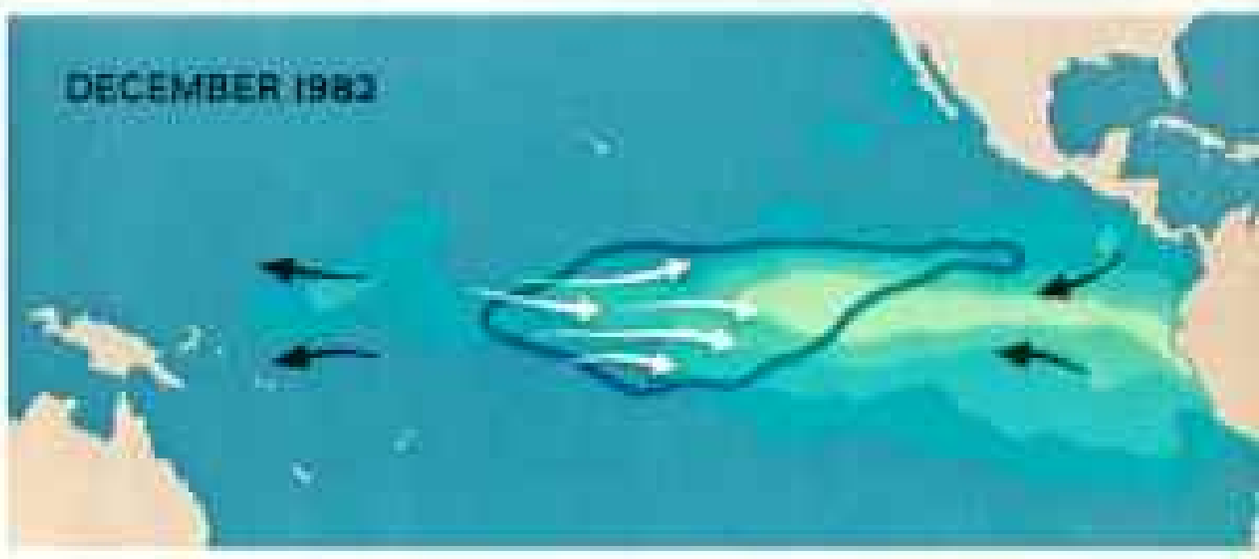


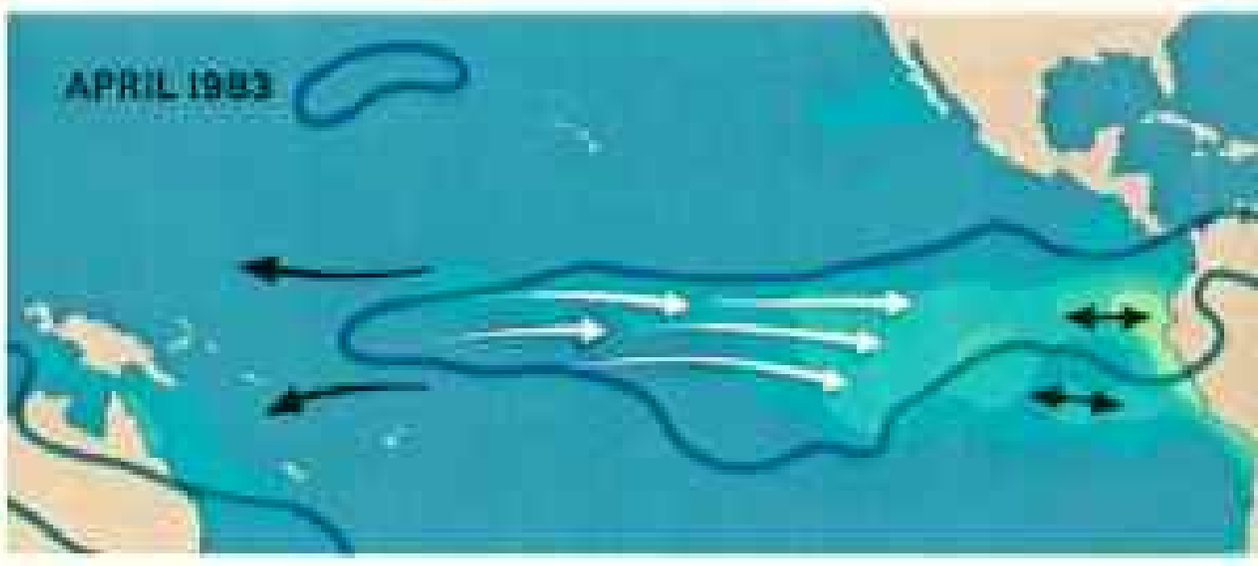
El Niño's footprint *on the ocean shows up as a rapid warming of the sea surface that culminated in December 1982 in a tongue of warm water stretching 8,000 miles along the Equator (shades of blue, from dark to light, identify temperatures 1°, 2°, 3°, and more than 4°C above normal). Darkest blue perimeters enclose areas of heavy rain. Black arrows show wind direction and speed; white arrows indicate the variation from normal.*

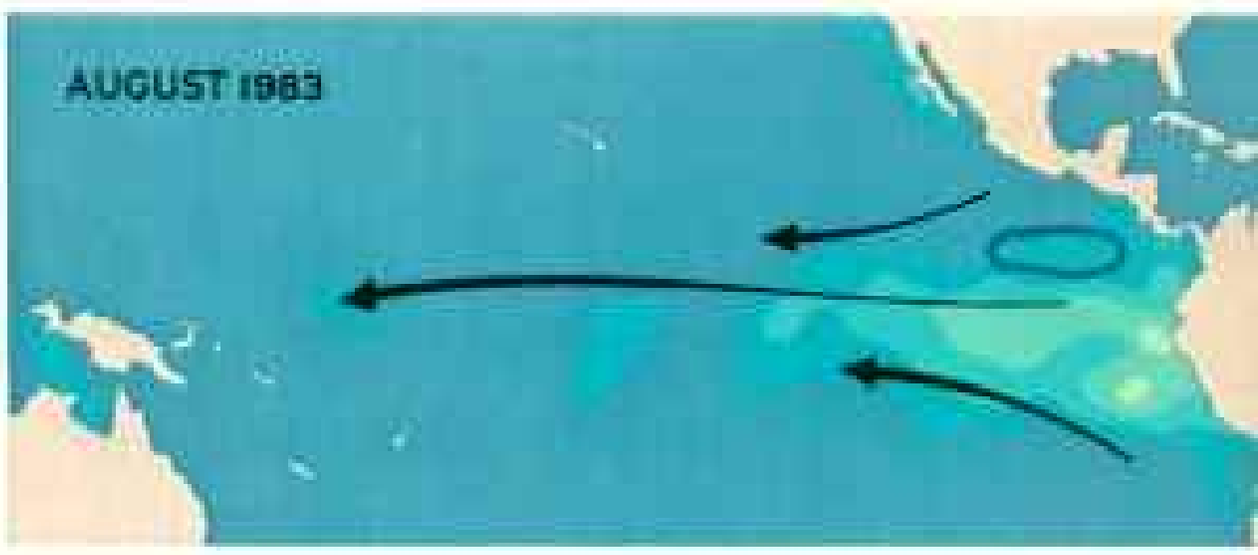
DIAGRAMS BY ALLEN CARROLL
MAPS BY MARK SEIDLER
BASED ON DATA FROM NOAA'S CLIMATE ANALYSIS CENTER





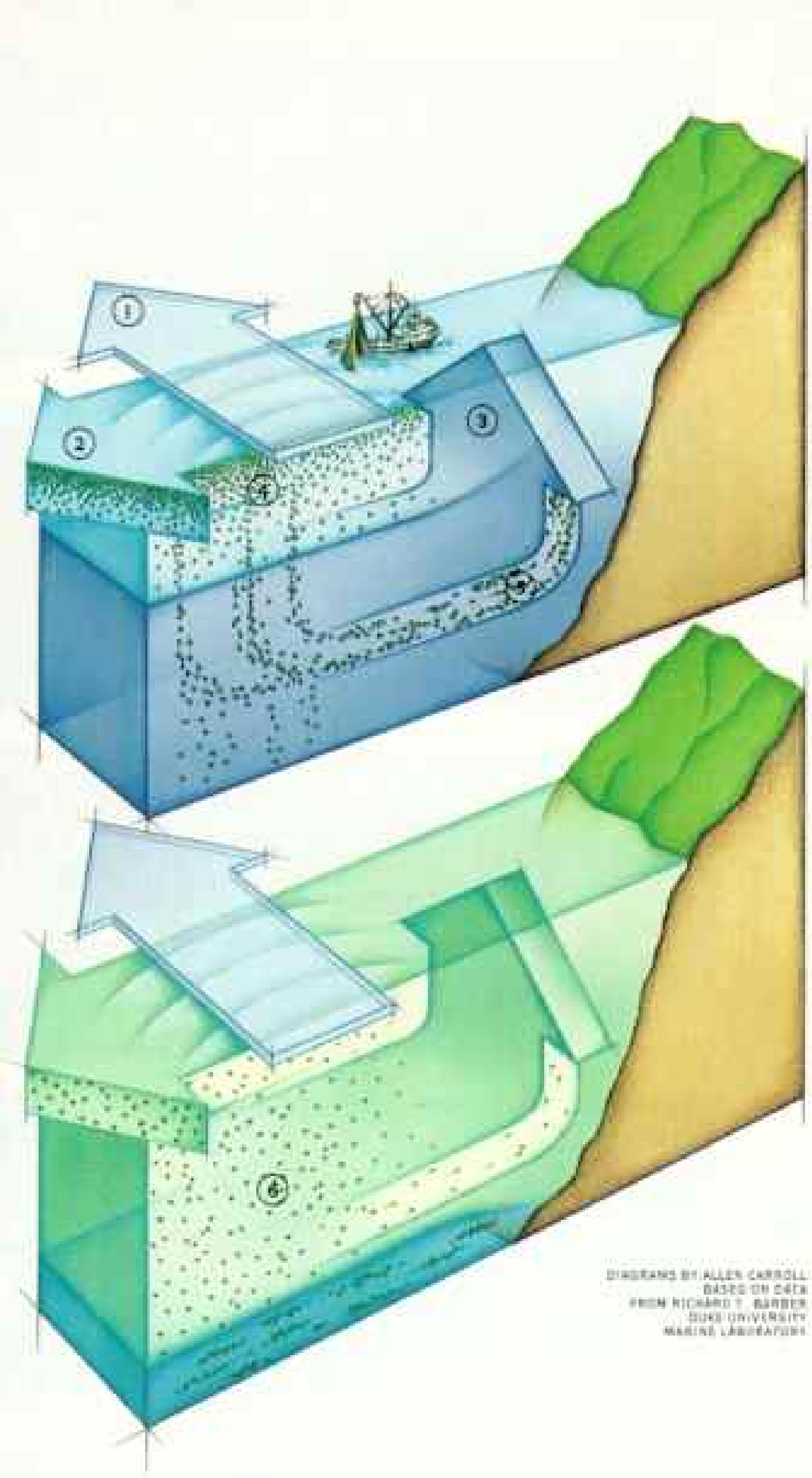




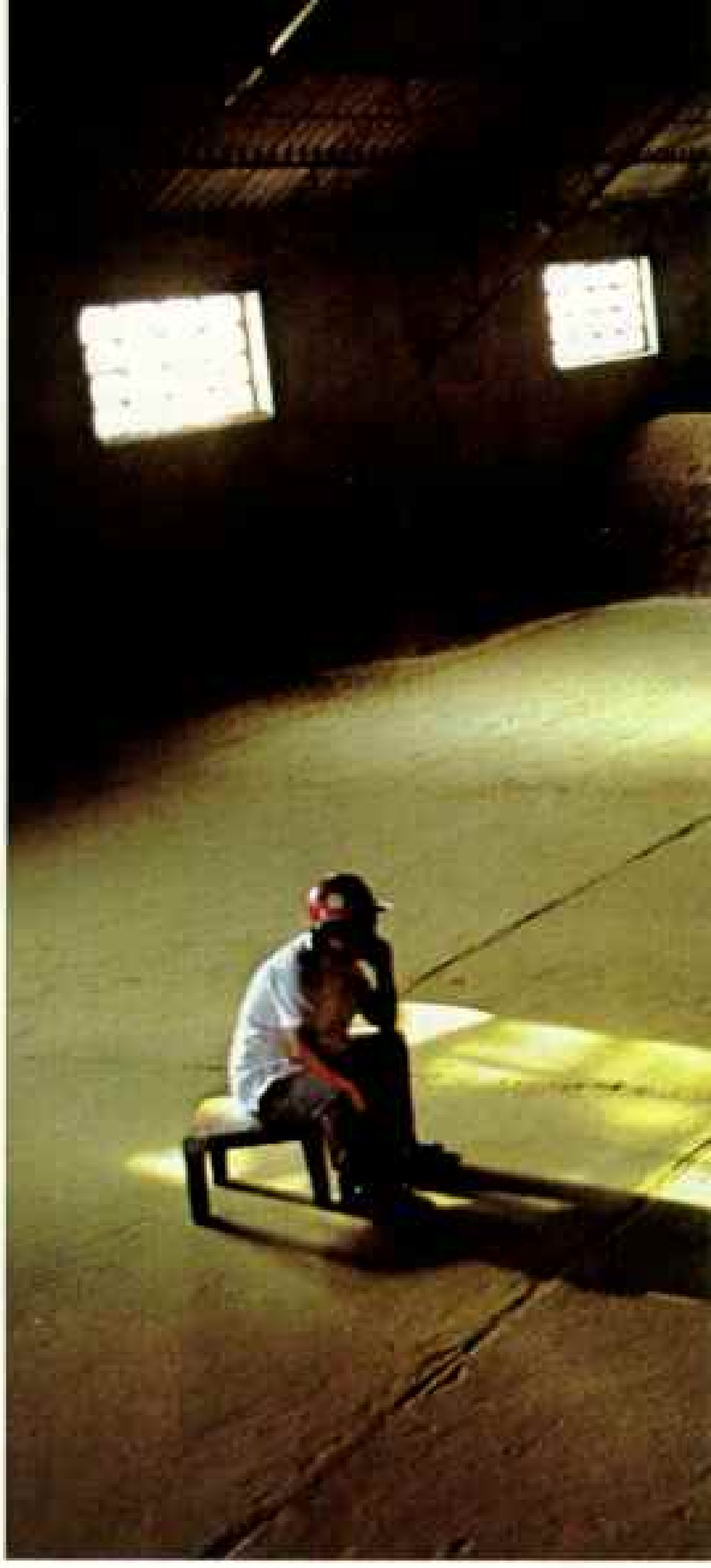


*Every few years the pattern breaks down—disastrously in 1982-83 (**diagram, above**). The low moves eastward (7), and the high weakens (8). Trade winds falter and are replaced by east-blowing winds (9), causing the surface current to reverse (10) and warm water to surge toward South America in a phenomenon known as a Kelvin wave (11).*

*Since this generally stable weather machine spans a quarter of the globe (**inset**), its collapse has far-reaching effects. The cause remains unknown, although El Niño and the monsoon system may be so intricately linked that changes in one affect behavior of the other.*



DIAGRAMS BY ALLEN CARROLL
BASED ON DATA
FROM RICHARD T. BARBER
DUKE UNIVERSITY
MARINE LABORATORY



ECUADOR AND PERU

When food chains collapse, fisheries suffer and die

*Good fishing off the South American coast means the marine food chain is intact (**top diagram**). North-blowing winds (1) and the earth's rotation push warm surface waters westward (2), and colder, deeper waters high in nutrients replace them (3). These support plankton (4), in turn eaten by fish. Dead plankton are recycled (5), and the system sustains itself.*

*When El Niño strikes, winds, westerly water flow, and coastal upwelling remain (**bottom diagram**). However, the upwelling is contained within the surface layer of warm water. Nutrients are not cycled upward. Plankton thins (6), and fish disappear.*

*The result: Warehouse stocks of fish meal are reduced (**above**), and seiners are beached (**right**). El Niño is not wholly to blame; overfishing had already depleted the once teeming anchovetas.*

BOTH BY THOMAS HEBBIA

(Continued from page 160) had spread a deadly fungus that wiped out the flock of 30,000 chickens.

I flew to Salinas, a seaside resort where Ecuadorians frolic during Carnival and Easter. A bursting reservoir had demolished a vital bridge that the crippled country could not repair, and Salinas was cut off from the rest of the nation (pages 146-7). Meanwhile deluges flooded the streets, and a windstorm ripped roofs from hundreds of houses. Now Ecuador's pleasure dome was largely abandoned, a gilded ghost town.

Thousands of displaced Ecuadorians gravitated to a great slum known as the Guasmo that attaches to Guayaquil's flank. Even where misery was a way of life, El Niño did not relent. Many of the Guasmo's shanties rose above pools of water fertilized by flooded toilet pits and turned green by a skim of slime. Patches of rash laced the residents' skin.

"Mosquitoes and other insects breeding on the slime pools carry infection," said Dr. Luis Aldoz Pilaloa, who manned a tiny Guasmo clinic. "We worry most about the virulent diseases—typhus, salmonella infection, typhoid fever. Typhoid is reaching epidemic proportions."

As I waited to depart in Guayaquil's airport, a thunderous downpour flooded streets and gathered in sheets on sodden fields. In that month of May, Guayaquil would receive 20 times its normal rainfall. When the flooding finally stopped last July and Ecuador added up the cost, the impoverished nation had lost crops and property valued at 400 million dollars.

THE THICK SLAB of warm ocean water that nudged Ecuador also wedged against neighboring Peru, and rains wreaked havoc in that nation's north. The day I arrived the people of Piura celebrated: Two days straight had passed without a downpour.

The climate had in fact been transformed. "The warm water is overriding the cold Peru Current, which acts as our national air conditioner," said Comdr. Walter Garcia, chief of the Navy's Oceanographic Department.

I learned that Child and man together were tinkering with the current's food chain, the most productive on earth.

"The Peru Current is the strongest of five areas of oceanic upwelling," explained Dr. Julio Valdivia, chief biologist for the Marine Institute. "Winds blowing up from the south drive surface water offshore, to be replaced by deeper colder waters rich in nutrients. These support trillions of planktonic diatoms that nurture the higher life-forms, along with the millions of guano birds that feed on them."

For a century Peru supported itself not by its fabled gold and silver but by droppings of the guano birds, which fertilized its crops and earned hard currency abroad. In the 1950s Peruvians began short-circuiting this food chain: They built a vast fleet aimed not at guano of the fish birds but at the fish themselves. By 1970, 1,500 modern fishing vessels hauled in 14 million tons of anchovetas a year—a fifth of the world's fish catch. Meanwhile the guano birds, unable to compete with the fisherman and jolted by Niños, sharply declined in numbers.

With the fleet at record strength in 1972, El Niño came again, contributing to the greatest orgy of fishing the world has known. Warm water sliding over the Peru Current herded the anchovetas into a narrow band along the coast. An armada of fishing boats closed in for the kill, and kill they did—as much as 180,000 tons of fish in a day. Neither fish nor guano birds ever recovered.

"Today the anchoveta can be listed as endangered," said Dr. Felipe Benavides, a distinguished Peruvian conservationist. "As for the birds, we must wait and see."

With the anchovetas' eclipse, sardines multiplied and took their place. But they never rivaled the teeming anchovetas. Now, with this most powerful Niño, Peruvians feared collapse of the food chain.

Hands too late *to help can only recover bodies near Chunchi, Ecuador, where more than a hundred died as rain-loosened slides of rock and mud swept across a highway, engulfing four buses and other vehicles. In a province of neighboring Peru, rains turned a desert into a swamp that attracted vermin and spread disease.*

PACIFIC BASIN

Birds vanish, coral reefs destroyed

*Where an ordinary summer in the Galapagos Islands might find some 500 blue-footed boobies resident in the crater of Daphne Major (**above**), an identical view in August 1983 (**above right**) shows none. As the waters cooled and fish returned, some boobies reappeared; by late August about 150 were back.*

*The bleached skeletons of coral off Panama (**right**) tell another story. With water temperatures far above normal, algae that lived with the coral polyps disappeared. A symbiotic bond was broken: Unpigmented coral was left naked to ultraviolet radiation, and the animals' skeletal growth declined to killing levels.*

As reports from Japan, Indonesia, the central and eastern Pacific, and even the Caribbean reached Peter Glynn of the Smithsonian's Tropical Research Institute in Panama, it was clear that El Niño warming was having a "much greater and more widespread impact" than did the crown-of-thorns starfish, an earlier coral nemesis.

P. R. GRANT (LEFT); R. GRANT (ABOVE); PETER M. GLYNN

"We must prevent overfishing of the sardine," said Dr. Valdivia. "When the Niño stops and cold upwelling resumes, plankton will reappear in huge numbers. Without fish to eat them, their dead bodies would rain down on the seafloor and decompose, consuming the water's oxygen. The ocean bottom could temporarily become a desert for fish but a paradise for anaerobic worms."

I drove to coastal Chimbote, fishing capital of the world in the anchoveta's heyday. Since then the fleet and the city had withered, and El Niño had brought ruin. Boats rusted in Chimbote's harbor; the enormous fish-meal plant stood idle. Sardines had all but vanished. "We catch a few, when we catch anything," said fisherman Adolfo Arratia, slouched against a boat shed with hands in his pockets. "Nothing for export; just enough to feed the townfolk."

But El Niño brought bonanza for a few. Warm seawater, coupled with nutrient-rich runoff from flooded rivers, had fueled a population explosion of shrimp. Fishermen who turned shrimpers thrived, and traders made fortunes. So it was for Carlos Pastorino, a youthful shrimp broker in storm-wracked Tumbes. "Before El Niño a local plant processed five tons of shrimp a week," he confided. "Now it's turning out 75."

SOUTH AMERICA'S TROUBLES stemmed largely from the oceanic influences of El Niño—the warm water and the rains it spawned. I headed westward to Tahiti, near where the atmospheric center—the great red spot—sat over the Equator.

"That's where the atmospheric engine finally parked that drove the entire phenomenon," said NOAA's Dr. Rasmusson. "Its enormous energy disturbed winter weather patterns over much of North America."

Tahiti and neighboring islands of French Polynesia, moored in the path of soft easterly trades, felt their last hurricane 75 years ago. Now El Niño hammered the islands with six tempests in five months.

Some 1,500 houses were flattened on Tahiti alone during those storms; 6,000 more lost their roofs. Miraculously only one person died. Limited aid came quickly from France: canvas tarpaulins to cover roofless houses; a planeload of chain saws to remove the thousands of trees that fell across highways and power lines.

Tahiti had a war-zone look when I visited in June. Foundations stood without houses; roofs strewed the ground and dangled from frazzled trees. The storms had curtailed the influx of cash-bearing tourists, and Tahitians had far too little money for repairs.

Yet Tahiti, protected by its mountains, suffered less than the Tuamotus, a scattering of low-lying atolls with no natural defenses against the giant waves.

More than 500 Tuamotuans had died in a single hurricane in 1903. Observers feared higher numbers now. But the islanders tuned in their transistor radios for hurricane warnings and took refuge in the churches, sturdiest of their buildings. When waves clawed at church eaves they tied their boats to the strongest coconut palms and rode out the storms as if under way. Entire villages were erased, but this time only 14 Tuamotuans lost their lives.

Polynesia could pay a special price for El Niño. "Many outer islanders sought refuge on Tahiti despite government efforts to discourage their migration," said Dr. Bengt Danielsson, a Tahiti resident and leading Pacific anthropologist. "Young people growing up in this urban setting will lose their traditional culture—a culture already under stress. This could be one of the gravest long-term effects of El Niño."

The trail of the Child led me north to the Equator, to a facet of El Niño both bizarre and mysterious: What had happened to the 17 million seabirds that once nested on Christmas Island?

For years Dr. Ralph W. Schreiber and his wife, Elizabeth Anne, had visited the huge atoll to record data on its immense population of nesting birds. Returning in November 1982 they found few birds, and those were abandoning their nestlings to starve.

"El Niño's warm equatorial waters probably drove away the fish on which the birds feed," said Dr. Schreiber, a National Geographic research grantee. "Faced with abandoning their young or dying themselves, the adults left. Whether they starved or went elsewhere, whether they'll return—these are questions for later visits."

I joined the Schreibers on a later visit to the atoll's scorching flats. Nest after nest

held signs of ecological crisis—the feathers and slender bones of dead young.

Signs of rebirth also abounded. Sooty terns by the thousands guarded their single eggs. Scatterings of noddies, frigates, tropic birds, and boobies nested in their chosen haunts. "These are meager concentrations by the old standard," said Dr. Schreiber. "But I'm encouraged and relieved."

As I zigzagged across the superheated Pacific, I passed over a vast, hidden realm of coral reef that bears El Niño's scars. "The polyps that build and maintain the reef can't survive in water much above 86°F," said Dr. Peter W. Glynn of the Smithsonian Institution. "El Niño temperatures stayed at 88°F for months."

NOWHERE did El Niño grind harder than in Australia, where drought, heat, dust storms, and nightmarish bushfires finally were quenched by widespread flooding. Australians gave up two and a half billion dollars to El Niño.

As Australia withered, desiccated soil lifted into the air and rode the torrid winds, seeping into houses, blinding motorists, clogging machinery. The climax came with a monster storm that rolled over Melbourne on February 8, 1983, a day many thought meant the end of the world.

It came silently, stealthily: a sudden darkening, a stilling of the breeze, then overhead a terrifying cloud of dust thousands of feet high extending 300 miles and churning half a million tons of soil.

For 40 minutes Melbourne scarcely breathed, and then the apparition passed, leaving 11,000 tons of topsoil on the city, bearing some as far as New Zealand.

The siege of dust storms bred gallows humor: "The realtors are *really* hurting. All this land changing hands, and not a single commission."

Fast upon Melbourne's day of darkness came the night of light: February 16, Ash Wednesday, a night when raging bushfires bracketed the city on three sides.

With driver Ken Matthews, I reconnoitered the charred remains of Macedon, a once prosperous outer suburb.

As drought set in, officials had warned Macedonians of the peril of fire, urged them to clear the tinderlike brush around their homes. But they loved the natural vegetation, with its many families of furry koalas.

On the sweltering night of Ash Wednesday, a bushfire flickered, but safely to the west, its path carrying it ever farther away. Gerry and Annette Radford sat in their home unworried.

They heard a distant, familiar growl—the local train. Again the growl, and again, louder. Too many trains! They raced to a window and saw flames swirling toward them, flames that had changed direction minutes before and had begun a wild rush toward Macedon.

Hail rattled on the Radfords' metal roof, a hail of flaming sticks. A log cabin beside their home exploded in flame, then a wall of

THOMAS NEBBIA

"There's no easy answer" *yet found to account for the onset of El Niño, according to meteorologist Eugene M. Rasmusson, chief of diagnostics for NOAA's Climate Analysis Center. He feels that trigger mechanisms probably come into play during the spring or autumn when world weather systems—especially the low-pressure cell usually resident over the Indonesian region—are in transition.*

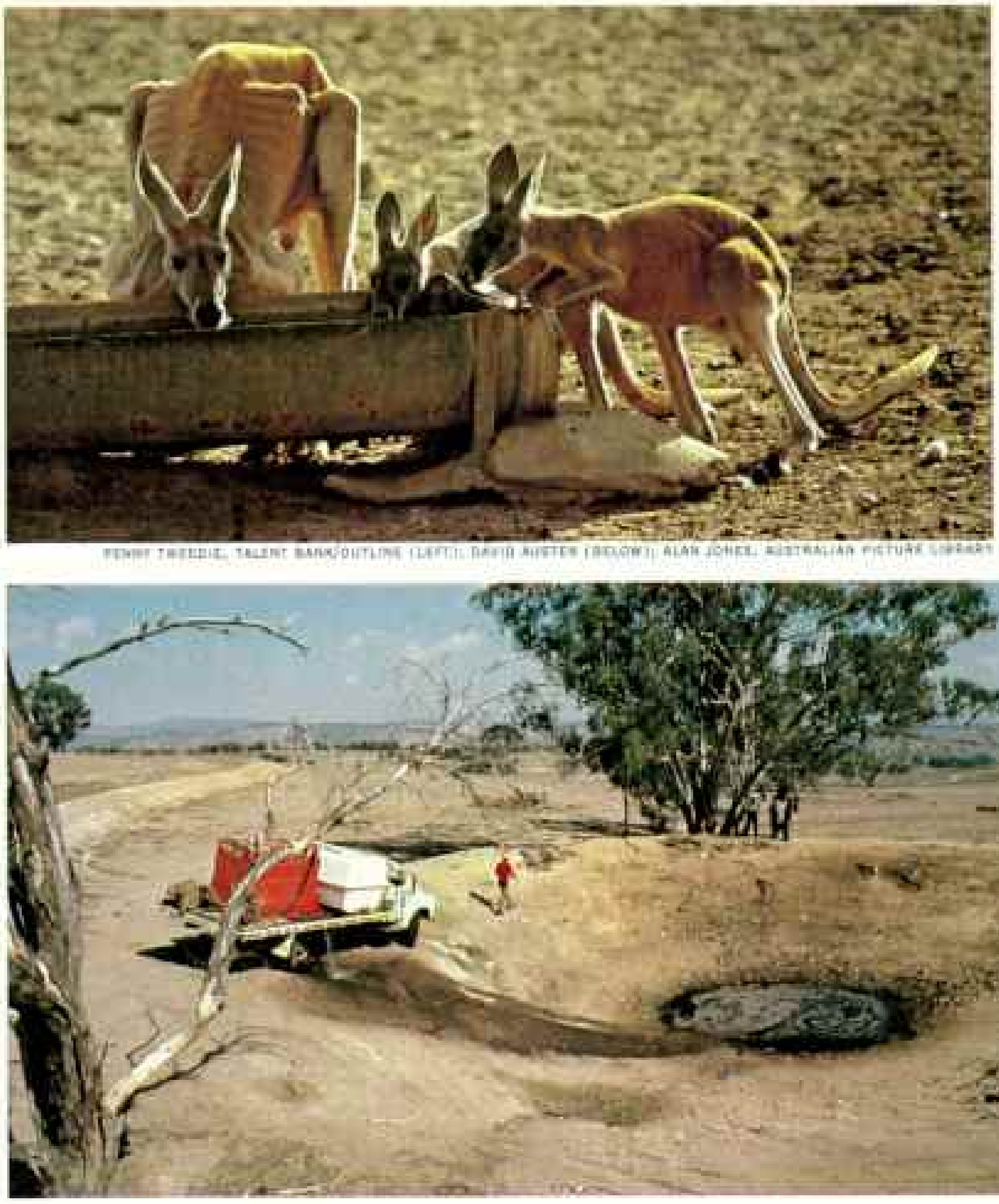
AUSTRALIA

Drought and fire storms

*Bone weary after months on the move, Snowy Miners and his son, Ashley (**left**), face another day of "the dry" in Australia's New South Wales. The Miners family was forced by drought to lead their 3,000 head of stock on a constant search for feed. They camped by night and pushed on at morning, looking for the next patch of scrub even as the weakest animals perished in the search.*

*Emaciation branded on their ribs, kangaroos (**below**) come in from the bush to water at a stock trough. Depleted in the early 1970s, kangaroos have multiplied greatly since, returning in strength just when herds could least bear competition. Although the animals are culled, kangaroo shooters receive less than ten dollars a carcass and skin, and hunting quotas have not been met. Some ranchers believe that during the drought they were feeding three to four kangaroos for every one of their own sheep.*

*Water finally became so scarce that at the Wardell Station, or ranch, it had to be trucked in (**bottom**) to replenish stock ponds.*



PENNY TWEEDIE, TALENT BANK/OUTLINE (LEFT); DAVID ALSTER (BELOW); ALAN JONES, AUSTRALIAN PICTURE LIBRARY

the house itself. "We knew then everything was lost," recalled Annette Radford.

"We took off in our Ford, but fallen trees blocked the drive. We leapt out and clambered over them, Gerry carrying our important papers, flames lighting our way.

"The heat was incredible. Smoke made the air too thick to breathe. We entered an abandoned house, but it wasn't abandoned; our neighbor Buck Brooksbank had stayed behind to save his home.

"I doused my head under a tap, and Buck gave us our orders. I was to watch from a window and beat back fire from that side. Buck and Gerry covered the rest.

"A flaming ember lodged in the eaves; Buck scrambled up and put it out. The house next door caught, only ten feet away. We could hold out only a little longer. Fire reached the nearest wall—and the fire brigade arrived and sprayed Buck's house.

"By dawn we could leave Buck, and we went back to our home. It had disappeared. The Brooksbanks loaned us this caravan to live in," said Mrs. Radford, gesturing at the small house trailer in which we sat.

"I groped around the ashes for my jewelry and found these." She showed me melted remains of a bracelet, gold wristwatch, and section of necklace. "Somehow our Ford survived." It had, but plastic moldings around the headlights had heated until the lights sagged like downcast eyes.

"I bore up for a few days," said Mrs. Radford. "Then I realized I didn't have my nail scissors, and I burst into tears.

"We'll rebuild, up there in that cleared spot, where it's safe."

Caravans similar to the Radfords' stood beside charred foundations and frames of new homes abuilding. I drove through a woods that had fed the fire. Black forest floor and stark black trunks beneath a cloud white sky gave me a sense of being part of a silhouette.

In all, 75 persons died in fires that raged through Victoria and South Australia, and some 8,000 were left homeless.

FOR MUCH of eastern Australia, the great dry broke with a wet—torrential rains that spawned enormous floods and dealt fresh blows to reeling farmers. I caught up with the wet at Saint George, a small sheep-and-wheat town sitting beside a temporary inland sea.

Where soggy islands rose inches above water, sheep already weakened by drought clustered forlornly. For 58 days a Royal Australian Air Force Caribou dropped hay for the marooned animals.

"Get in the safety harness, then start moving bales," suggested an officer as I scrambled aboard. Up we rose, the rear door agape so we could shove out bales.

A green light flashed. Hay away! We pushed mightily, and bales bounced amid bleating sheep. Another drop, four more drops, and our hundred bales were gone. Then back toward Saint George to reload.

"We don't know yet how many sheep drowned," said John Knight of the Department of Primary Industries. "Some stations report losses as high as 2,000 head. Foot rot will get thousands more; they'll walk right out of their hooves. Dropping feed by plane is expensive, but a lot of farmers couldn't have survived both flood and drought."

Parts of Indonesia and the Philippines felt the same raised pressures that tormented Australia, and they shared its drought. The summer monsoon was briefly blocked, bringing thirst to southern India.

As I flew across the Indian Ocean, clouds resembling sheep grazed the great blue paddock of the sea, fattening on its moisture. Normally they would have borne their rains to southern Africa. But changed pressure patterns linked to El Niño diverted them, and the region sweltered in record drought.

For industrialized South Africa, drought presented an intriguing problem. Electric power depended on water of the Vaal River for cooling condensers of the steam generators. Yet the Vaal was scarcely high enough for its task, and dropping every day.

South Africans devised a bold remedy:

BLEYVILLE TURNER, TALENT BANK (LEFT); GUNTER DEICHMANN, TALENT BANK/DOTLINE

Short of greener pastures, *stock that died while in transit to better Australian grazing lands were removed from trucks and abandoned* ***(left)*** *so as not to contaminate healthy animals.*

Nothing seemed immune from the drought of the century. An ostrichlike emu died entangled in a fence ***(right)****, probably in an attempt to reach a station-maintained water hole.*

By the time rains came again in March of 1983, Australia's agricultural economy had shriveled. Farm income fell by nearly half, and farm-related losses totaled two and a half billion dollars.

While crops might largely recover within a year, several years must pass before livestock herds can be rebuilt.

Reverse the Vaal's flow, so its waters could return upriver and flow down again and be used over and over. Along a 130-mile stretch engineers built seven weirs with pumping stations for lifting water to the weir above. Last September, as power curtailments loomed, the pumps spun into life, and the Vaal began its unlikely trek upstream.

No mechanical fix could help rural South Africa. Hardest hit were residents of the republic's national states—tribal homelands that were scenes of too many people, too many cattle, and too little rain.

"Cattle still represent wealth to rural blacks," said Dr. Michael Lewis as we drove toward the homeland of Gazankulu. "The men build up herds until they overgraze even in the best of times. In the drought some have lost 90 percent of their animals."

Leaving the parched grassland of white-owned farms, we crossed into the homeland—and total denudation. Most of the cattle had starved long ago; even the land's few goats were gaunt. I stopped at Thoma, a dusty village of thatch-roofed rondavels and empty cattle kraals, and talked with Mphephu Shibambu, mother of five.

Before the drought, she said, their kraal held seven cattle; now six had starved and the seventh was dying, unable to provide milk for the children. Her garden of pumpkins and tomatoes had withered away. The single meal a day was cornmeal porridge, fortified with occasional bought tomatoes. Yet so far the children had remained relatively healthy, she said, and soon she would have another.

I *CROSSED* the Limpopo River, bone-dry instead of gray-green and greasy, and entered Botswana, where cattle outnumber the sparse human population three to one. Lake Ngami, a key watering place, had dried up, and thousands of cattle had died of thirst and starvation, or mired in the thickening mud. Nearly half the human population was being sustained by food shipments, mainly from the U. S. and Canada, and malnutrition was rising.

"Normally one Botswana child in four is below the 'at risk' level of nutrition accepted throughout the world," said Carol Heald, secretary of the Interministerial Drought Committee. "In spite of outside

Drought turned apocalypse *when bushfires erupted across southeastern Australia in February 1983. Fireballs roared through woodlands* (**above**) *near Melbourne, and volatile eucalyptus trees ignited explosively. Tinder conditions and hot, high winds spread the conflagrations. Among the possible causes were power lines rubbing against trees and even, sadly, arson.*

The town of Macedon was cindered (**right**)*, and volunteers, including visiting U. S. sailors, pitched in with the cleanup. The national toll: 75 dead, 8,000 homeless, and a million acres of forest and farmland destroyed.*

BOTH BY MICHAEL COPPEL, TALENT BANK/FOCUS

help, this has climbed toward one in three."

Look at a map of Botswana and you see large areas colored blue: Ngami, Savuti Marsh, immense Makgadikgadi pans, the game-rich Okavango Delta. Now lake, marsh, and pans were tan with dust, and Okavango had shrunk by a third.

With Clive Walker and Peter Joffe of Africa's Endangered Wildlife Trust, I flew beyond Okavango to Chobe National Park, where profusions of wild animals roam as in an Africa of yesteryear.

"That winding trench down there," said Mr. Walker, "that is—or was—the Savuti Channel." Along its length we saw a dozen elephants and little else. "Two years ago we counted 1,300 elephants on the south bank alone. A thousand buffalo, hundreds of hippos, scores of crocodiles. Now they've probably trekked north to the Linyanti swamp." Those that didn't die on the way. Following their trail, we looked down on skeletons of young elephants that had faltered, been nudged to their feet by their mothers, and had fallen a final time.

We landed on a dirt strip by the dry channel, at a safari camp run by Botswanan Lloyd Wilmot and partner June Anthony. In a Land-Rover we bounced down into what once was the Savuti's deepest water hole. "All the animals of the ark came here," said Mr. Wilmot. He had watched the pool die—fish roll belly-up in fouling water, fish eagles turn to hunting birds, the great mammals come less and not at all, until finally the hippos, exposed backs burning in the sun, lumbered off for the Linyanti.

"Come see how the crocs are coping," said Mr. Wilmot. At the base of one of the Qubatsaa Hills he pointed to a crevice that opened deep into cool rock. Fifteen feet inside, a crocodile the size of a man lay in seeming suspended animation, waiting for the rains.

Back at camp we went forth with shovels, and in the dry riverbed we dug down six feet until the sand grew moist. Perhaps water would seep in, and a thirsty animal would find our hole. That night June Anthony told of Baby Huey, a massive bull elephant that often walks into camp at night, locates the basin in which we rinsed our hands, and without spilling a drop siphons the precious fluid into his mouth. Early next morning we visited our water hole and saw a bull

SOUTHERN AFRICA

Drought kills cattle, disrupts families, and leaves little hope

CAMPBELL, STORM (BELOW RIGHT); THOMAS NEBBIA

Stranded hippos, *whose Boteti River has turned to dust and muck, lumber toward death in Botswana's grassless drought.*

When grasses were gone, trees were next. At Waterpoort in South Africa, a worker ***(left, below)*** *chain-saws branches from a matoppie tree for fodder. Cattle, quickly habituated to their new diets, started toward the noise as soon as the saw began to scream.*

Long accustomed to a semi-nomadic life, a pastoral Namibian family ***(below)*** *is on the move again with dismal prospects—and still more mouths to feed in a litter of puppies.*

elephant, drinking as the seepage puddled.

"In a way the drought's a blessing," said Clive Walker. "This bush has been supporting too many elephants; they've hammered it until it's almost destroyed, and now it can recover." He added: "A lot more animals would have died if this area were fenced, like most parks. Here game is free to move where instinct tells it."

Where fences prevented migration, the drought brought massive die-offs. In Klaserie reserve, one of the largest of South Africa's private game parks, conservationists counted carcasses of 33,000 animals.

South Africa's well-run Kruger Park took its modest die-offs in stride. "We accept drought as a natural culling mechanism," said the Chief Warden, Dr. U. deV. Pienaar. "It helps keep herds at levels the habitat can support, by weeding out the sick and the old—survival of the fittest."

To the north, adverse weather tormented vast areas: drought in Ethiopia and West Africa, floods across Europe, intense heat in the U. S. Midwest. Was El Niño to blame?

"We see no obvious connection," observed NOAA's Dr. Rasmusson. "For a while El Niño was blamed for everything weather-wise. For all the havoc it wreaked, it also was a victim of bad press."

FOR REASONS UNKNOWN, all El Niños finally end, and in spring 1983 this one, too, entered into decay. The southern oscillation began its return swing, and sea-surface temperatures dropped across the Pacific, except off South America. There they persisted, fueling storms that dumped unremitting rain on Ecuador, Peru, and Bolivia.

Experts rank El Niño as the number one force disturbing world climate patterns and the primary target for research. This will find focus in a ten-year program beginning in 1985 known as TOGA, for Tropical Ocean and Global Atmosphere, to be headed by Dr. Rex J. Fleming, a NOAA research chief. Supported by several U. S. agencies, TOGA will marshal the resources of nations of the Pacific and Indian Ocean basins.

"It's a high-tech program," said Dr. Fleming, "three environmental satellites; a fleet of research vessels, including nine from Ecuador, Peru, Colombia, and Chile; and a massive deployment of instruments for monitoring both atmosphere and the ocean. If a Niño occurs during the study, we'll execute a rapid-response phase, with airdrops of buoys to intensify observations."

Before the maverick of 1982-83, scientists thought they understood the conditions necessary to bring on a Niño. Still believed valid for most events, they were formulated by Dr. Klaus Wyrtki, professor of oceanography at the University of Hawaii.

"Preceding an event," explained Dr. Wyrtki, "the high-pressure system east of Tahiti is strong, the Indonesian low is intense, and brisk southeast trade winds pile up warm water in the western Pacific—an immense storing of energy. Then the wind field collapses, thus releasing the accumulated warm water as an east-flowing surge known as a Kelvin wave. In 60 days the wave crosses the Pacific, raising the sea level and bringing the warm El Niño current to South America.

"This Niño broke all the rules," acknowledged Professor Wyrtki. "The trades didn't stiffen or the water pile up. Yet it was the strongest on record. For events such as this we need another Big Idea."

What gives rise to El Niño? Can we trace the event to its conception?

All agree it probably is too early to identify the triggering mechanism with confidence. But most expect to find it in the western Pacific, in the great red spot.

Dr. Rasmusson believes the origin relates to change of season—the transition period of spring or fall—when the Indonesian system enters a period of imbalance with respect to earth's other great convection centers, over central Africa and the Amazon Basin. Dr. Neville Nicholls, an Australian meteorologist, traces the trigger to a kick from the

Made docile by thirst, *an enormous and still wild bull elephant, given the name Baby Huey, sought water at a safari camp in Botswana's Chobe National Park. June Anthony pours for Huey, who also liked to reach into the tank of an open shower stall to suck down a bath's worth.*

LLOYD WILMOT

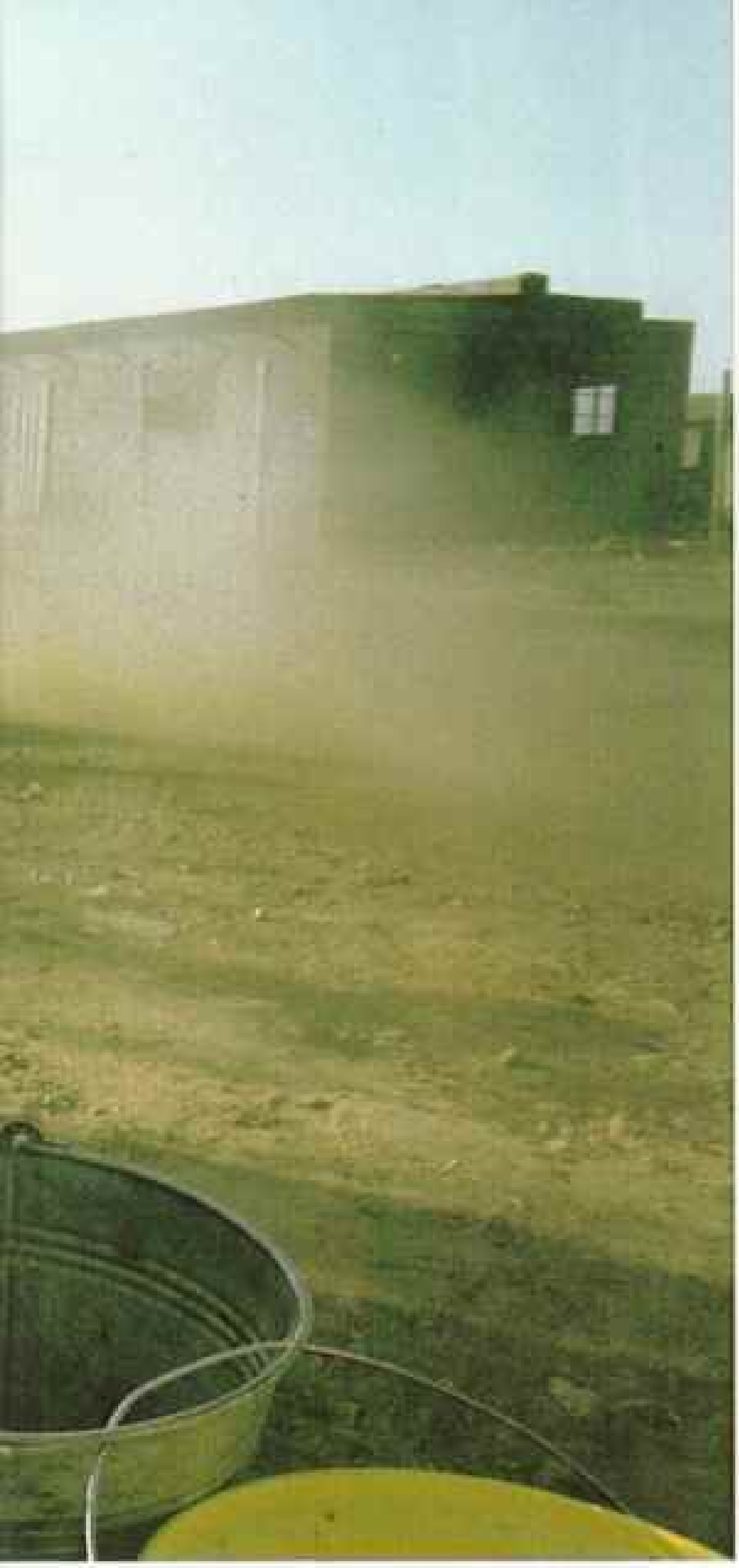
winter monsoon; Dr. Fleming, too, believes the winter monsoon provides the jolt.

Noting that a Niño's warming waters and weakening trade winds originate in localized areas across the tropical Pacific, Dr. S.G.H. Philander of Princeton's Geophysical Fluid Dynamics Laboratory suggests that unstable interactions between ocean and atmosphere govern El Niño's evolution.

What about the volcano El Chichón, with its timely barrage of atmospheric dust? "We have no evidence that it wasn't involved," said Dr. Wyrtki, "and none that it was. It remains a matter of serious speculation."

Behind the drive to understand El Niño lies the goal of prediction, with its obvious benefits: When the Child brought bitter winter weather to the eastern U. S. in 1976-77, supplies of heating fuels were exhausted, causing deaths and suffering that early warning could have avoided.

Understanding El Niño also holds a key to predicting general global climate fluctuation. "El Niño alone is not the controlling influence in world weather," observed Dr. Roland Madden of the National Center for



BOTH BY THOMAS NEBBIA

A valve with no handle *on a faucet with no water in a land with no rain* ***(left)*** *stands useless where residents of Ekuvukeni, Natal, South Africa, wait with containers by a whirlwind road for the daily water truck. In a neighboring district a Zulu woman* ***(above)*** *carries her treasure of water home from a distant well.*

Its global tantrums done, El Niño leaves lives strewn like broken toys.

Atmospheric Research. "But it offers the best chance for a breakthrough in long-range prediction."

Is the phenomenon so complex as to be beyond man's powers to predict? "El Niños have been cruel to forecasters," said Dr. C. S. Ramage, tropical meteorologist with the University of Hawaii. "With the immense number of variables, I fear there's little hope for prediction."

Many scientists would disagree. But they acknowledge the difficulty.

"We're dealing with interplay between two very different fluids—atmosphere and ocean—in the boundless dimensions of time and space," observed Dr. Jerome Namias, forecast specialist with the Scripps Institution of Oceanography in La Jolla, California. "Neither medium has a 'normal' state, and abnormality in one causes abnormality in the other. Weather is always abnormal. Events such as El Niños have no definite starting point and no end—it's a matter of where you break into the scene, and where you leave it. Perhaps the only thing more complex is human behavior itself." □

Surviving, Italian Style

By WILLIAM S. ELLIS
NATIONAL GEOGRAPHIC SENIOR WRITER

Photographs by COTTON COULSON

THEY SCULPTURED a cameo in a cliff and called it a town, and from where it sits, high above the blue sea, there are vistas to smite the arrogance of mortals.

It was founded nearly 1,500 years ago, given the name Ravello, and forever after it has been in the service of the eternal beauty of Italy's Amalfi coast. To be there on a morning in April, when sunlight is forging jewels in the pools of last night's rain, is to savor a place where poets come to die.

Like so much of Italy, Ravello speaks to the past—through the mustiness of the cathedral, now nearly nine centuries old, and the mules that continue to haul logs out of the forests. And the main square, Piazza Vescovado, is on this morning as it might have been when there was a dukedom here. Women in black, their faces crabbed with wrinkles, stand at a corner, beating the air with gestures, puffing and pursing their lips in a lovely orchestration of neighborliness. An aged prelate walks across the square, short stepping, head bent to his breviary.

Not far away men and women are working the land—fields where grapevines are trained on sticks lashed in crosses, as they were 200 years ago—with horses and hoes. It is a land gone feeble through an eternity of turning, powdery earth that gives itself too quickly now to the wind.

There are strangers in Ravello this day. Tourists have arrived in buses and cars and on motorbikes. Some are seated at the outdoor tables of the coffeehouses, scribbling on postcards and inquiring of the waiters where it was that Jackie Kennedy stayed while vacationing here. *Jackie Kennedy!* Ravello wears her onetime presence in the village like a divine anointment.

You will hear it said in Ravello that hardship has befallen Italy as it continues, in its 37th year as a republic, to consort with crisis. Governments, more than 40 of them since the end of World War II, form and fall with the regularity of the seasons. Rare is the time without a strike causing fibrillation in the rhythm of workaday life. In Sicily and Naples, mobsters are killing one another in record numbers.

You will hear all that and more, and it will be related with detachment and cynicism. Rare is a nation so loved as Italy; rare, too, a people so cavalier in their sense of nationhood as the Italians.

"For the average Italian the first loyalty is to family, then to the region he or she is from, and finally to country," a young novelist living in Milan said to me. "It is very difficult to arouse national interest here. In my lifetime nothing did that so well as Italy's winning of the world soccer championship in 1982. When that happened, everyone was out in the streets, waving Italian flags. And that was a revelation because up to then I don't even think I knew what the Italian flag looked like."

***La bella figura**—that special flair the Italians have cultivated so well, here seen on a street in Rome—is reaping profits as well as praise. Suspected of being closet anarchists since they change governments the way they change clothes, Italians often seem on the brink of disaster. But style and daring carry them through.*

So it is with wonder that I found, in travels from the Alps to Sicily, a renewed force acting to enrich the Italian art of survival. It is not openly apparent, but it is there just as surely as there are birdsongs carrying down from the beech and chestnut trees here in Ravello on this morning in April—the resurgence of Italian innovation in design, the strengthening of the tradition of superb craftsmanship, the chesty push for more active roles in international affairs.

Today in Cleveland, Ohio, and Washington, D. C., riders of the subway are being borne in Italian-made cars. In Milan and Rome, designers of wearing apparel have taken on kingly roles in the realm of high fashion. Fiat, the behemoth of Italian industry, has turned its shrinking fortunes around and once again vies for first in motorcar sales in Europe. Italian wines now outsell all other imports in the United States.

Economic salvation *came to Urbania, in east-central Italy, when Father Corrado Catani* (**above**) *hitched the town's star to the apparel industry, a major bulwark of the Italian economy. One of a new breed of "management priests," Father Catani oversees the production of 6,000 pairs of blue jeans a day for Italian fashion houses like Kappa Sport, which recently introduced its Jesus Jeans to the Soviet Union.*

STILL, ON THE SURFACE, Italy's economy is disorderly and sickly. Much of its strength lies hidden in a vast underground, or back-alley, economy in which livelihood is reduced to an elemental state of providing labor in return for money without paying taxes or otherwise committing the business to record. It is shadowy and out of sight because, for one thing, the government chooses to close its eyes to something beyond its control. There are hundreds of thousands of families involved in this, and to tamper with their method of operation would likely bring paralysis to the workable (but barely) chaos of Italy.

It is hidden, too, because who riding a carousel pays heed to the motor that turns the dazzling stage? The lights flash, music blows through the big pipes, and silent, shining horses go around in their pleasure derby. It is too magical for technical considerations, just as Italy is too joyful a carousel of color and character to draw much attention to the machinery of its economy.

Thus, there will be distractions while seeking out the Ricci family—mother, father, and ten children—in the back-alley work force of Naples.

It is less than 50 miles from Ravello to Naples, carrying past the ruins of Pompeii, and past those of Herculaneum where, even now, excavations are giving new dimensions to the tragedy visited on that once elegant Roman town below Mount Vesuvius.*

And all along the way there is the bay, the wide bite of blue water in which rise the islands of Capri and Ischia and Procida. Only in a few places—Cape Town, for one—are water and land in such striking communion.

I walked the streets of Naples and became as a dust spot in an urban galaxy of beauty and ugliness, nobility and depravity. Here was the Naples of legend: alleyways touched with wedges of sunlight on the cobblestones

*See "A Buried Roman Town Gives Up Its Dead," by Joseph Judge, in the December 1982 GEOGRAPHIC.

THE AUTO INDUSTRY,
one of Italy's top export earners, is centered around the industrial triangle formed by Milan, Genoa, and Turin. One robotized giant, Fiat, and several labor-intensive, exclusive makes like Lamborghini and Maserati define the market.

MASTERS OF DESIGN,
like Pininfarina, have made Italian products the global epitome of excellence. Apparel makers benefit especially from this national talent, as do the violin makers of Cremona and jewelers like Damiani.

TOURISM
With two Rivieras—one centered on Genoa, the other on Rimini—and hundreds of mountain resorts, Italians spend most of their vacation lire at home. Foreigners also spend huge sums, especially on the Rome, Florence, and Venice circuit.

GUNS AND SUBWAY CARS
Brisk sales of ships, fighter planes, and weaponry have made Italy one of Europe's major arms exporters. One supplier, Breda, also makes cars for subway systems in Cleveland, Ohio, and Washington, D. C.

A VAST VINEYARD,
Arizona-size Italy is the world's leading wine producer—2 billion gallons a year, or 5 times U. S. production. Exports, like the familiar Chianti Classico, Riunite, and Martini labels, account for 25 percent of the yield.

APPAREL
Thousands of small contractors mean flexibility and economy in the ephemeral world of high fashion, where Italian houses like Armani and Gucci thrive.

STATE INDUSTRIES,
such as steel, chemicals, and Alfa Romeo automobiles, have been concentrated largely in the impoverished south. Beset by labor problems, most continue to run huge deficits.

ITALY AND ITS TWO ECONOMIES

Behind the familiar trademarks of Italy's official marketplace has emerged a dynamic "shadow economy" of unreported wages and profits. Producing a cornucopia of leather goods, textiles, furniture, and other products, tens of thousands of family workshops add perhaps 15 to 20 percent to the nation's GDP.

Piety and politics, *powerful suitors for the Italian soul, contend in two cities: Rome, with the venerable presence of the Vatican (**above**), and Bologna (**facing page**), where the Communist-oriented city government and labor unions turn out for a May Day parade.*

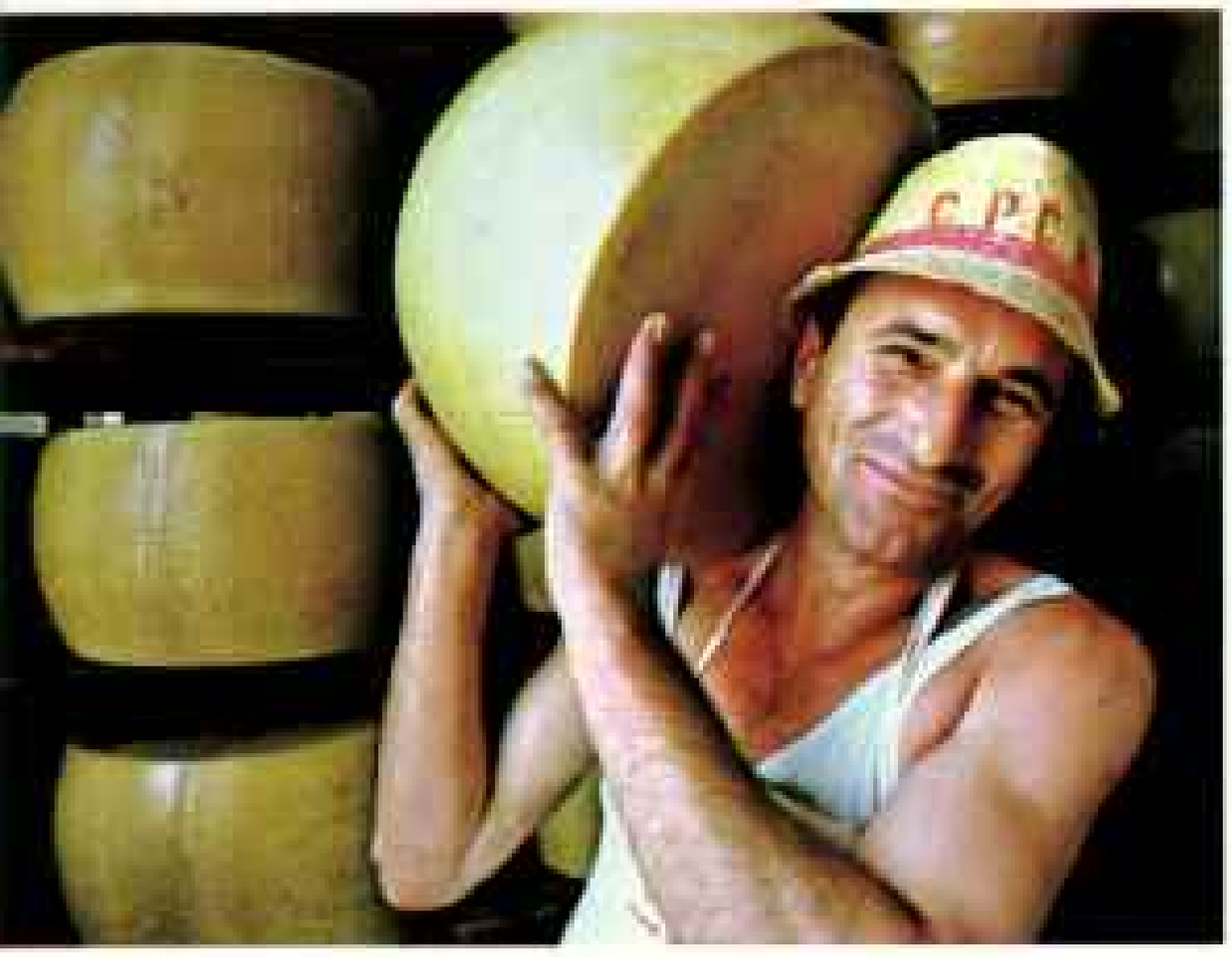
Born in the twenties, Italy's Communist Party has in recent years exerted great influence over labor and social legislation. Control of government—which has changed 44 times in 37 years—has resided with shifting coalitions of the Christian Democrats and minor parties. Many blame this inherently unstable political system for continuing economic chaos.

Rome became the capital in 1870, when Italian troops wrested the city from papal control nine years after the rest of the country was unified. For years afterward, popes saw themselves as "prisoners of the Vatican," suspending their Sunday blessings in the great colonnaded St. Peter's Square. Today the Pope is Rome's star attraction, granting audiences in both the piazza and the modern auditorium, foreground.


DALLA FABBRICA
ALLA SOCIETÀ
DISARMO

A nation of epicures, *Italy grows most of its own feast and produces an astonishing variety of wines. In the famed Chianti region near Florence, Maurizio Castelli* ***(left)*** *employs a master's senses in inspecting a dessert wine at the Badia a Coltibuono estate.*

Pasta's best friend, Parmesan cheese ***(right)****—some two million wheels of it a year—comes from the Parma region. Cherry blossoms* ***(above)*** *grace the fertile foothills of the Alps near Verona.*



and festooned with clothes out to dry; children with moons of dirt on their knees running and yelling; eyes staring from the window of a *basso*, the single-room residence that opens on to the street; cats in convention before the butcher's shop; young men coming on strong in vainglory and modish clothes.

TOMORROW I will find the Ricci family. Today I will go to the cathedral and watch with a thousand others as the archbishop stands before the altar and raises his arms high so we can see the vial that holds the congealed blood of St. Gennaro. A handkerchief is waved by the archbishop's aide to signal that the blood of Naples' patron saint has liquefied and run red, as it does several times each year.

Naples has its miracles and its music, but at times it seems as if the whole frenzied sprawl long ago washed up from the waters of the bay, from some unfathomable depth where dwells a muse of rascality.

. . . *Joy is everywhere, funiculì, funiculà.*

The song speaks of Naples, but the joy is elusive, now that an estimated 5,000 members of the Camorra, the Naples equivalent of the Mafia, do battle among themselves at a cost in lives of perhaps 200 a year. They make up the core of the criminal society that oversees a vast operation involving tens of thousands of Neapolitans engaged in extortion, smuggling, the making and distribution of drugs, and other illegal activities.

It is a measure of the change taking place in Italy that last year there occurred an extraordinary show of defiance of the Camorra. For two days in January nearly 60,000 small businesses in the Naples area closed in a show of protest against the payment of protection money to the racketeers. At about the same time thousands of students supporting the strike demonstrated in front of the home of a Camorra chieftain. Church leaders spoke out, angrily proclaiming that Neapolitans were at the end of their endurance of all the violence and lawlessness.

However, there was to be no instant reform in Naples, not in a place so bound to its past that it remains marbled with the character of the Greek city-state. But a start was made. If nothing else, *omertà*, the code of silence, was no longer inviolable.

"HOW DID I GOVERN Naples? With a great deal of patience and humor." Maurizio Valenzi, painter, intellectual, journalist, and mayor of Naples from 1975 until last year, smiled wearily. He is in his 70s now, and his years as head of the city administration have left him with a certain immunity to political fallout. He is outspoken.

"According to the figures, we have high unemployment in Naples," he said. "But the figures are misleading. Many people are on the unemployment list, but not all of them are telling the truth. They are working here and there, for friends and cousins and so forth, and are not declared for tax purposes. They are looking for a sitting job with the city administration, and when it comes to hard work, they refuse to present themselves."

Mayor Valenzi is a Communist, as are the mayors of many large cities in Italy. Yet there is a heavy presence of the U. S. Navy in Naples, along with that of the North Atlantic Treaty Organization. Indeed, as we talked, the aircraft carrier U.S.S. *Independence* was steaming to anchorage in the bay. "We consider the Americans as guests here," the mayor said, "and we have a good relationship. But for some time that relationship was not good because there were too many Neapolitans who considered the American sailor as simply someone to whom they could sell something."

About 100,000 people in the Naples region lost their homes in November 1980,

Underground entrepreneurs *when they started four years ago, the Basile brothers, Gianni and Salvatore, now pay taxes on their handbag business in Naples—an important center for leather goods. With ten relatives they produce 50 bags a day, exemplifying the family-oriented heart of Italy's economy.*

when the earth heaved at least three times in two and a half minutes. The earthquake destruction was widespread, and the lives lost numbered almost 3,000.

For the Ricci family, whom I found living in an abandoned schoolhouse, the disaster brought added suffering to their hardscrabble lives. "Our house was falling apart anyway," Cira Ricci, the mother, said. "When the earthquake came, it was finished."

The family's living quarters in the schoolhouse are confined more or less to the old cafeteria. The smallest children are at play in the large room, pushing wheeled toys across the floor while making spittle-dampened noises, and the older ones of the brood are seated at a table, working with leather.

This is a workshop as well as a home, an invisible force in an invisible economy. A shipment of leather comes from a nearby factory almost every day. Cira Ricci and four of her ten children cut the leather and make straps for shoes. Only straps. Somewhere else in Naples, another family is making heels, and, in another place, sharp knives are tracing the patterns for soles.

And back at the factory, all the parts come together like filings sucked to a magnet from varied and distant fields.

"I would estimate that the people involved in the underground economy account for about 20 percent of the work force in Italy," said Bruno Contini, a professor of economics at the University of Turin. "These economic activities are not necessarily illegal, but in most cases they do violate certain existing government regulations, both for tax-evasion purposes and for purposes of evading legislation having to do with labor protection."

In addition to the payroll, an employer in Italy is required to pay a percentage of his workers' take-home pay to the national government. The money is used to finance the extensive program of social benefits. "With all these charges levied against the employer, the tax he must pay for each worker easily exceeds 50 percent of the take-home pay," Contini said.

It is this tax that the underground economy aims to avoid. Because of the flexibility of the work schedule, the employee benefits from the arrangement (often he or she holds a second, salaried job), and, of course, the employer profits. The burden falls in its entirety on the government.

The firm manufacturing the shoes for which the Ricci family makes straps deals with its underground workers through a subcontractor. For the record, therefore, it has a work force of only 10 or 12 and is not subject to the strict laws enacted to benefit labor unions. It can hire and fire as it pleases, and in Italy, where unions through the years have grown mighty, in the tradition of Caesars, such freedom of management is highly prized.

There are tens of thousands of small and medium-size manufacturing companies throughout the country today, and they are the sprinters in the race against crushing recession. In many cases, employees of a company all belong to a single family (the average Italian company has 14 workers as compared with, say, West Germany's 80). It is like spilled mercury, this fragmentation, and it is not without benefit, for we know well that of all the nations in the world, few are as skillful in the craft of survival as is Italy and the Italians.

SURVIVAL here is fashioned from a distrust of the government and of authority of any kind (yes, even the church) other than that of the family. "Arrangements" are forever being made—to get a nephew a job in the post office, and then to have him certified as soon as possible as an "invalid" eligible for retirement on a disability pension; to be allowed to park where parking is not allowed; to start a month-long August vacation in the third week of July.

Throughout Italy today, men, women, and even children are at war against the vicissitudes of daily life. Listen now to this small conspiracy in the making, as overheard in a Florence restaurant:

"I must be away from work tomorrow, so if you will sign my card in the morning. . . ."

"Impossible, Carlo."

"Did I mention my cousin who has free use of a large hall at his disposal?"

"*Ecco!*—Of course! My daughter's wedding reception!"

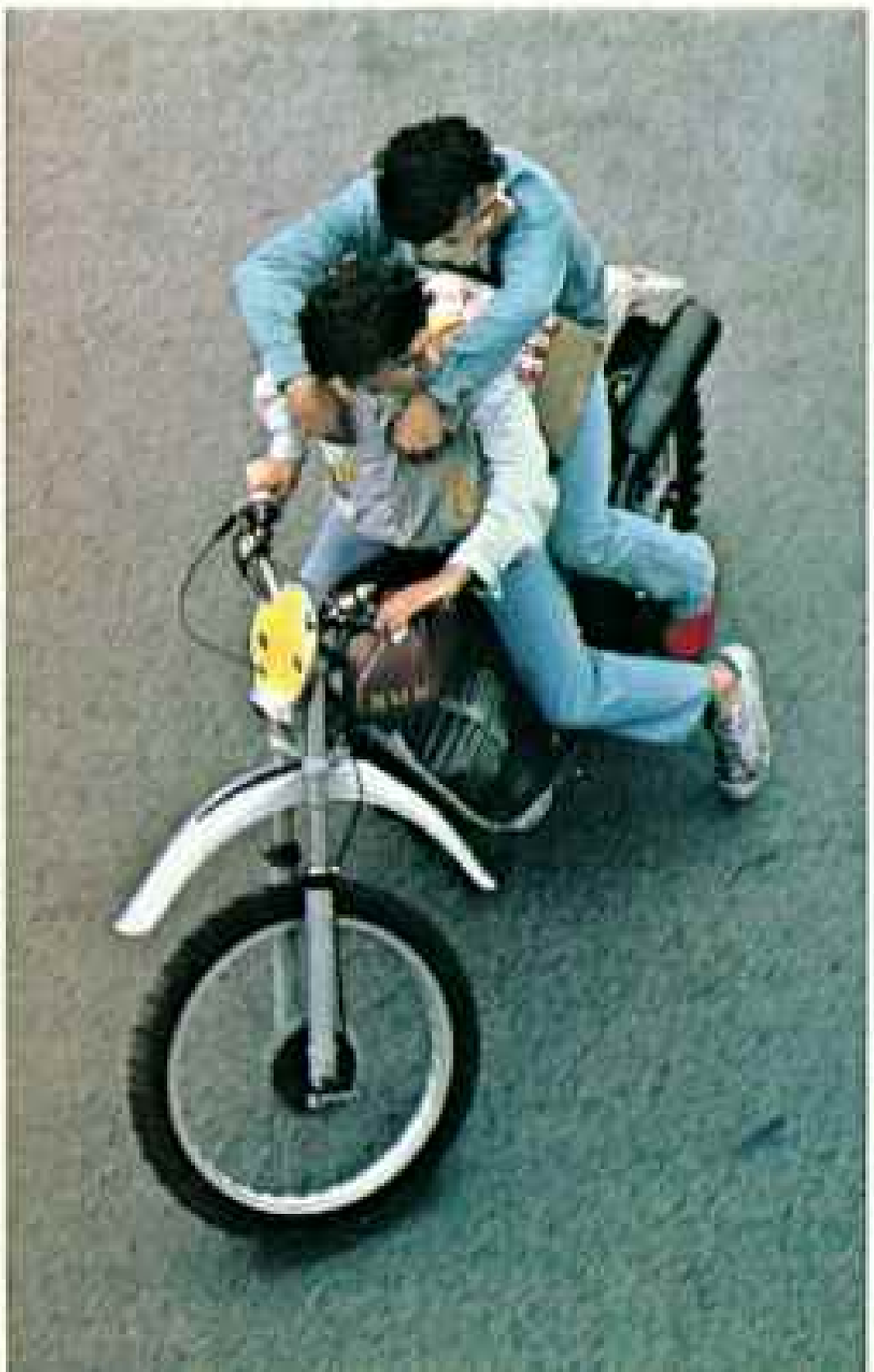
In Sicily, walking in the shade of cypress trees, along a road where legions once marched, I heard other Italians speak of

In the land of the midday sun*—Italy's Mezzogiorno, which includes everything south of Rome—neighborhoods like Naples' Spanish quarter*

hold to old-time ways. Despite years of government efforts at revitalization, a gulf still divides the north from the south, origin of most of Italy's emigrants.

ALL BY O. LOUIS MAZZATENTA, NATIONAL GEOGRAPHIC STAFF

A run for the money *in Naples occurs in broad daylight. Unloading an illicit cargo of cigarettes* ***(above)****, presumably obtained from a ship far offshore, the smugglers are met by youths* ***(below)****, who whisk the contraband off to vendors, thousands of whom are involved in the tax-dodging trade. The police arrive* ***(facing page)*** *but fail to prevent a getaway. A recent drowning of two contrabbandieri during such a chase resulted in harsh criticism of the police by Neapolitans, who, like many other Italians, have a high tolerance for those who defy authority.*



another kind of survival. Not far away, Mount Etna was erupting, sending down the most intense flow of molten lava there since 1950. There would be an attempt in a few days to divert at least some of the lava by means of explosives and the opening of a new channel.

"I have lived with the anger of that mountain all my life," said a Sicilian whose village lay in the lava's path. We walked to a place where it had crashed across the road, and now it lay, hot and smoldering, like a smarting welt on the back of a penitent. "They may stop it for a time with the dynamite, but it will be back. It always comes back."

In Nicolosi, one of the three villages threatened by Etna, Giovanni Vacirca left his small food market and walked a short distance to a café where he sat at an outdoor table and ordered coffee. Only once did he look up at the mountain and the curls of ashy smoke trailing to the sky. "The lava is slowing," he said. "It will not get to us."

He did not want to think darker thoughts, for it had taken him many years to come to own his market. He had left Sicily as a young man and traveled to Australia and the United States. And finally he had come home to marry a girl from another village and open the store. "It's not much, the business, but we make a living," he said.

Explosives experts set off 880 pounds of dynamite on the slope of Etna, and in the beginning the lava took to the new channel. Some scientists termed this attempt at volcano engineering a success; others said the result was not worth the cost (five million dollars) since the lava was slowing of its own accord.

In the end there were fresh scars on the land that aprons Europe's tallest and most active volcano, and Sicilians like Giovanni Vacirca were flushed with the exhilaration of survival.

AND IN VENICE the water was rising to calf level in Piazza San Marco as the first flood of the year began to wash over the city. Ludovico de Luigi, a Venetian artist of major talent, put a finger to his lips, a signal to be quiet, and then we could hear the music of an orchestra at one of the sidewalk cafés in the great square.

"It's like the *Titanic*," De Luigi said.

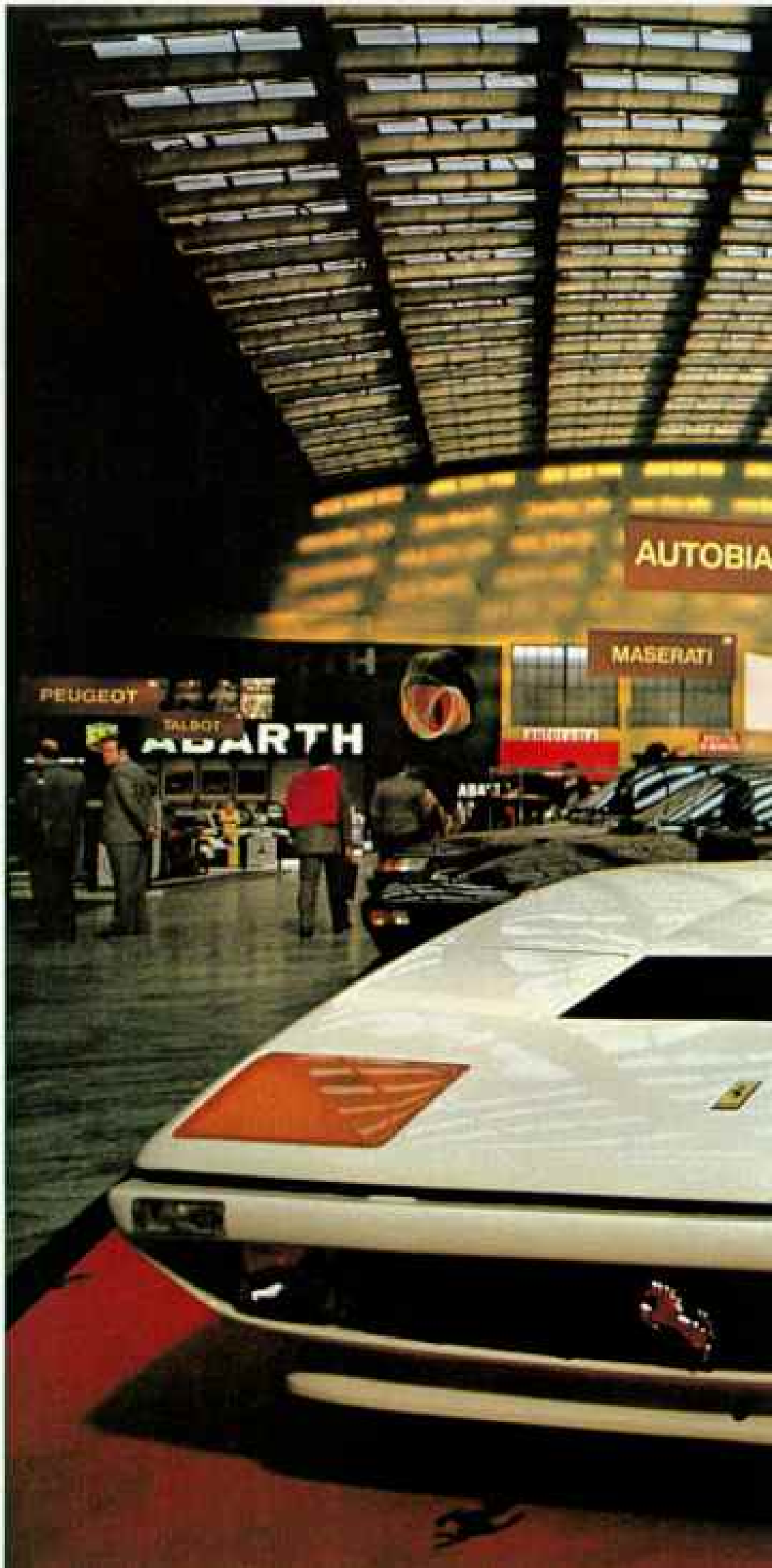
National Geographic, February 1984

"Venice is sinking and they keep playing."

South and west of Venice, in the city of Pistoia, Giuseppe Gallini remarked on the high price of fuel in Italy, and said: "If we could convert some of our wine into gasoline, we'd solve a lot of our problems."

The plight of Venice and the almost total dependence on imports for sources of energy are concerns shared by many Italians, and in the case of the former, many non-Italians as well. For what other city in this nation so rich in great cities stirs the soul as much as Venice? Some say Florence, but I think not. Florence is cerebral, Venice a vision.

But it is in Milan that the heart of Italy's sleight-of-hand economy truly beats. Big and vibrant, the chief city of Lombardy is both a factory and a showcase for Italian



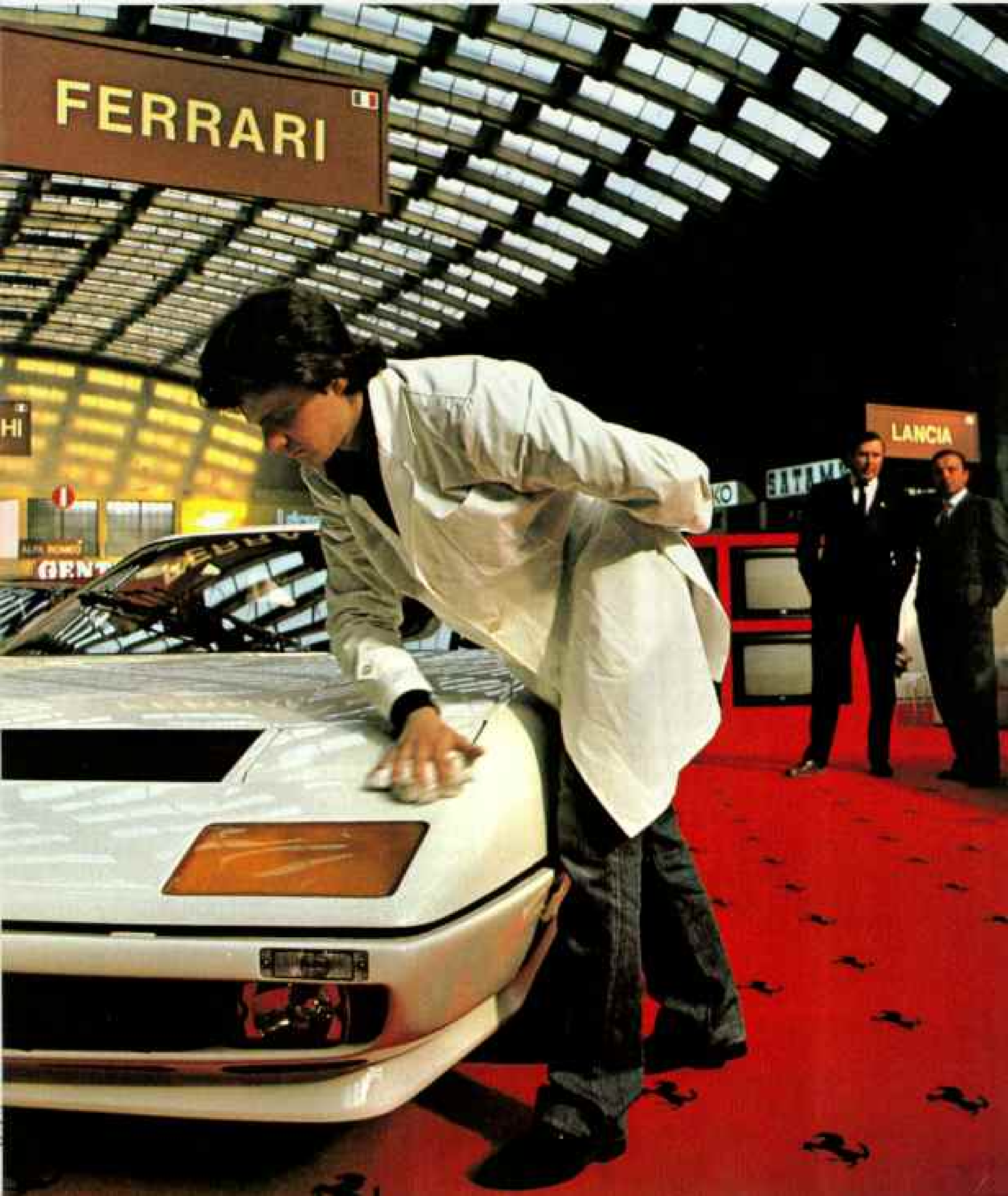
Renaissance men of today, *designers like Ettore Sottsass* ***(above)*** *are key figures in Italy's commercial comeback. Designed in 1970 for Olivetti, Italy's office-machine giant, Sottsass' Valentine portable typewriter has been called "one of the sassiest pieces of industrial design since the early MG sports car."*

Also sassy, the sleek hand-tooled thoroughbreds at an auto fair in Turin ***(right)*** *have earned that city a reputation as world capital for auto design. Fiat, Italy's largest private employer, is Europe's top-selling carmaker.*

products, a hub for the comings and goings of trade in Italy and much of Western Europe. It is not only an industrial city (fully a quarter of industrial employment in Italy is spawned in the region), but also a city of fine food and subtle elegance and cultural wealth.

Many thousands of exhibitors travel to Milan each year for the trade shows held in the massive complex of buildings at the fairgrounds. In another section of the city, restorers are working on Leonardo da Vinci's "Last Supper" in the church of Santa Maria delle Grazie and, as they clean and repair, they discover that Leonardo portrayed St. Matthew with his mouth open, speaking.*

*The restoration of the "Last Supper" is described by Carlo Bertelli in the November 1983 GEOGRAPHIC.

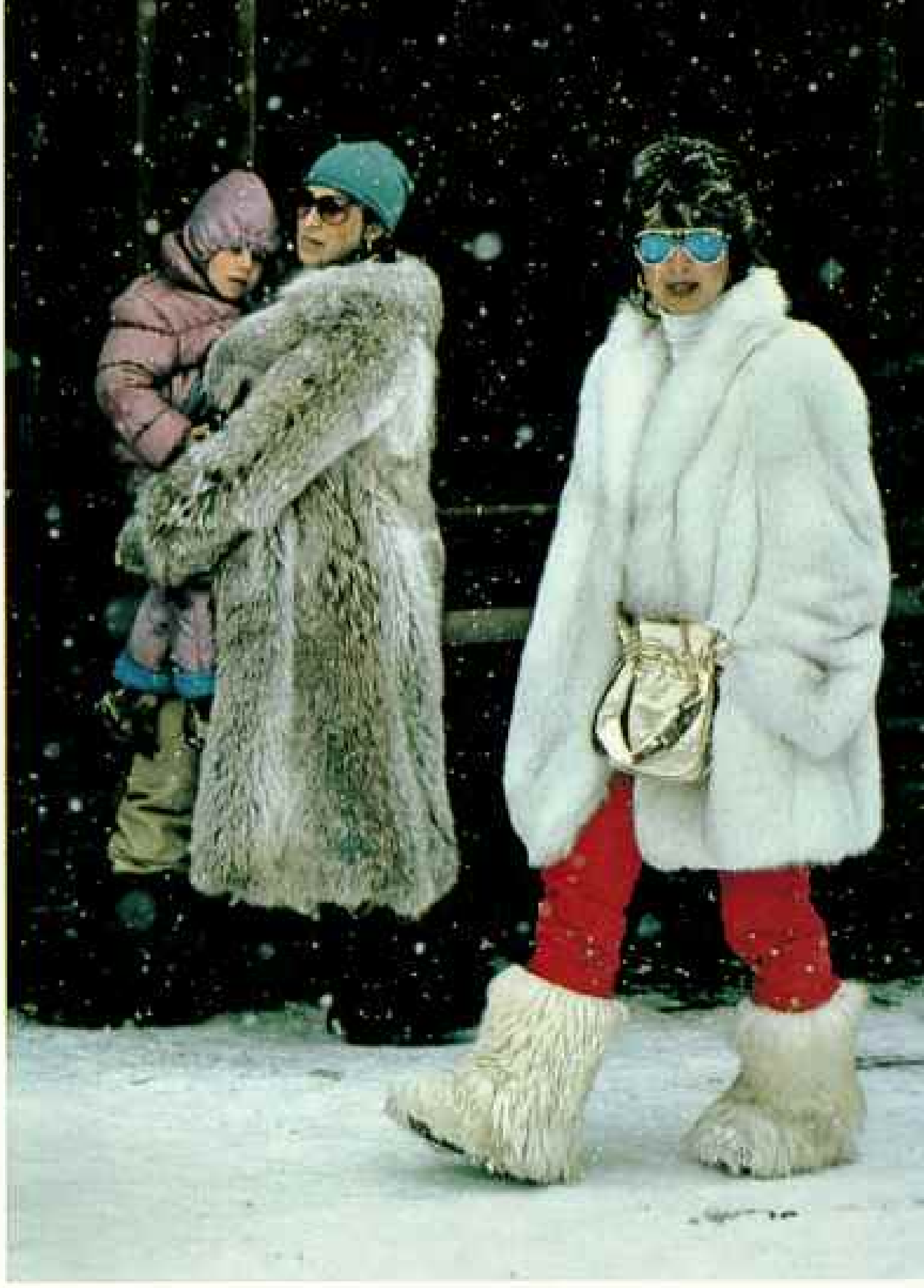


Go elsewhere in Milan and there is the Duomo, the cathedral, rising in white stone (but a-whisper with soft colors after a rain) to become, with more than 2,000 statues on the facade, the most extravagant creation of religious Gothic architecture in Italy. And Teatro alla Scala: Ah, the operatic voices that have lifted from that stage and carried through the horseshoe of red and gold.

The lucky visitor will come on Peck, a food store in Milan since 1883. It is like the Louvre in there, with cheeses and sausages, truffles and mushrooms the objects of art. There is *mascarpone*, a cheese like whipped cream that keeps for only two days, and tortas with truffles selling for $15 a pound. Balls of mozzarella rest in water, while mushrooms are layered in three-foot-high glass vials. There are salamis hung like bombs away, and Culatello hams, the best of what the pig has to offer, pinkish and dry, and with a taste to knight the tongue.

IN THE CENTER OF MILAN is a building called the Palazzo Durini. Dating from 1648, it was once the home of silk traders, cardinals, and lesser royalty. They entertained on a lavish scale, and among the guests who slept there were the Empress Maria Theresa, the Duke of Modena, the Elector of Saxony, and Napoleon.

Palazzo Durini is a grand house. The vault of the central hall is decorated with the allegory of the *trionfo d'amore*, featuring Cupid shooting his arrows from a coach being pulled through the clouds by four white horses. The drawing room is Empire style, and the upstairs apartments have walls and



ceilings covered with paintings of Pegasus prancing, Achilles dragging the corpse of Hector, and tales from the life of Aeneas.

It is there, amid the baroque splendor, that Giorgio Armani exhibits his work. He is a designer of clothes; indeed, in the world of high fashion, an Armani label is a ticket to the deepest reaches of "in." He has appeared on the cover of *Time* magazine, and in the accompanying article a woman president of a clothing store is quoted as saying, "Armani is the king of the Italian Alps."

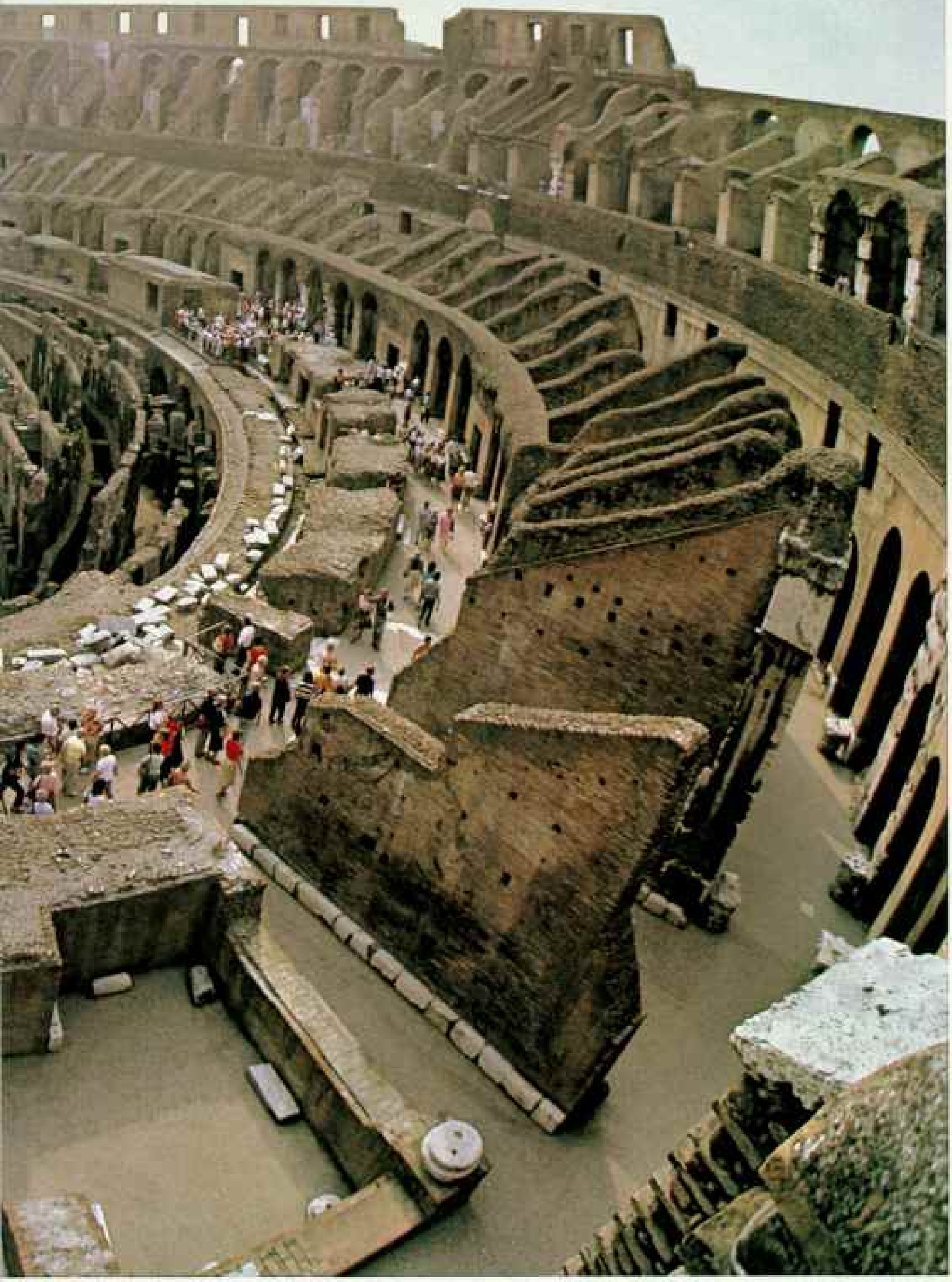
Giorgio Armani is short and slim, hardly a mountain man. "But it has been said that I am like a bear because I avoid the snobbish aspects of fashion," he said. "I feel I can retain my own personality and viewpoints while involved in this."

The Italian fashion industry has export

Fur-bearing species *flourish in the rarefied atmosphere of Cortina d'Ampezzo, high in the rugged Dolomite Mountains* ***(above left)*** *of north Italy. Here, at the site of the 1956 Winter Olympics, the rich and famous of Italian society flock to enjoy magnificent ski slopes and promenade their winter fashions* ***(above)****. They include ski and après-ski boots turned out by Italy's vast network of small footwear shops.*

Under Austrian dominion until 1918, much of Italy's far northeast still speaks German. European gateways to the industrial and agricultural wealth of the Po Valley, three of Italy's Alpine passes are now traversed by oil pipelines, vital to the energy-poor nation.

Where lions once stalked, *in the long-exposed underground stalls of the Colosseum, hordes of alley cats now reign. Stripped of its marble by centuries*



of scavengers, the classical structure, dating from A.D. 80, is still a favorite of tourists, who in 1982 brought Italy nearly six billion dollars in foreign exchange.

sales equal to half the amount spent for energy imports into the nation. Armani alone has combined yearly sales in excess of 135 million dollars. There are others like him designing and manufacturing clothes in Italy, and it is on their shoulders that Italian fashion has risen to all-time heights of elegance and style. Armani is lauded not only for his designs but also for the perfect fit of his clothes. He has put women in man-size blazers, and men in jackets of a style last seen among bombardiers in World War II.

As for himself, Giorgio Armani wears white socks.

THE WEALTH that style and fashion bring to Italy does not quiet loud lamentations for the state of the economy. On paper it is a nation with outrageous inflation, high unemployment, and general fiscal malaise. In truth, the real economic growth, the rise from year to year in its gross domestic product, surpasses that of most major nations in Europe. (The official GDP figure may not always bear that out, but to that amount must be added a minimum of 15 percent for the products and services coming out of the underground economy.)

Thus does rather a sound heart beat in that body of nation with the sickly pall.

Sound, too, because as a clothing manufacturer in Prato said in a boast not his alone, but belonging to makers of most things Italian, "We turn out good material." Who, having worn a pair of Ferragamo shoes or a Nino Cerruti sports jacket—having felt the sensuous cling of Missoni knitwear—can rise to challenge that? Seldom is Italian craftsmanship sacrificed for the sake of growth and a wider market. The production of the Ferrari sports car, that hand-tooled cocoon of luxury seemingly fueled with champagne, remains limited to a few thousand each year, not for nobility's sake but for lack of knowledge of how to be less than the best.

A parallel is to be found in the restaurants of Italy where, no matter how small the establishment, it is likely that crisp linen napery will be found on the tables. A penchant for class has something to do with that, but mostly it is attributable to the fact that there are not trees enough in Italy to produce the pulp needed for paper napkins.

And so it is with the richest of irony that Italy, because of its shortcomings, must settle for high quality and touches of elegance.

Even the signs being carried by Communist youths as they march along a street in Florence are of artistic merit. There are several thousand demonstrators out this day, to show support for the Palestine Liberation Organization. As they pass the Galleria

Hilltop fortress, *the town of Urbino* ***(facing page)*** *seems to defy time. A Renaissance showcase, it is now celebrating the 500th birth date of its illustrious native son, the painter Raphael. Near EUR, Mussolini's "new city" outside Rome* ***(above)****, 20th-century fortresses dominate.*

dell'Accademia, where the white Carrara marble of Michelangelo's "David" glistens in sunlight spilling through a ceiling window, there are angry shouts from drivers caught up in the knot of traffic.

"Imbecille!" one yells. Nothing touches off so strong a storm in the Italian temperament as the intrusion of politics on private life. It makes little difference if the demonstrators are Communists, Fascists, or, for that matter, Rosicrucians: They are disrupting the movement of traffic (not that it moves all that well when there are *no* demonstrators), and that is reason enough to call down curses on them and their causes.

Survival.

Who in Italy is more skillful in the art than the politicians who, in the past 37 years, have wrought 44 changes of government? Often these changes are called "crises," but they are simply stirrings in the stewpot of alliances, coalitions, and issue posturing of Italian politics. In last summer's election, for example, the Christian Democratic Party, which had prevailed in all but two of the previous 43 governments, retained a slim majority, only to lose the leadership within weeks to the Socialists. The Communists slipped, while some small parties such as the Republicans gained.

"You want to know what it all means?" said a Milan newspaper reporter. "It means, my friend, that Italy has no idea of where it is going as a nation. So we each chart our own way. We swim, each with our own stroke, to keep the whole of us from drowning."

IT IS IN THE NORTH with its heavy concentration of industry that the vital signs of Italy's economic health are the strongest. It is there, too, in the Piedmont city of Turin, that the Fiat company is headquartered.

Today Fiat's three plants in Turin employ 57,000 workers. Production amounts to about 4,000 cars a day. It is largely automated work with robots on the assembly line. That this could occur in the face of labor-union power in Italy is the story of Fiat's survival and its leadership once again of the automobile market in Europe.

In the 1970s Turin became fertile ground for Communist agitation and acts of violence by terrorists. Fiat, as the largest private company in the nation, was the major target. Some of its employees were wounded. At least four were killed. There were frequent and crippling strikes. Losses mounted, and the problem seemed beyond even the business genius of Fiat's chairman and head of the controlling family, Giovanni Agnelli.

When it was announced that 23,000 workers would be laid off, a strike began. In the 35th day of the walkout, something happened that is likely to be remembered in Turin for many years to come. Disillusioned by the violence and fearful for the future of their jobs, workers estimated to number 40,000 walked in silence through the streets of the city in protest not against Fiat but against the union. The strike was broken.

At the same time, Olivetti, in the city of Ivrea, north of Turin, has rebounded and become the leader in its field in Europe. The company now ranks eighth worldwide in sales of office machines and data-processing equipment.

What sets Olivetti apart is its genius for design. To this day the Lettera 22 portable typewriter is considered by many engineers to be the finest industrial design of the century. "It was so popular," said Paolo Viti, director of Olivetti's design division, "that we had trouble getting the public to notice our other products. You see, in Italy we don't have oil, coal, or low-cost energy, so we have to concentrate on what we do have, and one of those is a talent for design."

TURIN TO VENICE, Milan to Naples—across and down the boot does the economy of Italy alternately show and hide itself, and in the middle is Rome, somewhat forgotten in all of this, but, in the end, still the mother of the land. Rome's voice is that of authority, not, like those of Turin and Milan, of commerce.

The day of arrival in Rome was for me another birthday, a veritable rebirth. So wrote Goethe.

Wordsworth was not so taken with the city: *Is this, ye Gods, the Capitolian Hill?*

Sometimes scandals outnumber sermons in this city of basilicas and vestments. Here, too, life produces marvelous sketches of farce, and if they are missed on the streets, they can be seen in the new

wave of Italian films being made in Rome.

Like much in the country, the film industry is once again active after a period of slump. Young directors are at work, turning out comedies from the absurdities of life. At work, too, is one of the older masters of Italian films, Federico Fellini. It was during the shooting of a scene in his latest film, at the sprawling Mussolini-built Cinema City in Rome, that Fellini, a gentle man with the bearing of a bass fiddle among flutes, mourned the passing of a time when films had not yet "lost their authority to television." In Italy there are more than a thousand independent television stations, and the offerings range from pornography to somber readings of Dante.

American films have always commanded a wide audience in Italy, and that provides a lot of work for dubbers. And so, the question arises: Who here speaks for Van Johnson?

His name is Piero Palermini and, since Van Johnson makes few films these days, Palermini works as a photographer. No longer a young man, he dubbed his first Johnson film in 1949, and went on to do many others, of which his favorite was *The Last Time I Saw Paris*. Another American film that he liked, he told me, was about five brothers who go off to war. "It had everything," he said. "The five brothers got dead, everything."

And in exchange for Van Johnson, what has Italy given the United States? Luciano Pavarotti, for one. Warmly embraced by Americans, the operatic tenor today is more familiar to fans at the Met than at La Scala. Italy also gives the United States wine, and that too has earned a welcome here.

There are Italian wines marketed by a company called Villa Banfi, and they are restructuring the wine-drinking habits of Americans. No other wine imported into the U. S. sells quite so briskly as this fruity, lightly effervescent, low-alcohol offering with the Riunite label.

The sales of the wine in the States exceed 130 million bottles a year. It is heavily advertised, with a suggestion that it is a wine to be served at any time, chilled if so desired, quaffed like a beer, sipped like nectar, taken with the potato salad at picnics or with the lamb chop under candlelight. It is, in short, the all-purpose wine, the Swiss army knife of imbibition.

"This is a perfectly valid wine, magnificently made," a Villa Banfi executive said. "It is a product of the most modern technology and thorough research of wine making."

Massive quantities of Italian wines are being sent each year to France and Germany and the Soviet Union. France alone imports some 200 million gallons; much of that is blended with local wine and sold under French labels. "And now they are marketing a 'Eurowine,'" an expert on Italian wines told me. "The idea is that what comes in that bottle can be from anywhere in Europe. In effect, we already had that, because so many French and German wines have for a long time contained a lot of Italian wine."

There is an area in Italy extending over 175,000 acres in which are grown the grapes for Chianti Classico. It runs south of Florence to Siena, and in this region of rolling hills and broad valleys you find vineyard after vineyard swollen with Sangiovese, Canaiolo, Malvasia, and Trebbiano, the grapes of Chianti.

It was by a law enacted in 1932 that the Chianti Classico region was designated. Production is tightly regulated, and the wines that reach the strict standards set forth are awarded the highly prized seal of approval, the Gallo Nero, or Black Rooster, a symbol in use since the 13th century when it was the emblem of the Chianti League.

Italy imports beef from France, wheat from the United States, milk and butter from Germany. But its wines are its own, and they are now becoming much of the rest of the world's wines as well. It is seldom on food and drink that this nation is faulted.

AS INDUSTRIALIZATION has risen and claimed more and more of the land, agricultural lands have shrunk in Italy. There are still many farms in the broad Po Valley, but it is not the jamboree of agriculture it once was. The valley is still struck blind by the fog in winter, when the river feels its way to the sea. Cremona is there, medieval and haunting and remembering its most famous sons, Antonio Stradivari and Andre and Nicolò Amati, the greatest of violin makers.

Violins are still made in Cremona. Students come there from all over the world to

attend a vocational school where they are taught to make not only violins but other stringed instruments, such as the cello, viola, and bass, as well.

And that seems only right, for in the far future, when this era in Italy's eternal survival is seen as history, it should be said that there was music.

Sergio Renzi, president of the school in Cremona, is hopeful that the violins now being made there will one day be as valuable as those from the hands of Stradivari and the Amatis. But who today will sculpture another "David?" Who will leave to the world, with Italy as executor of the bequest, treasures to match those of Michelangelo and Bernini and Leonardo and all the master artists born to this land?

In Italy today many are deeply concerned, fearful for the preservation of the treasures that survive in such abundance in this country, for they are being seriously damaged by pollution. In many cases the marble has become powdery, and the statue has lost its sharpness of detail.

"We first became aware of the problem in the 1960s," said Antonio Paolucci of Florence, an expert on restoration. "And in just that short time, so much more damage has been done. The major cause is pollution from automobiles and fumes from home heating systems."

The danger is not restricted to art in the open. "There are just too many tourists in Italy," Dr. Paolucci said. "They crowd into the museums and that raises the humidity, thereby endangering the artwork."

A new agent for preservation of art in marble is now being tested. It is called Fomblin Y Met, and some have hailed it as close to an elixir of life for the statues and carvings. It is a substance not much different from that used to coat the exterior of the shuttle and other space vehicles for purposes of lubrication. Applied to marble, it bars penetration of pollutants while at the same time allowing the evaporation of water.

"We will have to wait several years to get the results," Dr. Paolucci said, "but so far Fomblin Y Met seems to give excellent results. Not only does it offer protection, but it doesn't alter the color of the stone. And it is inexpensive."

Herdlike tourism is villainous to a man with the concerns of Dr. Paolucci. He has looked ahead and seen the possibility of a future without Bernini's "Fountain of the Rivers" in Rome's Piazza Navona, or the inlaid marble facade of the church of Santa Maria Novella in Florence, and his apprehensions run deep—deep to the point where he says, "The time is coming when we will probably have to close the whole center of Florence to traffic. But Venice, that's the worst. It has become like a Disneyland."

CERTAINLY there is no more open aspect to Italy's open-hidden economy than tourism in Venice. The mayor, Mario Rigo, has even proposed that tourists be required to buy tickets before being admitted to the city.

Close to 15 million tourists now crowd into Venice each year, and the city continues to sink, a ship awash to its gunwales. It is so old, and so beautiful, that the peril tears at the heart. There are Venetians who weep now when they speak of their city, weep as only they would, not for nation, but for this small and hymned place.

But their tears do not cloud the ever present vision of priorities. There is a lady selling flowers—gardenias, I think—in the Piazza San Marco, and when it comes to midnight, she still has a single flower left. She goes into a church and offers the flower to God before walking to the edge of the Grand Canal where she speaks to a man with an aura of influence. "Ezio," she says, "my vendor's license is finished tomorrow. What must I tell them to get it renewed?"

And the answer comes in a voice that carries into the night like wind in a chimney. "Tell them," it says in a most Italian way, "that you know me."

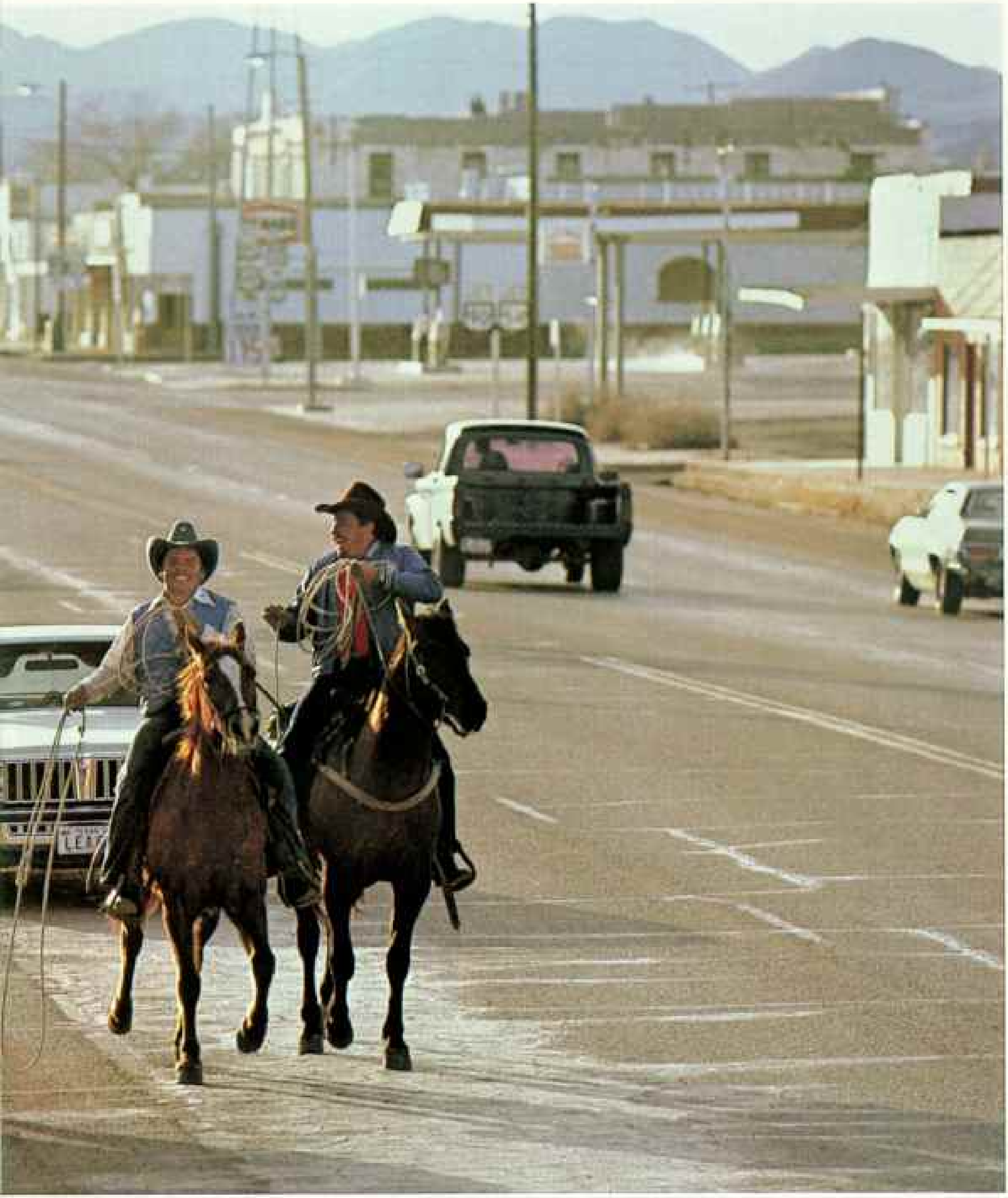
Survival. □

Masquerader at the carnival of Venice *captures the élan of this youngest of Italy's great cities, whose Piazza San Marco is mirrored as a fleeting image through the café window. A powerful maritime republic for a thousand years, Venice early embodied the entrepreneurial spirit that seems to drive modern Italy.*

Where the frontier never died, cowboys take a Sunday

TEXAS WEST

By GRIFFIN SMITH, JR.

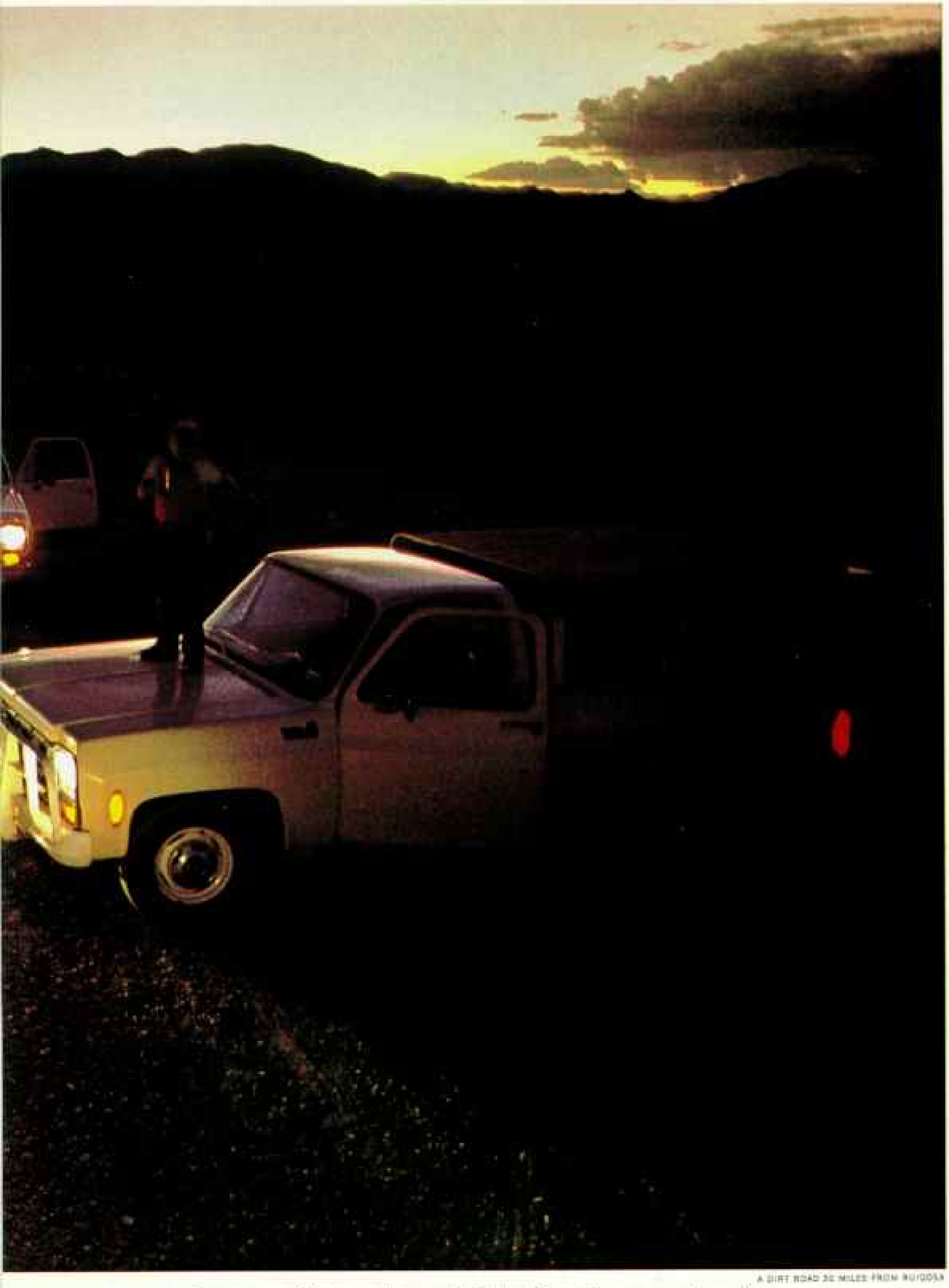


ride around the West Texas town of Van Horn.

OF THE PECOS

Photographs by DAN DRY

"A visitor asked what we do for entertainment.
Well, we call ranch neighbors to meet at this dirt



A DIRT ROAD 30 MILES FROM RUIDOSA

crossroads on a Saturday night. To the music of our truck radios, we dance under the stars."

JACK PAUL III, RUIDOSA

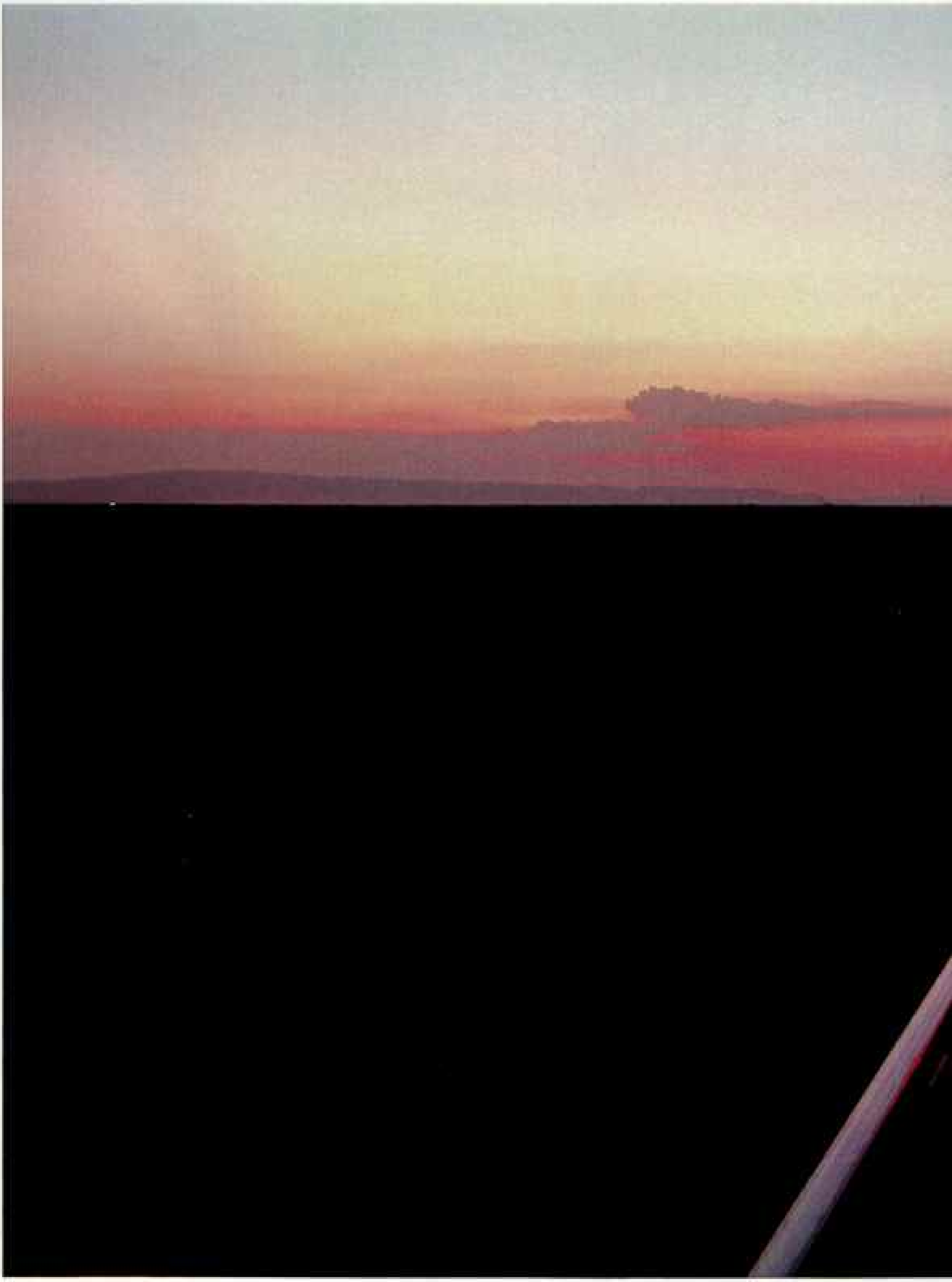
"Sometimes I think the good Lord meant all this desert to be cattle country. We can raise a 135-acre circle of wheat or alfalfa with each center-pivot sprinkler, but last year it cost more to farm than we got from the crop. Course, if we find oil on the land, that always helps."

ROBERT L. COWAN, FARM MANAGER

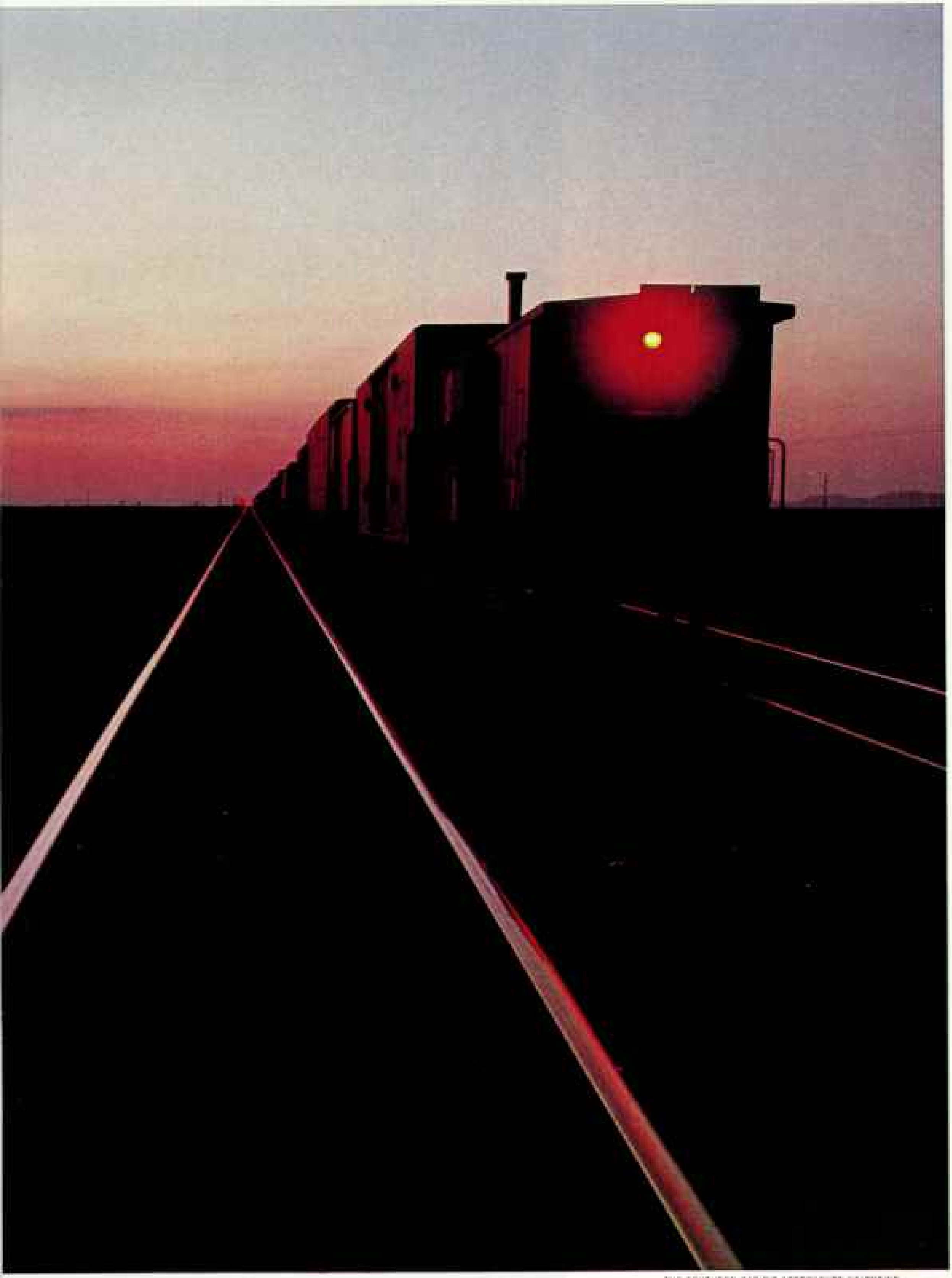
BETWEEN FORT STOCKTON AND PECOS

"Most of West Texas is bone-dry. Our little rain comes in torrents; flooding left this silty clay. An explorer called our streams suicidal."

JEWEL McADOO, RANCHER



"The land is so full of silence that there is no room for sound. The most important noise heard in



THE SOUTHERN PACIFIC APPROACHES VALENTINE.

this frontier is the low three-toned wail of the railroad whistle, announcing a link with the outside world."

RICHARD WEST, TEXAS WRITER

"Folks here are tough as shoe leather but good as velvet. Criminals used to be gunfighters with vendettas; now it's drug smugglers and oil-field equipment thieves."

RAUL FLOREZ,
REEVES COUNTY SHERIFF

"We cling to the land our ancestors were granted by the governor in 1876; we still use the irrigation canals they dug."

LUCIA REDE MADRID, REDFORD

ELEMENTARY SCHOOL STUDENT RAUL BAEZA OF CANDELARIA

"Cowboy fun went official in Texas with the first rodeo in Pecos a century ago; now boys and girls take a course for credit and practice every day [right] at Sul Ross State University; it's more popular than baseball [above]."

RODEO COACH
JOHN MAHONEY, ALPINE

"Turkey vultures like to sun themselves in the heat of the day. This is a working ranch; we pasture

crossbred steers from Old Mexico. It's plush after rain, but everybody had trouble last year."

JULIA TREDAWAY, BIG BEND RANCH

SAMMIE BRAMBLETT is not an impulse shopper. The nearest grocery store is an 86-mile trip from her ranch on a bluff above the Rio Grande. The nearest gasoline station, bank, and post office are no closer. At age 74 she lives alone at the end of the longest dead-end road in all Texas.

"We pioneered this place in 1935," she said as we stood in her dusty backyard, looking across the broad river valley toward a ring of blue mountains shimmering in Mexico. There was no other human habitation as far as the eye could see. "Once you get used to it, it's no problem. The only thing I miss is the movies."

Electric lights reached the Bramblett household in 1960. The telephone has still not come; Sammie communicates with the outside world through a radio rigged so that incoming calls make her car horn blow.

"I've got a pistol, and I know how to use it."

Is she ever afraid? You jest. "I've got a pistol, and I know how to use it. I talk 'River Spanish,' and if I stand in the door and point this ol' gun, I don't *have* any more trouble."

The most telling fact about Texas west of the Pecos River, where Sammie Bramblett lives, is that by its standards she is no figure from the past. During several weeks of maneuvering a four-wheel-drive vehicle through the canyons, mountains, and desert flats of that isolated region, I met dozens like her, people for whom solitude is the basic fact of life. No one considers them hermits or eccentrics—not even the cityfolk of Pecos (population 12,855) or Fort Stockton (population 8,688), towns that are the closest the region gets to mainstream America. Texas west of the Pecos is among the last truly idiosyncratic parts of the United States, and its people are a tough, old-fashioned breed, secure in their convictions and self-sufficient in their ways, delighted to be left alone.

Spanish explorers called it the *despoblado*—the unpopulated place. Texans who speak today of the Trans-Pecos or, more loosely, the Big Bend country, mean this same rugged quarter. Though it embraces nine counties and part of a tenth, together the size of South Carolina, it is home to just 55,000 inhabitants, excluding El Paso.

The mountains of the Trans-Pecos are the last tail end of the Rockies, and the deluge of westward migration reached them late and weak. Not until the Apaches were defeated in 1881 and the railroad came through in 1883 was the way clear. Even today, Texas west of the Pecos is a place where man's hold is far from secure.

Cora Moore, nearly 90, was born near Madera Canyon in the Davis Mountains on land her father was the first white man to own. "I had a beautiful life," she said. "I was an only child. I was my daddy's cowboy. Oh, we'd ride all day. There was everything out there you could ever want to have." Cora's nephew, John, still owns that land.

When ranch manager B. L. Pruitt went out to the canyon to check his cattle one afternoon, I went too. We parked at the road's end, beside the ruins of a house that a family named Hunsaker built in the 1930s.

Once it was a home administered in the grand way; Cora Moore had told me of the parties, the afternoons of bridge. But help was too far away when the fire broke out. Now it is a ruined shell, its great staircase littered with burned timbers and broken roof tiles. Like hundreds of abandoned homesteads in the Trans-Pecos, it declares the frailty of man's presence there.

Hike a short way up the canyon, and Madera seems as free and boundless as it was when Cora Moore rode there as a child. A trickle of water flowed across the rocks, pooling from time to time in deep green basins. "You can sure hear a pin drop up here," Pruitt said—and at that instant there was a scratch of gravel behind us. Half a dozen white-tailed deer skittered into the brush.

In the Trans-Pecos, history is biography: Some lives, like Cora Moore's, have nearly spanned it all. Lela Weatherby lives quietly now in Fort Davis, a retired Latin teacher. But as a teenager in the lawless time of Pancho Villa, she was at the Brite Ranch on Christmas Day in 1917, when Mexican

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Author **Griffin Smith, Jr.**, an attorney and freelance writer from Little Rock, Arkansas, contributed "The Mexican Americans: A People on the Move" to the June 1980 GEOGRAPHIC.

bandits raided the storehouse, terrorized the inhabitants, and killed three men. The memory of that raid still lingers below the surface of the mind of every rancher within half a day's ride of the Rio Grande. His door may never be locked, but his gun is always loaded.

In Redford, a lonely, two-hour drive from the Brite Ranch, I dropped in on the general store of Enrique Madrid's family. Theirs is an astonishing home containing more than 9,000 books. In a corner of the store Mrs. Madrid operates what must be the largest private lending library in the United States. I watched as two young girls made their selections and brought them to be recorded in a card file. Almost everything is returned.

Suspicion of strangers *makes sense when you live on a cattle ranch beside the Rio Grande at the end of 38 miles of dirt road. But Sammie Bramblett turns to smiles when she gets to know you. Security? Her .38 says no problem.*

Redford and nearby Presidio are farther from a commercial airport than anywhere else in the lower 48 states. A visitor to Presidio in 1849 described it as a "poor, stricken town" with a "barren and desolate aspect." It has grown no lovelier since. Though dusk was falling on the first day of autumn, the temperature sign at the First (and last) Presidio Bank still read 102 degrees. I felt I had come to the last path of the earth.

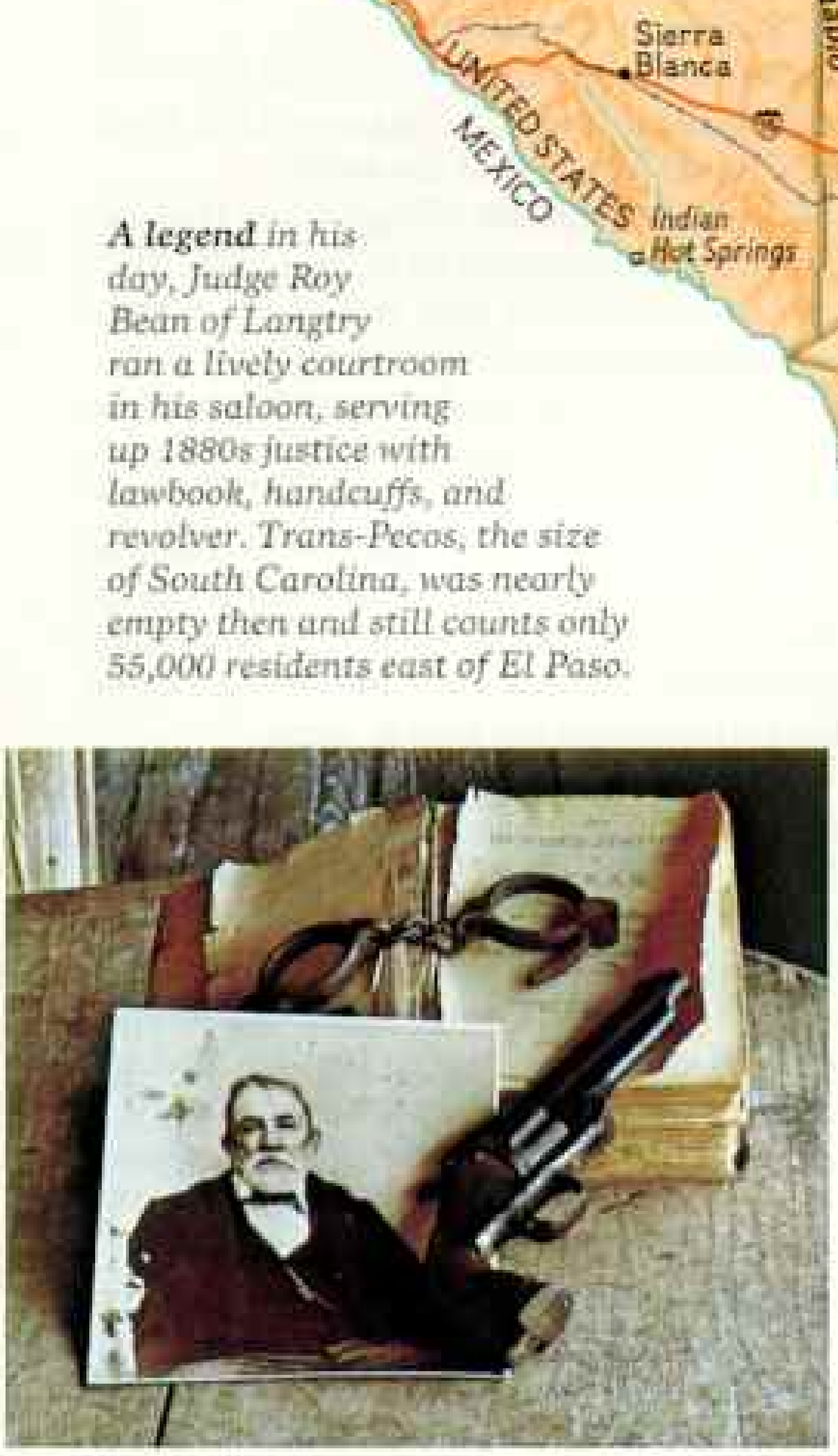
This was an Indian village when the first Spanish explorers arrived in the 1580s. Men have cultivated the rich soil of its desert-ringed basin since prehistoric times.

Today the shops on its windblown main street conceal behind their plain facades an abundance of luxury goods. Few local ranchers can afford the best of them. But until the peso was devalued in 1982, wealthy Mexicans from as far away as Chihuahua city flocked to this tiny border town for things they could not find at home.

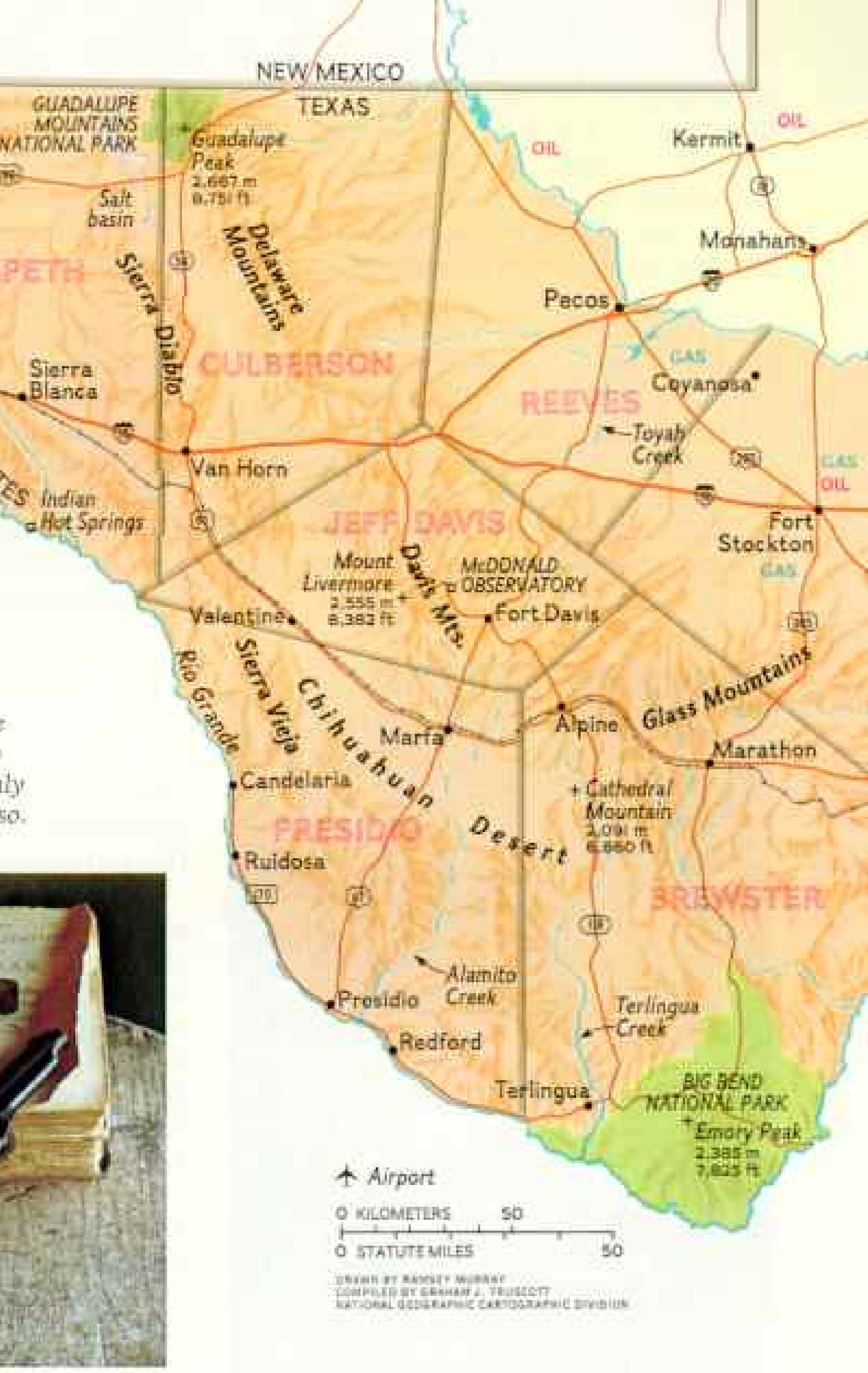
Down the road is a sandy, grassless cemetery. Some headstones had sunk into the ground; others tilted a little more crazily with each rain. The poorer graves were marked only by a scattering of rocks. I stopped at a tiny grave marked simply BOY; at the shared resting place of Guadalupe Guerrero and Henry Olthoff, who died years apart (what story there?); at a simple concrete slab where someone, tracing the lettering by hand before the surface dried, had added a small lopsided heart.

Candelaria, upriver from Presidio, is so small that the church celebrates Mass only every other week. But it is a living community whose soul is the immaculate dry-goods store run by two elderly sisters, Frances "Nellie" Howard and Marion Walker. The store has been in their family for three-quarters of a century. It is a high-ceilinged period piece with glass-front cabinets. Shoes, cooking pots, bolts of cloth, and cans of food are arranged methodically on shelves behind the counters. Nellie pumps gasoline wearing a sunbonnet and gloves.

The sisters' values are sobriety, honesty, and hard work. Each day from noon to one they close and retire for lunch in their formal dining room next door. They insist that children always speak English inside the store,



A legend *in his day, Judge Roy Bean of Langtry ran a lively courtroom in his saloon, serving up 1880s justice with lawbook, handcuffs, and revolver. Trans-Pecos, the size of South Carolina, was nearly empty then and still counts only 55,000 residents east of El Paso.*



regardless of what they speak outside. "You should start early to respect this country," Nellie says.

Decades ago, before irrigation around El Paso sucked the river dry, Candelaria was a cotton town. Now the sisters are the last Anglo residents, their store an embassy of the Texas way of life.

The one- or two-room schoolhouse once was a familiar fixture in rural America. In Candelaria it still is. Each Sunday night Johnnie Chambers makes the long journey from her ranch to a cottage in the schoolyard, staying there all week preparing lessons for the 22 Hispanic children of Candelaria Elementary.

She is a woman with a purpose. Wearing white slacks and a blouse, her hair in a bun, round pink glasses perched on her nose, she was constantly in motion, teaching grammar, anatomy, and arithmetic. Sometimes she spoke in Spanish, other times in English. One moment she was administering tests, the next grading them; she pasted gold stars on one achiever's forehead as she taught others geography. A country schoolhouse is as busy as a box of kittens.

At the end of the day the children opened

One of the largest national parks outside Alaska, Big Bend (1,141 sq. mi.) has been called the hottest, coldest, driest, wettest, and orneriest place in Texas. Largely undeveloped, the park offers the solitude of spectacular canyons inhabited by golden eagles and mountain lions.

their music books. Johnnie led them in song; "Oh! Susanna," "The Blue-tail Fly," "Brother John." For a moment I was in a 19th-century frontier Texas schoolroom; only the students were different. Johnnie let them vote. "Red River Valley," they shouted as one. I listened:

From this valley they say you are going.
We will miss your bright eyes and your smile. . . .

The brilliant afternoon sun streamed across the broad dry Rio Grande. When the sisters are gone and Johnnie Chambers is gone, I thought to myself, this will be Mexico again.

Come and sit by my side if you love me,
Do not hasten to bid me adieu;
But remember the Red River Valley,
And the girl that has loved you so true.

High above Candelaria, across an escarpment called the Rimrock, cattle breeders like Clay and Jody Miller raise Herefords in the spacious grasslands known as the Marfa Highlands. They are lucky enough to pipe water straight into their home from a surface creek fed by perennial springs, but their cattle business is hostage to the weather. The number of cattle per section roughly equals the number of inches of rain per year.

> "The word 'rain' dominates every conversation. Did you get any, how much, where, hope you do."

The search for water is the one abiding constant of life west of the Pecos. "The word 'rain' dominates every conversation," wrote Texas author Richard West. "Did you get any, how much, where, hope you do." When torrents come, water runs off with wasteful havoc. The proud Pecos highway bridge near Langtry was 50 feet above the river, but a 20-inch downpour one night in 1954 obliterated it beneath an 86-foot-high wall of water. In the Trans-Pecos, fortune smiles with bared teeth.

Leaving the Millers' ranch, I stopped in Valentine to meet one of West Texas' most unusual women. Jewel Babb is 83 and widowed many years. In a famous photograph of Judge Roy Bean holding court on the porch of his saloon in Langtry, a little boy in overalls stands shyly beside the steps. He grew up to take Jewel as his bride, but that was long ago. Now she lives in a thin frame house, catering to visitors who come to be healed by her psychic powers. Could she, I asked, sum up her life? She thought a long time, so long that I thought she had not heard me. Her eyes seemed to gaze far away. "It was *hard*," she finally said.

A young woman arrived carrying her infant girl, whose head lolled from side to side. Jewel laid the child across her lap. She massaged first a leg, then a foot, then toes, her aged leathery hands stroking the smooth baby skin with practiced gentleness; then she moved them in arcs above the child's head. The mother watched the ritual respectfully; afterward, cradling her daughter in her arms, she seemed pleased.

Valentine is a division point on the busy main line of the Southern Pacific railroad. Crews change there, bedding down for the night in comfortable lodgings, while U. S. Border Patrolmen search the waiting freights looking for illegal aliens. At dusk I followed one long train out of Valentine; it snaked across the horizon in the golden light, shuttling the products of commerce and industry from one coast to another, swallowed up for a moment in this vast and silent emptiness. It slowed for Alpine, the largest of three rival towns in the highland ranch country.

Alpine (population 5,465) owes its preeminence to a state college, Sul Ross State University, whose 1,900 students hail from 29 states and 21 foreign countries. The school's intercollegiate rodeo teams shine in events like bulldogging, saddle bronc riding, and calf roping. Students' pickup trucks bear signs like "I'm a roper, not a doper." More traditionally minded scholars probe the biology and geology of the Chihuahuan desert.

Fort Davis, near the University of Texas' McDonald Observatory, is the highest town in Texas at 4,900 feet: conservative, chilly, a bit straitlaced. The courthouse has turnstiles to prevent stray cattle from wandering off the street and into the halls of justice.

I found County Judge Ann Scudday in her office, typing her own letters. On her civil

High, wide, and secure, *Marfa supplies the immense ranches of Presidio County as it has for a hundred years. Once cattlemen struck deals in the lobby of the El Paisano Hotel, left, built in 1929 for $200,000; now absentee owners control half the land, and the hotel is being converted to condos. Still, as a judge in the stately courthouse says, "You can leave your doors unlocked in Marfa."*

court docket only three cases had been filed in the previous four years. Two were settled; in the other, a landowner failed to appear in court, and a surveyor was granted access across the land. "I wished him luck and told him I hoped he didn't get shot," she said.

The Fort Davis cavalry post, established in the 1850s, has been restored as a historic site. Across the way is Leroy Baeza's family grocery. He has seen the future, and he likes Fort Davis better.

"Growing up here, I couldn't wait to get away," he said. "I went to Los Angeles, and by the time I was 30, I was chief industrial engineer at Disneyland. I planned the infrastructure of offices and stuff, not the creative things. But you want to do your own thing. So I came back here. Now it all seems like a dream."

He stepped inside to help his father sack some groceries. "My daughter was in kindergarten when we left," he said, cushioning a box of eggs between some paper towels. "Now she's 16, and she says, 'You mean I could have grown up living in *Hollywood!?*' But here I can let her have the car keys, and I don't worry if she's still out at eleven; there, I'd worry every time she left the house. Young people don't appreciate this kind of place."

Marfa, the third of the highland towns, remains what it has been for a hundred years: a tiny self-contained trading center where cattlemen buy necessities. It is "landlocked" by the adjacent ranchers—unable to grow unless they choose to sell their land. And because growth means newcomers with who-knows-what exotic ways, most reasons for growing do not strike the ranchers as good ideas. An hour up the road at Van Horn I encountered that world they try so hard to keep at bay.

In 1859 John Butterfield's stage traveled from the Pecos River to El Paso in 55 hours. Now sleek buses cover the same distance in less than six. But travelers still stop for fuel and refreshment at Van Horn, the only town of consequence for 175 miles on Interstate 10.

To Bill and Gloria Moore, agents for both Greyhound and Trailways, the highway is a conduit for whatever the outside world chooses to deliver. So the windows and doors of their bus-station cafeteria are reinforced with heavy metal bars, a rare sight west of the Pecos.

"We never know who's going to walk through that door," Gloria explained. "People try to steal anything from a candy bar to someone's baggage. They get drunk on the bus, and the driver puts them off. Hitchhikers think they can sit here all day."

"Ninety-nine percent of the people are real nice," Bill, a former lawman, added.

Three transcontinental buses arrived together. Dozens of riders poured out to stretch their legs, blinking at the surroundings. One young man leaned against the wall and sipped from something inside a paper bag. For a few minutes it was Los Angeles in Van Horn. Then one by one the buses drove away, and it was again West Texas. As if on cue, a tumbleweed rolled down the street behind them.

Occasionally even Angelenos come to stay. A few years ago the Reverend Ted Peck ministered to a Presbyterian church in the suburbs there. Now he has congregations in both Marfa and Fort Davis and a 1,600-square-mile parish to cover in his 1977 Volkswagen bus. I caught up with him at the Marfa church, looking less than his 40 years, wearing blue jeans and cooking stew for the Thursday night Bible class. An Old Testament passage in Hebrew lay open for study on a table.

"Big money changes hands here over just a handshake. Of course, if it's *land*, they bring lawyers."

"It's a little more individualist out here," he said with a grin. "Me and my Bible and my horse on top of a hill, we visit God." A man's faith affects the way business is done. "Big money changes hands here over just a handshake. Of course if it's *land*, they bring lawyers."

In the sober, hard existence of the Trans-Pecos, the annual Wick Fowler Memorial World Championship Chili Cook-off is pure comic relief. Held in the ghost town of Terlingua, once a quicksilver mining center

described as "the fartherest you can go without getting anywhere," it honors the Texas chili guru who in 1967 challenged New York humorist H. Allen Smith to a chili-making duel. (Smith had provoked Texans by writing that his chili was the best.)

"The only place on earth where a disaster would never be noticed. . . ."

Terlingua was chosen, Smith claimed, because it is "the only place on earth where a disaster would never be noticed, the town itself being a disaster."

Now, for two days each November, a portable village sprouts in the desert. Serious cooks, for whom chili is ambrosia, rub shoulders with amateur "show groups," whose theatrical skits provide a pretext to cavort. I joined 8,000 other spectators, many of them in the waning stages of sobriety, at this mardi gras of the country and western set.

There were people dressed as chili peppers, as monks, as locomotives. There were bouncy women dressed as Dallas Cowboys and bearded men in brassieres as their cheerleaders. There was the Best Little Chili House in Texas. And from many of the simmering caldrons the smells were, well, disturbing. Was it chili, or was it herbicide?

Eastward, the wild exalted country of Big Bend National Park is the scenic heart of the Trans-Pecos. As I drove through its vast silences, the uproar of the chili cook-off receded like a thunderstorm. This was landscape reduced to its essentials, surface and horizon and sky. A love of such land, with its solitude and its spare, sudden beauty, and no less a love of personal independence—the chance for a man to do as he pleases, unwatched and unbossed—make the people of the Trans-Pecos what they are.

In Sanderson, a hardy and admirable little town still struggling to recover from a catastrophic flood that struck without warning from a normally dry canyon one dark night in 1965, I met curly-headed Dudley Harrison, then a candidate for the Texas Legislature—sheep raiser, entrepreneur, a man who minces no words.

"I dislike federal and state government control in any shape, form, or fashion," he says, an edge to his voice. "I've lived on the Rio Grande all my life, and we're a dying breed, I think we are. We're down to 70 cents a pound on wool, and we can't move

Healing hands *of Jewel Babb bring relief to a crying infant. The 83-year-old widow, now living in Valentine, once owned Indian Hot Springs on the Rio Grande, where she learned folk remedies from Indian and Mexican neighbors and faith healing on her own. "I sure saw a lot of people get well."*

these lambs. The government has tried to keep food prices low, and it's succeeded at the ranchers' expense." And so, like the Roman general Cincinnatus leaving his plow to defend the republic, he offered himself for state representative.

When Harrison growls, "I do not believe the federal government can control *anything* better than *I* can," he speaks not only with the voice of his constituents, who elected him resoundingly, but also with the spirit of the first men to come to the Trans-Pecos, pursuing independence above all else.

When Roy Bean declared himself "the law west of the Pecos" in 1882, he added a phrase to the English language and gave a whole section of Texas a lasting identity. The premises where he dispensed both liquor and justice stand preserved in Langtry, a depopulated water stop not far from the limestone canyons where the Pecos meets the Rio Grande. When the inaccessible western side of these canyons was opened by the railroad, someone was needed to maintain order, and barkeep Bean, a knockabout who had followed the railroad crews with a tent saloon, was somehow appointed justice of the peace.

Was he a hero or a scoundrel? Some say his peculiar brand of law was the best that could be had under the rough-and-tumble circumstances of the day. But the late Pard

Schupach, a Dryden rancher who was among the last who knew him personally, disagreed. "I was in Langtry the day he died—old age, I think, and too much beer, and maybe too much mean. There wasn't nothing decent about him, nothing."

On the other hand, lean, balding Jack Skiles, a Langtry sheep rancher who supervises the state's excellent Judge Roy Bean Visitor Center, quoted a lady to me who grew up in Langtry: "Roy Bean might have been a murderer and a robber and a thief, but he was a good man in his way."

I asked Skiles to explain the old rapscallion's lasting notoriety.

"The Maher-Fitzsimmons prizefight." In 1896 Bean promoted the world heavyweight boxing championship on a sandbar in the Rio Grande. The match had been outlawed by several states before Bean's offer put it beyond the reach of lawmen. "When all those eastern sportswriters got out here, they didn't have much copy," Skiles said. "The old judge put on such a show for them, they made him famous."

Bean's name is forever associated with British actress Lillie Langtry, "the Jersey Lily," a beauty rumored to have been the mistress of the Prince of Wales, later Edward VII. Bean posted a sign (misspelled) declaring his saloon the Jersey Lilly, and told visitors the town of Langtry was named for her. But, says Jack Skiles, "He heard this town had her name—it was probably named for a railroad man—and, being a big public-relations man, Bean thought, 'Boy howdy!' It was all a big blow."

Far upriver from Langtry is a very different Trans-Pecos. In the hour between Sanderson and Fort Stockton, one crosses an

*"**I've never been without a horse** since I was three," says Sondra Harris, a major in range-animal science at Sul Ross State University, who sees riding as a way to calm nerves and just have fun. She brought her beloved palomino Toffy to college so she could ride to class, work in roundups, and explore back trails. Like many in the Trans-Pecos she wants to enjoy the wilderness free of crowds and cars.*

invisible line into the part of the Trans-Pecos most attuned to the modern world. Fort Stockton and Pecos are unlike the rest: in wealth, in bustling tempo, in their cordial attitude toward industry. They are home to nearly half the Trans-Pecos people. Like progressive towns anywhere, they seem eager to grow. Outside Fort Stockton is a new hospital and clinic. Remembering Big Bend country, where Jewel Babb practiced the healing arts of the Mexican *curanderas*, I felt catapulted forward half a century.

In a piquant twist, the doctors who run this sparkling new clinic are Thais. Fort Stockton, finding that upwardly mobile young medical graduates tend to spurn small towns, built it purposely to lure new doctors there, and from Bangkok via New York came Prasert Thammasithiboon, M.D., a surgeon, and his wife, Napaporn Jessadapagorn, a pediatrician. The "Doctors Boon," for short.

"We like it here," he told me. "In Thailand wet and hot, here dry and hot, eh? Low unemployment rate, fine schools for the kids. It's a rich county, that's good, eh? We try to adapt to American ways. We enjoy rodeo and western dance. We don't know how to dance, but we try." The Boons are not untypical. In Pecos several doctors from Pakistan have settled in to practice.

Shallow, salty, swift, the Pecos River in these parts lacks the grandeur of its course near Langtry. The land is flat and charmless. But underneath are wondrous things. Two-thirds of the wealth of the Trans-Pecos is generated in the county where Fort Stockton lies, and it's spelled p-e-t-r-o-l-e-u-m.

The Yates oil field at Iraan owes its name to Ira G. Yates, a struggling grocer. He paid $2.50 an acre for land along the Pecos, where, in 1926, a veritable inland sea of oil was discovered. Today it still produces 125,000 barrels of oil a day. The mineral rights were long ago leased by the family to corporations, principally Marathon Oil, which operates the field.

Surprisingly, Marathon Oil is not the county's largest employer; Firestone is. At its test center near Fort Stockton, James Ward and 122 other drivers negotiate new cars around a 7.7-mile oval high-speed track five days a week, 350 miles a day, testing tires and chatting on their CB radios. For the first 15 years Ward moonlighted at rodeos in El Paso: "I'd get off work here about 2:30, be in El Paso that night, and be back here for work in the morning. I'd put in a 900-mile day." And for relaxation? "We're into motorsicklin' and boatin'. Lake Amistad's just 200 miles away."

These wide-open spaces seldom enjoy a sense of nature's fruitful bounty. But in Coyanosa and the Toyah Valley, irrigation from groundwater fosters an exception. Pecans, peppers, and the famous Pecos cantaloupes are grown. Agribusinessman Bill Ramsey oversees fields of cotton and barley, staying in touch with his town office by a mobile telephone. Soil and water expert Jaroy Moore experiments with guayule, a plant that yields natural rubber. And on isolated patches of desert, farmer Frank Carpenter, foreman of the Escondido Vineyard near Bakersfield, takes pride in his white Chenin Blanc. "It's the most satisfying crop I've ever worked with," he told me. "You sort of feel like the first pioneers must have felt when they discovered this land was good for something." How odd, I thought, that in this barren place not long removed from the Apaches, men nurture French grapes.

> "You sort of feel like the first pioneers must have felt when they discovered this land was good for something."

Other, deeper currents are stirring the Trans-Pecos. Mexican-American influence is on the rise. Six counties now have Hispanic majorities. But the ethnic transformation is less a matter of numbers than of participation—social, political, and economic—by people who once stayed on the periphery.

The story is carved in stone on a war memorial on the Presidio County Courthouse lawn in Marfa. Of the five who died in World War I, none had Spanish surnames; in World War II, 20 of 39 did; in Korea, three of four; and in Vietnam, three of three.

Outwardly, Anglo-Hispanic relations

were relaxed and easygoing. In Fort Stockton, MeMe Arriaga was crowned Homecoming Queen, succeeding Stacie Diebitsch. The cable-television station wished everyone *Feliz Halloween*. "I am proud I can speak in the Spanish language," Dudley Harrison's campaign brochures declared.

Casual friendships routinely cross ethnic lines (social relationships less often do). In Reeves County, genial Sheriff Raul Florez is an improbable Mexican good ol' boy—a Mason, a Shriner, a Baptist, a Texas Aggie who played football for Bear Bryant. Eighty-five percent of the voters sent him back for a second term to his memento-lined office where I found him, pistol on hip, flanked by shelves of Texas Criminal Procedure.

"People here are very clannish," he says, pausing now and then to spit tobacco juice into a plastic cup. "You don't just move in. But once they accept you, you're just like family." He had grown up the hard way—poor, shining shoes to earn a few dimes. "Now the old ranchers come in for a cup of coffee and want my help with a windmill or something. That's what we call a noncriminal service, and we'll find a way. These are the people I worked for as a kid."

> "The gringo will last—*probably*—provided we're willing to accept that we're on somebody else's turf."

Many older Anglo families view the changes with mistrust. "The gringo will last—*probably*," one younger Anglo told me, "provided we're willing to accept that we're on somebody else's turf."

No less momentous than this ethnic shift is the changing ownership of the land. Outside speculators, willing to pay far more than the land's productive value for ranching in hope that oil may be found there, tempt even old families to trade their patrimony for greenbacks. Since the 1973 Arab oil embargo, most of Brewster and Presidio Counties have passed into the hands of absentee owners. Those who remain worry that distant investors will care nothing about predator control, or thievery, or taxes to support the schools.

Until now, the arrival of electricity and the eradication of a cattle pest called the screwworm had done more to raise the standard of living in the Trans-Pecos than all else combined. But now, odd contradictions have begun to sprout in the isolation. Cable TV. Satellite dishes. Computer stores.

Remote ranches may vault from the age of radio to the age of home data access without ever passing through the age of television. One rancher beamed at the prospect of following his few stocks on a home computer that put him on equal footing with a broker on Wall Street. In ten years, I thought, the isolation may be gone, and the deep Trans-Pecos more like the rest of America.

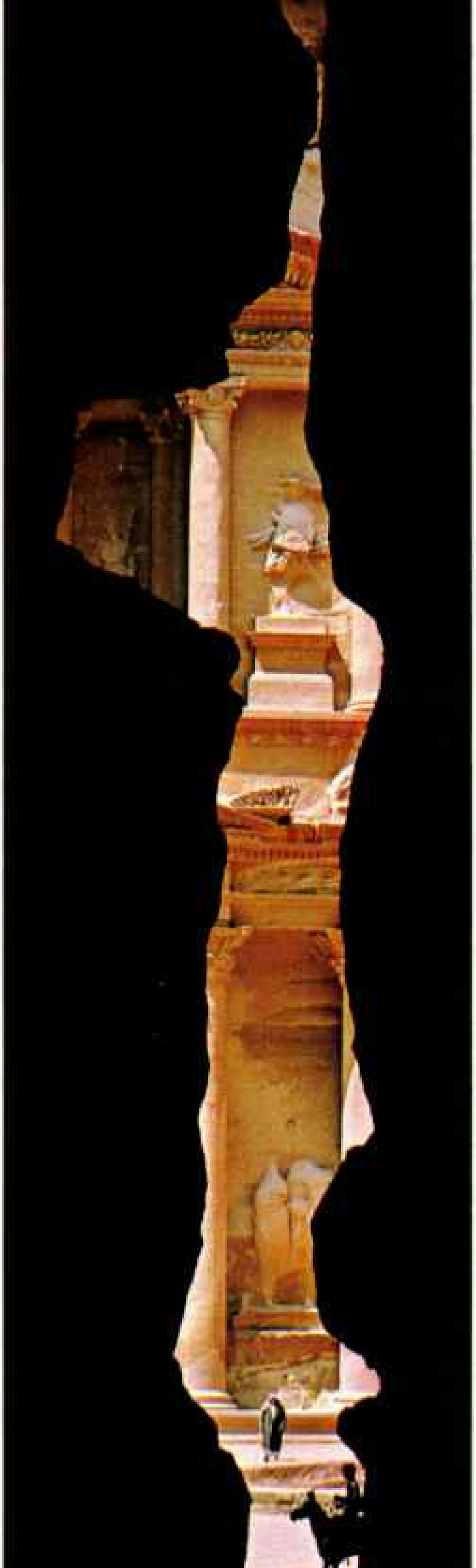
In 50 years, though, I was not so sure. I thought of the ghost towns, the ruins of the Hunsaker house I had seen in Madera Canyon, the abandoned adobe shells. Once the tall grass had stretched as far as the eye could see, and the cool springs had run free; now overgrazing had taken its toll, and many springs were dry. In parts of the Trans-Pecos the white man had already passed across the land like smoke.

The civilization of Europe had swept out of the Old World to what it called the New; across the Atlantic and the Appalachians and the swirling Mississippi, planting neat ordered farms on blackland prairies until it beached against these gravelly and forbidding outermost shores. It brought Latin teachers and motorcars and the 9,000 books in Mrs. Madrid's Redford store.

Seen in the broad sweep of history, men have never managed to "develop" the Trans-Pecos. They simply *cling* to it, wresting what they can from the obstinate land. Would those I met, the latest comers, last? □

Warming the feet and the heart *on a cold March night, ranch foreman Randy Glover settles into the comforts of Alpine's Crystal Bar, where students, ranchers, and geologists exchange news and opinions. Fellowship is treasured by all but confirmed loners in this empty quarter of Texas.*


Crystal Bar
LONE STAR



Jordan: Kingdom in the Middle

ROSE-RED GLOW of antiquity bathes Petra (left), capital of the Nabataeans who carved it from the living stone 20 centuries ago. The light of modern knowledge suffuses eager college graduates (right) in Amman, hub of today's Hashemite Kingdom of Jordan. Never resource rich, the country now exports experts; one in three Jordanians is a student. Its northeastern border touches Iraq, at war with Iran; south lie the strategic oil fields of Saudi Arabia; and on the western doorstep stretches the West Bank, occupied by Israel, coveted by stateless Palestinians.

By THOMAS J. ABERCROMBIE
NATIONAL GEOGRAPHIC SENIOR WRITER

Photographs by JODI COBB
NATIONAL GEOGRAPHIC PHOTOGRAPHER

Acrobats of the desert skies, *the Royal Jordanian Falcons trail ribbons of smoke above desolate Wadi Ramm. Sponsored by Alia, the Royal Jordanian Airline, the Falcons fly their Pitts Special biplanes to entertain small desert villages as well as air-show crowds in Europe and North America. The awesome cliffs of Wadi*

Ramm, rising half a mile above the sands, seemed "vast and silent" to Lawrence of Arabia as he rode with Arab forces to attack Turkish trains in World War I. "Our little caravan grew self-conscious, and fell dead quiet," he wrote, "afraid and ashamed to flaunt its smallness in the presence of the stupendous hills."

Jordan's only seaport, *the town of Aqaba* ***(above)*** *became a major entry point for supplies to Iraq after war broke out in 1980 between that nation and Iran. At its peak 2,000 trucks a day left Aqaba's loading docks, many bound for Baghdad. The number has since decreased somewhat with the opening of new routes through Turkey. In the past decade the Jordanian government has spent millions to develop the port facilities at Aqaba, transforming this quiet resort and fishing village into an industrial center of nearly 40,000 people.*

Loaded down with belongings, Egyptian workers ***(right)*** *at Aqaba head for a ferry to Suez. About 125,000 foreigners, mostly Egyptians, work in Jordan as laborers. At the same time nearly half of Jordan's work force, some 300,000 people, take skilled jobs in other countries, mainly Saudi Arabia, Kuwait, and other Persian Gulf states. The money they send home is the nation's largest source of income.*


AQABA TOURIST ROUT

THE SMALL BUS through no-man's-land creaked to a stop at the last Arab checkpoint, set among the rushes along the Jordan River bank.

"Passports!" A mustachioed Jordanian officer leaned through the bus door. I was careful to hand him the one from my right coat pocket. Across the road a sandbagged machine-gun nest pointed twin barrels over the rusty bridge toward a waving banner, Israel's blue-and-white Star of David. The officer compared face and photograph.

"*Allah yisallmak,*" he nodded, handing my documents back to me: "May God keep you safe."

Our wheels rattled the planks of the King Hussein or Allenby Bridge (facing page), one of two links over the troubled Jordan River; the other, Damiya Bridge, crosses some 16 miles north. Barely 50 feet wide here, the stream coils its last miles toward the Dead Sea, thickened with mud and salt. In this river Jesus was baptized, and today pilgrims still carry home vials of its miraculous waters. Armies of Egyptians, Persians, Greeks, Romans, Byzantines, Arabs, and Turks, in turn, trudged to empire along its muddy banks.

"*Shalom, shalom,*" bade the Israeli soldier with a submachine gun who boarded the bus. I produced my other passport, the one from my left pocket. Border guards emptied my suitcase, politely but thoroughly poking into every sock, sampling the toothpaste, dismantling my electric razor. Finally, a military policewoman thumped a rubber stamp into the passport. Such a mark on my "real" passport would void it for Arab countries—even for my return across the bridge—so, like many who cross often, I carried double documents.

"Welcome to Israel," she dismissed me, in English.

Relieved to be through the formalities, I didn't venture to correct her. But, although Israel has occupied this side of the river since 1967, it has yet to formally annex the West Bank. I had merely crossed from Jordan into Jordan. Or had I?

Arabs, who make up 97 percent of the population here, qualify as Jordanian citizens; the predominant language and culture, Arabic. Here Jordan's laws also apply, and its stable currency, the dinar, prevails. Still, virtually all countries, including the United States, officially view the West Bank and East Jerusalem as "occupied territory." Jordan itself concedes that West Bankers, as Palestinians, must ultimately elect their own future. And although the Camp David accords commit Israel to withdraw once agreement is reached, the present Israeli government vows never to leave.

Under the Ottoman Turks for centuries, the Holy Land became British mandates of Palestine and Transjordan after World War I. To administer Transjordan, Britain turned to Prince Abdullah, son of the Hashemite ruler of Mecca, who had allied himself with the British against the Turks. In 1946 Abdullah was proclaimed king of an independent Arab state, the Hashemite Kingdom of Jordan (map, pages 244-5).

Two years later another independent state, Israel, was formed, resulting in the first Arab-Israeli war. Although the fighting humiliated Arab armies and left most of Palestine under Jewish rule, Jordanian soldiers held East Jerusalem and an enclave on the western bank of the Jordan River. Denied their homeland, the West Bank Palestinians opted, reluctantly, to unite with Jordan. Soon afterward Abdullah was assassinated; his grandson, King Hussein, rules Jordan today. During the Six Day War in 1967 Israel seized the West Bank, and occupies it still.

EACH TIME I crossed the narrow Allenby Bridge—from Jordan to Jordan (or "Israel" or "occupied territory") and back again—I was haunted by rising tensions on both sides of the river. No country shares such a long frontier with Israel as Jordan, and already some 150 Israeli settlements cloud the future of the West Bank. That cloud darkens the precarious prosperity of the entire Kingdom of Jordan.

On a recent two-month tour of this crucial Middle East state I spoke with Jordanians on farms and in factories, in the Royal Palace and dusty Bedouin tents, at ministries and town halls, on campus and at remote desert truck stops.

In Jordan's precocious capital, Amman, I found a favorite refuge, the rooftop coffeehouse called Central across from the Arab Bank in the heart of the old downtown suq. Here I often puffed one of the tall glass water

pipes the waiter tends, deftly adding charcoal bits with great iron tweezers.

Most of the all-male clientele come for the gossip and backgammon; for me, it was the panorama. As afternoon shadows cooled the valley, pedestrians of half a dozen nationalities filled the noisy lanes below, narrowed by shops overflowing with stacks of cooking pots and china, overcoats, luggage, racks of sandals. I finished my cup and, courage up, descended into the calico scene.

Along King Faisal Street, past stalls of goldsmiths and money changers, I rubbed elbows with village women in richly embroidered dresses and merchants wearing three-piece suits with Arab headcloths, thumbing prayer beads. Egyptian construction workers in long robes strolled arm in arm, lugging shiny new stereos.

Under the slender minarets of Hussein Mosque in rows of Arabic confectioneries, pots of boiling syrup and rose water sweeten the air to offer fresh *baklava*, sticky *knafeh*, and *borma*, devastating rolls of sugared pistachios. I paused at one stall, a kind of Bedouin general store cluttered with kettles, saddlebags, swords, raw wool, mousetraps, and tambourines; another hung out brightly colored rugs, handwoven by desert dwellers. Nearby, a seller of holy books wielded a feather duster on the gold and green bindings of his Korans.

At the hillside roundabout called First Circle, Amman levels off into a middle-class neighborhood of tidy stone houses. Ringing for Jordan's small Christian minority—an estimated 10 percent—church bells here alternate with calls from the minaret.

Past Third Circle lies opulent Zahran quarter, stony fields where sheep grazed when last I saw it 15 years earlier, now lined with new embassies, government ministries, and palatial villas banked by gardens of roses, jasmine, and bougainvillea.

Amman's new wealthy, the families of bankers, builders, and businessmen, browse in the modern boutiques of Jebel Amman or Western-style Shmeisani, where they can try on $150 shoes at Raffaello's, or pick up a bottle of Châteauneuf-du-Pape at the Piccadilly Supermarket.

Nearby, among modern banks, luxury hotels, and apartment buildings, rise the futuristic white terraces of Shmeisani Center, built by a Seoul company with its own crew. The 20-story shopping and office complex—the Korean Pyramid, some call it—is one of Amman's tallest. All this prosperity derives from oil money, though Jordan has no wells of its own.

"Our most important natural resource is expertise," said Labor Minister Jawad al-Anani. I met the American-trained economist at his new office in Shmeisani. "Jordanians place high priority on education. Families scrape and sacrifice to get their sons and daughters through school.

"As a result, today we have a talent surplus. Some 300,000 skilled workers—half

the Jordanian work force—are employed abroad, mostly in Saudi Arabia and the [Persian] Gulf states. The more than a billion dollars a year they send home represents Jordan's single biggest source of income.

"Unemployment is negligible. In fact, we have to import laborers, 125,000—mainly from Egypt."

AT BASMAN PALACE, overlooking central Amman, I was received by His Majesty King Hussein bin Talal. Fifteen years had passed since we first met in this small garden of pine and cypress; the "boy king" I remembered had grown into the elder statesman. The deep-voiced welcome was just as warm, the handshake, iron firm, but His Majesty struck me as older than his 47

(Continued on page 248)

Sea of Galilee

Mediterranean Sea

Jordan River

WEST BANK
OCCUPIED BY ISRAEL

Nablus

Tel Aviv

Amman

King Hussein Bridge
(Allenby Bridge)

Jerusalem

Hebron

GAZA STRIP
OCCUPIED BY ISRAEL

Dead Sea

ISRAEL

JORDAN

EGYPT

Petra

Al Jafr Basin

Ma'an

Wadi Rumm

Elat

Aqaba

Gulf of Aqaba

JORDAN

SAUDI ARABIA

HASHEMITE KINGDOM OF Jordan

ONE OF EARTH'S major faults, Jordan's Rift Valley runs north from the Gulf of Aqaba beyond the Sea of Galilee. The desolation of much of Jordan is visible in the typical Landsat colors, in which vegetation appears red. Salt pans in the Dead Sea show in blue. Elsewhere, dry riverbeds lace purple-tinted mountains of limestone and sandstone. The trace of a desert highway begins in Saudi Arabia, skirts Al Jafr Basin, and heads north past Ma'an to Amman.

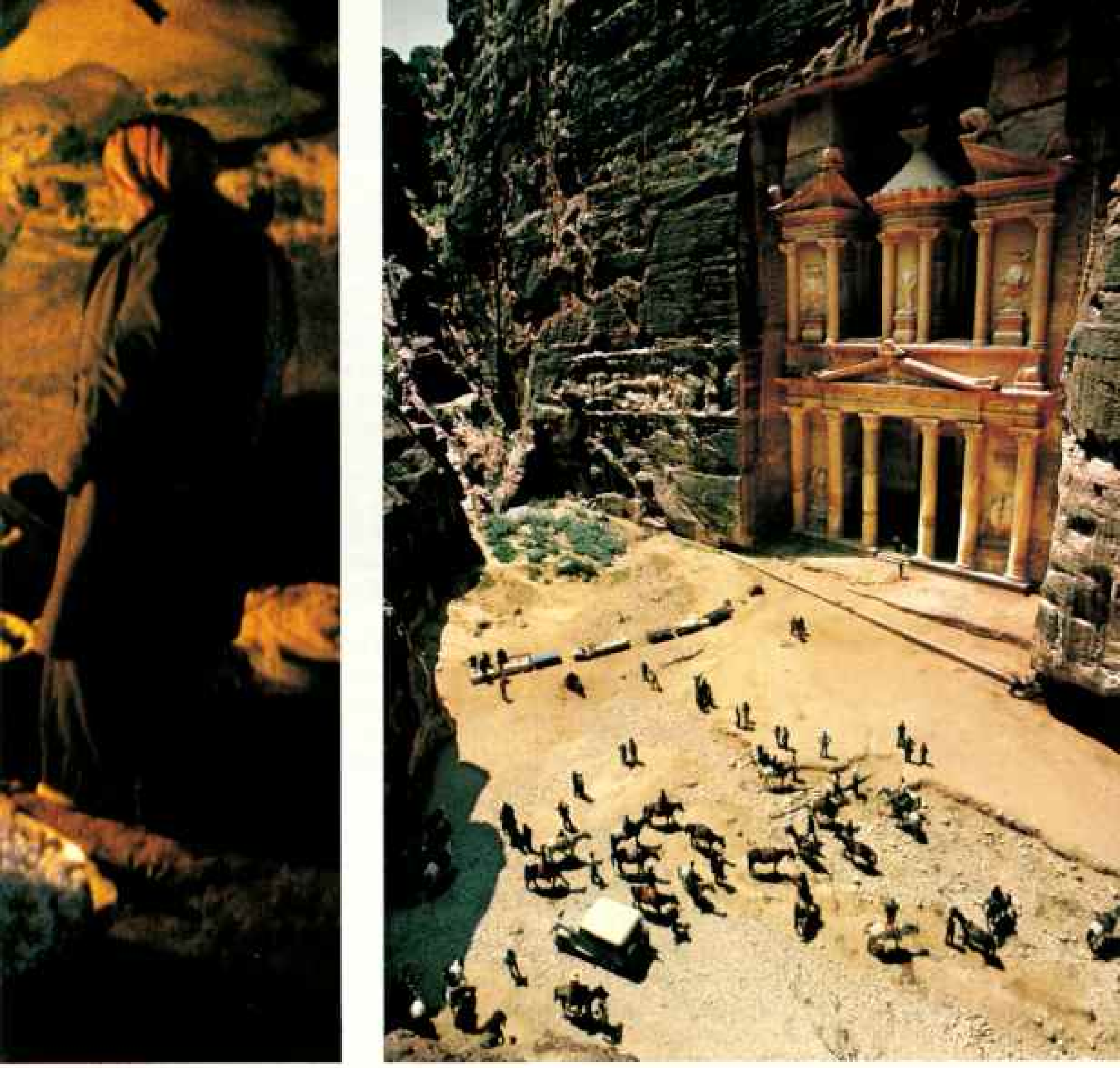
From ancient times the region has been overrun by conquerors. Not until 1921 was a separate emirate named Transjordan created under British mandate by the League of Nations. After World War II, Emir Abdullah of the Hashemite family established a constitutional monarchy called Jordan. In 1948 the United Nations plan for separate Arab and Jewish states in Palestine triggered warfare, joined by Jordan, which absorbed

the West Bank. Renewed conflict in 1967 led to its occupation by Israel. Through troubled years and even today, Palestinian refugees flee eastward across the Jordan River, and today more than half of the East Bank population is Palestinian.

AREA: 97,740 sq km (37,738 sq mi). **POPULATION:** East Bank, 2,350,000; West Bank, 800,000. **CAPITAL:** Amman (1,000,000). **LANGUAGE:** Arabic. **RELIGION:** Sunni Muslim. **GOVERNMENT:** Constitutional monarchy. **INDUSTRY:** Phosphate, potash, petroleum refining, fertilizer, cement. **AGRICULTURE:** Fruits, vegetables, tobacco, grain. **PER CAPITA INCOME:** $1,692. **LITERACY:** 70%.

KILOMETERS 25
STATUTE MILES 25
NATIONAL GEOGRAPHIC CARTOGRAPHIC DIVISION
GEOPOLIS™ MOSAIC FROM LANDSAT
DATA BY EARTH SATELLITE CORPORATION

Like shadows of the past, *Bedouin still make their homes in the ruins of Petra, center of Nabataean civilization more than 2,000 years ago. The men of a family living in a cave* ***(above)*** *prepare a feast of goat's meat and rice for a wedding. Many of these Bedouin serve as guides to tourists who come by horse to see the singular monuments carved in the cliffsides. Among the best preserved, the Pharaoh's Treasury* ***(above right)*** *stands 130 feet tall. Named for a legend that it once sheltered royal treasure, it may have been built in the second century A.D. as a tomb for a Nabataean king. Its large, empty chambers reach deep into solid rock. Several hundred temples, tombs, and houses are scattered through encircling hillsides* ***(right)****, enough for a city of 30,000. Founded at the crossroads of major caravan routes linking Egypt, Arabia, and Mesopotamia, Petra served as the Nabataean capital for four centuries and flourished for another three centuries after conquest by Rome in A.D. 106.*



years. For months the King, following President Ronald Reagan's initiative, had labored to negotiate an "agreement" for the West Bank with Yasir Arafat, leader of the Palestine Liberation Organization. He had traveled extensively to seek support in Arab capitals, in Washington, even China. A few days before, Hussein had announced that the American initiative had stalled.

"What can we do," he shrugged, "but keep trying? We have faced crises before. This one, too, we will survive."

In office longer than any other Middle East head of state, King Hussein is a survivor: four Arab-Israeli conflicts, a bloody civil war—a dozen attempts on his own life. I remembered a chilling description of one ambush outside the capital. Five of Hussein's guards were wounded, one fatally, by a shower of machine-gun fire that "spattered on the tarmac like raindrops," a friend who had been in the motorcade told me. The outraged King had shouted "Shame! Shame!" at his assailants until an aide hauled him down into a protective ditch.

FOR MANY JORDANIANS in these unsettled times the key to survival is education. "Knowledge is security," as a student I met at the University of Jordan put it. "It is one investment no one can steal, annex, or appropriate." With 850,000 students now enrolled, including 27,000 at university level, one out of three Jordanians is a student. Some 60,000 study abroad. As they come back steeped in a second language—usually English or "American"—Amman grows more the bilingual city.

In any language Amman is crowded. Despite the building boom, demand for housing is greater than supply. Especially pinched are the city's poor: West Bank Palestinians driven out by war and Israeli occupation, as well as Jordanian villagers drawn by the great urban promise. They crowd into United Nations refugee camps or into tin and mud-brick slums. In recent years Amman's new Urban Development Department has taken steps to stem the blight.

"We are upgrading five depressed areas and will build three completely new townsites along the city's eastern edge—homes for 40,000 people," said Dr. Hisham al-Zagha, the city planner in charge.

"Here we are building a community center and elementary schools, as well as houses," explained Mrs. Hidaya Khairi, a Jerusalem-born sociologist I met at the East Wahdat site. "Farther down will be the clinic and a mosque."

We were soon surrounded by the people, mostly women, in village garb. They were enthusiastic about the project, but there were questions. Mrs. Khairi had most of the answers. One old woman: "Will I be able to keep the milking goats?" (Yes.) Another, carrying a crying baby, worries: "I need the income from the small shop I run from my old house." (We will try to arrange a zoning code waiver for your new home.) An old man asks: "Will the new house accommodate *both* my wives?" (That, you better work out with the architects!)

DESPITE THE LURE of the cities, nearly half of Jordan still lives off the land even though barely one-sixth of the Indiana-size kingdom has water for crops. Around Amman, during brief greening by spring rains, herders steer fat flocks across carpets of wildflowers between wide squares of wheat and barley. But the idyll soon fades under dry summer dust. Along the warm Jordan Valley, much of it a thousand feet below sea level, stretches the country's prime farmland. Yet, lacking water, much of this still lies fallow.

Over the past three decades, backed at first by U. S. AID funds and later by the World Bank and wealthy Arab neighbors, the Jordanian government has been implementing a plan to revitalize the valley with irrigation canals, roads, schools housing, and food-processing plants. Today the Jordan Valley Authority (JVA) has a 180-million-dollar annual budget. At Deir Alla, near the junction of the Jordan and Zarqa Rivers, I talked with Dr. Munther Haddadin, JVA's president. Beyond us the Zarqa's water splashed past almond and oleander blossoms into the East Ghor Canal, JVA's main artery.

"Few places on earth are better for growing things," Dr. Haddadin said. "The soil is rich; the climate, nearly frost free. Almost every variety thrives: citrus, bananas, melons, vegetables.

"We have the water, we have the land, we

have the people. Our job is simply to bring them together."

The 1967 war devastated development plans by splitting the valley. Later, Israel bombed east-bank villages, farms, and canals and diverted more of the river's headwaters. The east-bank population dwindled from a prewar 60,000 to fewer than 5,000.

"Our 60-mile East Ghor Canal was a major step. Using a portion of the Yarmuk and other Jordan tributaries, it now waters 57,500 valley acres," Dr. Haddadin said.

I saw an example of the valley's cornucopia on one private farm. Owner Zaid Rifai, puffing a long Havana, pants tucked into cowboy boots, led me through his 160-acre spread near Karameh. Parched bottomland

"High-tech agriculture is costly," Mr. Rifai said. "Our operation—including a staff of 40, plus another 100 temporary workers during the harvests—costs $400,000 a year. Water, although critical, is only 2 percent of the budget. To bring the valley back to life will take government and private investment. Not just in money, but in hard work—and faith.

"We're living under the gun here still," he continued. "Nineteen new Israeli military settlements just across the river. The future of the West Bank is far from resolved, but thanks to projects like the JVA, the people are coming back. But only peace can bring stability to the valley.

"Am I optimistic?" He pondered my question, then gestured. "I think what I have built here answers that."

***Childhood friend** of King Hussein, Zaid Rifai served as prime minister from 1973 to 1976. Today he owns a farm in the Jordan Valley, where prehistoric funerary ruins such as this one remind visitors that this land has been cultivated since civilization began. In the years after the 1967 war many residents fled the valley when Israel bombed villages and refugee camps there in retaliation for West Bank guerrilla raids. Aiming to double the valley's present population of 100,000, the government is busy creating new housing.*

three years before, it now grew cucumbers, melons, squash, grapes, and lemons. In rows of plastic-covered, fan-cooled hothouses, mist sprayers and drip systems rationed water to tomato plants that could produce year round.

"We shut them down in July and August," Mr. Rifai said. "In summer we can't compete with the highland crops. But our winter tomatoes bring twice the normal price."

Mr. Rifai, a Harvard-educated former Jordanian prime minister, had traveled widely to find the latest in agricultural technology. In his sheds he showed me an Italian tractor, American seeds, German irrigation pipe, English plows, Dutch greenhouses.

Agriculture in this valley is hardly new; it was already exporting foodstuffs by 3000 B.C. Ancient ruins, splendid and diverse, that grace modern Jordan recapitulate much of mankind's struggle. Flint tools, fashioned by hunters half a million years ago, litter the desert around Azraq oasis. Recent excavations at Ain Ghazal in Amman reveal one of the oldest human settlements, built 8,000 years ago (page 263). Later, architects from Persia, Greece, Rome, and Byzantium left their marks; Crusaders abandoned castles here, and Turks their forts and mosques.

Of all the artifacts in today's kingdom none surpass crag-bound Petra, the ancient capital of the mysterious Nabataeans, 115 miles south of Amman. Seldom have man and nature so successfully conspired to cast a spell as in this famous "rose-red city half as old as time."

Canny caravan traders in frankincense, indigo, silk, and slaves, the Nabataeans had migrated from Arabia to install their fortress here at the intersection of lucrative camel routes in the fourth century B.C. They carved hundreds of ornate tombs and houses out of the living rock to embellish their capital, which throve for seven centuries. Later, as sea-lanes outbid the old camel routes, the great merchant town faded. For a thousand years it lay forgotten.

IT IS BARELY DAYBREAK when I enter the Siq, a giant gash in the mountain wall just below the government rest house at Wadi Musa. For a mile the blood red sandstone passage burrows darkly downward, away from the warmth and glare of the desert sun; overhanging cliffs, 200 feet high, obscure all but slivers of the sky. Across one glides a hawk. A paved road in its ancient heyday, my route is now a dry torrent bed strewn with boulders, in stretches barely wide enough to let two horses pass.

At the lower end of the Siq, the shadows are pierced by a tall crack of rosy light. Beyond, the dark walls roll back like a curtain on a striking vision: Limned by the sun's first rays, an immense classical facade glows a hundred hues of crimson; its Corinthian capitals, its pediments and friezes shine bright and crisp as new (page 247).

Tomb? Temple? Not even the experts can agree. Local tribesmen call it Khaznet al-Faroun, the Pharaoh's Treasury; some still believe it hides a fortune in gold. But Petra's real treasure lies in its architectural jewels; the Treasury is only the first of a dozen.

I enter one tomb fitted with a wooden door and hung with a small sign:

WELCOME CHANGE MONEY
BEDOUIN SUPERMARKET
POST OFFICE

"About 20 families still live in the ruins," says Petra's postmaster, Awad Hamad, "although many have moved now to the new

Reaping the fruits *of advanced farming techniques, the Jordan Valley* ***(below)*** *produces 75 percent of the value of the nation's crops on only 10 percent of the cultivated land. Workers inside a plastic hothouse* ***(right)*** *tend cucumber plants on one of the many farms irrigated by the East Ghor Canal, fed by water from the Yarmuk and Zarqa Rivers. The Jordan River, heavily tapped by Israel for agriculture farther north, is only a trickle by the time it reaches the Jordan Valley.*

government-built village a mile to the north.

"We still graze our sheep here, and plant the hillsides nearby," he adds. "There is always money to be had working on the excavations or guiding tourists."

Awad's wares are basic: soap powder, aspirin, razor blades, homegrown tobacco, potatoes, flashlight batteries. Outside, in a timeless tableau, his wife and daughters in long black dresses winnow wheat in the light morning breeze. But from a hand-crank telephone on the wall you can ring up the 20th century—and find turbulent Middle East history still steadily evolving.

WHILE FOR THOUSANDS of years Middle Eastern sites like Petra grew into cities, nations, and empires, Jordan's eastern desert remained the wanderers' realm. Acquiring the camel before 1100 B.C., they ranged the broad stone and gravel wasteland, moving constantly to feed their hardy flocks. Now the days of the nomads are numbered. The tent-dwelling Bedouin, always a minority in the kingdom, have dwindled today to less than 3 percent of the population. Yet the Bedouin has left his mark on his city cousins—the influence of his strict code of honor, his deep sense of reli-

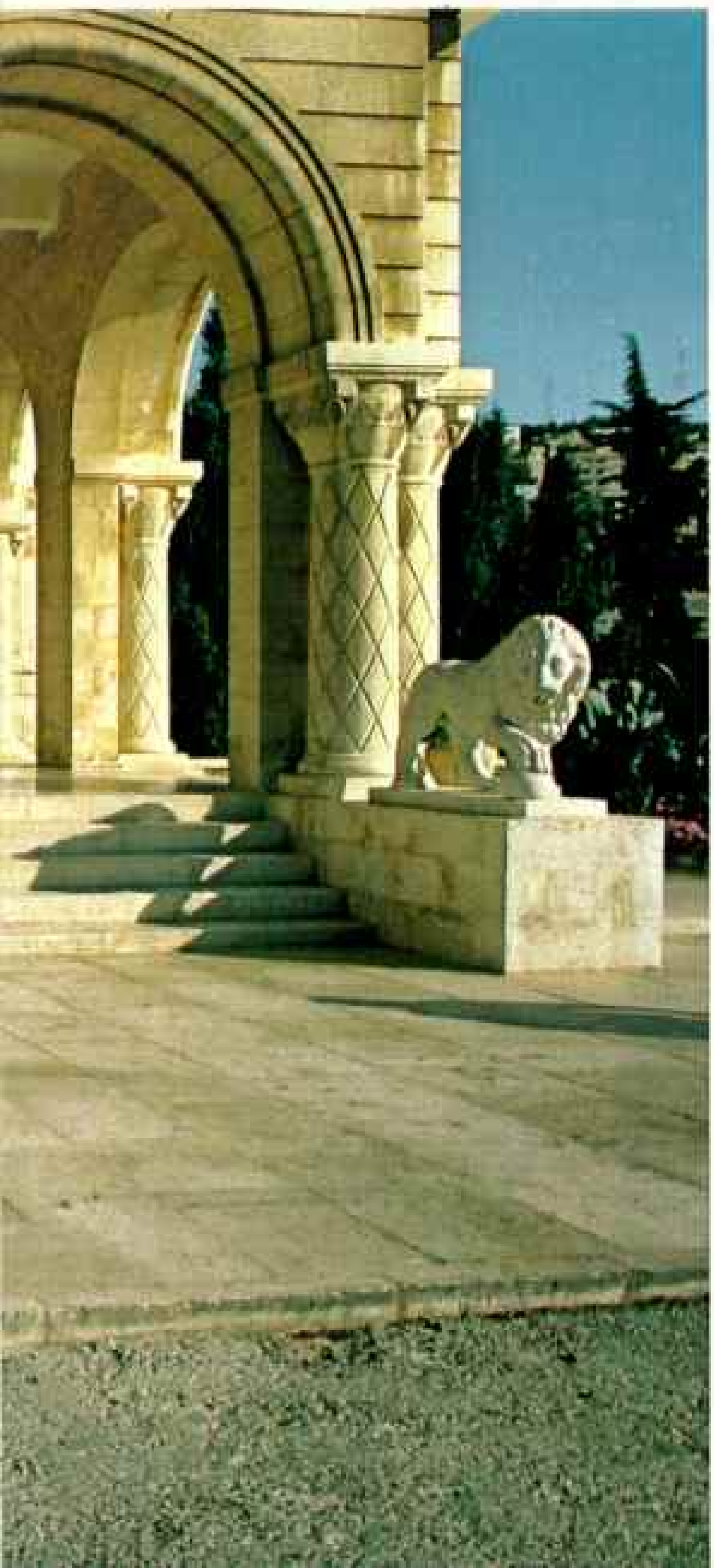
gion, his taste in food, his dress, his idiom.

Organized half a century ago, Jordan's oldest military force, the Shurtat al-Badiyah, Desert Police, still draws its recruits from Bedouin ranks, men like Capt. Awad Jazi. Captain Jazi commanded the post at H-5, a busy truck stop in the forbidding black basalt desert along the Amman-Baghdad highway.

"For us the desert is neither fearsome nor mysterious," said Captain Jazi. "It is home. We know its barren hills, each bitter stretch between the wells. We understand its signs and its people.

"We still send out camel patrols. It's the only way to cover some of the boulder-strewn reaches between here and the Syrian border," Captain Jazi said. "For surprising smugglers, who cross with perfume, television sets, or cigarettes—well, a camel can be better. No engine noise, no dust clouds."

Normally the Desert Police move by Land-Rover or Dodge pickup. "Our duties are much like those of any other police force: finding a lost passport, rescuing stalled motorists," Captain Jazi said. "We carry two-way radios now; we take fingerprint training. We can call in policewomen, a



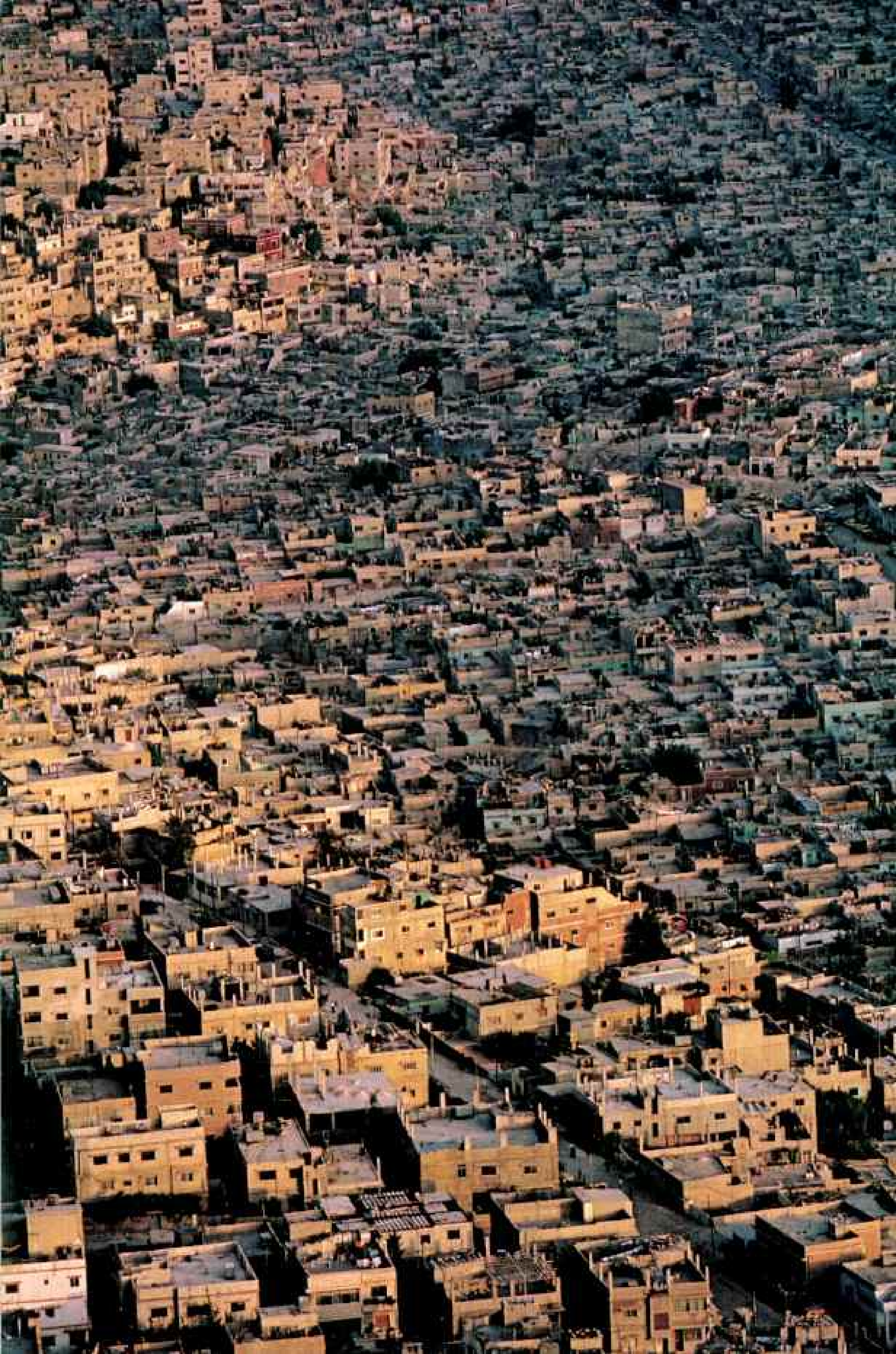
The royal tricycle *awaits Prince Hamzah* ***(left)*** *at the Royal Palace in Amman. His sister, Princess Iman* ***(above)****, gets a hug from their parents, King Hussein and Queen Noor, the former Lisa Halaby of Washington, D. C. Hussein has dealt with seven U. S. Presidents since 1953, when he formally assumed the throne at 17. A cautious, confident leader, he has survived many attempts on his life—before his eyes Abdullah, his grandfather, was assassinated in Jerusalem. Hussein has gained the reputation of a moderate in the heated politics of the Middle East.*

Overflowing the hills, *Jordan's capital, Amman (**facing page**), has absorbed a flood of rural poor and Palestinian refugees in recent decades. About half the population east of the Jordan River now lives in the greater metropolitan area, including thousands in refugee camps set up after the 1948 and 1967 wars.*

*Built on the site of Rabbath Ammon, capital of the Ammonite kingdom about 1200 B.C., the city—known to Romans as Philadelphia—flourished under Rome and Byzantium but slid into obscurity a century after the Muslim conquest of 635. A sleepy desert town in the 1920s, when Abdullah made it the seat of government in the new emirate of Transjordan, Amman today (**above**) has become a major banking and trade center—due in part to the strife in Beirut, once the region's financial capital.*

*Spirited discussion (**left**) fills a lull between classes at the University of Jordan, where half of the 12,000-member student body are women. In the past few decades, Jordanian women have achieved success in traditionally male professions such as medicine, business, and architecture. Today women constitute some 15 percent of the country's labor force.*

An estimated 60,000 young Jordanians, mostly men, are studying abroad in places such as Egypt, the United States, and the Soviet Union.



portable crime lab, even army helicopters."

Looking for tent dwellers, I motored south across the desert from H-5 to Qaa' al-Shajarah, the "plain of the tree," named for the single gnarled pistachio that rises beside a mud flat now brimming from a rare rain. Its branches were garnished with small strips of cloth, marking the prayers of passing nomads. Tearing an edge off my handkerchief, I added one of my own.

On a rocky rise beyond the lakelet I kicked off my shoes at the tent of Khalaf Sirhan, a spare, dark man in a suit coat, long gray caftan, and a red-checkered headcloth. Adding handfuls of dry camel dung to the fire, he fanned it to a glow, and soon the smell of roasting coffee beans filled the tent.

Tattered carpets covered the earth floor around the hearth; a gunnysack partition separated us from the women's quarters. A crude wooden chest held cups and a kerosene lamp. Through an open flap I saw Khalaf's herd, a hundred or more camels, grazing along the southern horizon.

"My youngest son and I tend the camels now," Khalaf said. "Most men of the clan are away. An uncle is in the army; a brother drives a truck." Such outside work has become the main source of Bedouin income. Khalaf ground the coffee, adding a pinch of cardamom, before brewing it in his long-beaked brass pot.

"*Bismillah*," he intoned as we drank: "In God's name."

MOST OF JORDAN'S BEDOUIN, an estimated 250,000, have folded their tents, some singed by relentless droughts in the 1970s, others lured by promise of an easier life under government settlement programs. Near the Desert Police fort at Deir al-Kahf, Sheikh Megbel Smiran of the al-Jabal tribe walked me around a budding village of 80 small houses on one-acre plots. Many were already planted with young grapevines and olive trees. A camel behind one house marked one stage of transition; a pickup truck parked next door, another. Sheikh Megbel's house was spiked by a tall antenna mast and a bank of solar cells to power his push-button telephone.

"Here in the desert, everything is measured by water," Sheikh Megbel stressed. "First we brought it in by tank truck—at ten dinars [$30] a load. We could hardly afford enough for the livestock. Three years ago the government connected us to the pipeline that runs from Azraq oasis to Irbid. Now we even have enough for small crops."

As Jordan husbands its precious farmland, its mining industry helps feed flagging soils in other lands. Phosphate hauled from dusty desert mines and potash dredged from glistening salt-sea reservoirs—more than four million tons a year altogether—make fertilizer Jordan's biggest industry.

I visited the Arab Potash Company's sprawling salt-harvesting works along the Dead Sea's torrid southeastern rim. Investors from Saudi Arabia, Kuwait, Iraq, and Libya joined Jordan to form the 465-million-dollar venture.

After lunch at the company "township," a 25-million-dollar oasis near Safi—complete with shops, tennis courts, and swimming pool—I drove with sales manager Marwan Khoury to the Dead Sea, 1,300 feet below sea level. The intake station pumped the crystal-clear water—seven times as briny as the ocean—to the first evaporation pond.

"We thicken the brine in four stages," Marwan explained, as he piloted our jeep across the network of basins that flood 37 square miles of the desert floor. "Solar energy does the work at this stage. Especially in summer, when temperatures approach 120°F, there is plenty of sunshine."

Farther along, the waters thickened into what looked like ice and snow. Harvesting dredges pumped the slush to the refinery complex where the raw salt yields a top-grade potash. Specially built 50-ton trucks haul the finished fertilizer 135 miles south across the desert to Aqaba.

UNTIL RECENT TIMES, Jordan's only seaport—Aqaba—slumbered as a palm-shaded fishing village by the small fort that Lawrence of Arabia once captured from the Turks after a swift forced march across the desert. Wedged between Israel and the Saudi Arabian frontier, the Jordanian coast was barely five miles long.

"In 1965 Jordan arranged a land exchange with the Saudis, gaining 12 more miles of shoreline," said Muzahim Muhaisin, chief engineer for the Aqaba Town Planning Commission. We were dining on fresh red

snapper at a busy restaurant in the new commercial center. "Since then Aqaba has grown sixfold—to nearly 40,000."

Looking across the moonlit Gulf of Aqaba, I could make out the glitter of Elat, Israel's Red Sea port, only five miles away. Another fleet of lights shimmered offshore.

"Sometimes a hundred ships anchor out there—we average 30 to 35—waiting for container docks, the fertilizer jetty, or the Aqaba-Suez passenger terminal," Muzahim said. "Work begins soon on a 50-million-dollar, roll-on-roll-off facility.

"For a while some 2,000 trucks a day set out from the port, north along the desert highway to Amman," he said. "About 70 percent went on to Baghdad. The war between Iraq and Iran closed ports on the [Persian] Gulf, adding to Aqaba's work load."

NEXT MORNING I made the harbor rounds aboard an American-built 31-footer nicknamed the "pollution patrol" with Mohammed Muslim at the wheel. We cruised the shoreline past the tourist beaches and hotels, then turned southward to weave among the anchored giants. From the stern of a Soviet freighter high above us, two sailors were fishing. Spotting us, they quickly hauled in their lines and vanished belowdecks.

"Ha, there is no law against fishing," Captain Muslim smiled. "But the word is out. 'Beware of the patrol.' We gave out three tickets this week, for pumping bilges. The fine was 1,400 dinars [$4,000]."

We returned along a line of red-and-white buoys that extend the Jordan-Israel cease-fire line out to sea. Beyond it, officers of a bristling gray gunboat followed us through binoculars.

Although its "borders" with Israel proper are closed and heavily guarded, the Jordan government still maintains vital links with West Bank Arabs. At his busy Amman office I spoke with Hassan Ibrahim, Jordan's Minister for Occupied Territory Affairs, as he worked through stacks of documents.

"To the 800,000 Jordanian citizens across the river we have to be all things to all people," Mr. Ibrahim explained. "We renew passports, arrange housing loans, pay the salaries of many municipal employees, try to maintain clinics and farmers co-ops, issue

With traditional hospitality, *Sheikh Hayel Surour welcomes guests to a feast at Umm al-Jamal to mark the end of mourning after the death of a prominent politician's father. Like most of Jordan's 250,000 Bedouin, the sheikh lives a settled life, though he follows the customs of his nomadic forebears.*

the high-school diplomas," he said. "Everything is cumbersome; with no mail or telephone connections to the other side, everything must go by messenger. Meanwhile, Israel says the West Bank belongs to them. They are changing the face of the land to claim it for their own.

"But one thing they will not change," he added, "the spirit of our people."

Among West Bankers, I constantly encountered a fierce will to maintain their Palestinian identity, a determination, these days, narrowed by rage and darkened by desperation. Missing here are the smiles and hustle of Amman's carefree prosperity. In Jordan proper, the future is expanding; for West Bank Arabs it tightens, acre by acre, as land is pulled out from under them.

Politics dominates the guarded West Bank conversations, even among children. As it has for centuries, life centers closely around family and clan. People cling tenaciously to the land their forebears tilled.

Few I met knew that landscape better, or loved it more, than Kamal Abdulfattah, chairman of Middle East Studies at Birzeit University, northwest of Jerusalem. There he teaches a course in the geography of Palestine, regularly leading field trips through the countryside. On his day off he guided me on a tour over the West Bank's back roads.

"Jerusalem is the crossroads of Palestine," Kamal began, as we made our dawn getaway heading north from the Holy City along Nablus Road, "and Palestine, the crossroads of the ancient world. For 5,000 years this was a main highway from Egypt to Damascus."

NORTH OF RAMALLAH we turned off near a Roman spring and followed a track up through limestone terraces of gnarled olive groves now edged with lavender blooms of wild crocuses, first flowers of winter. On the higher, colder slopes olives gave way to figs. In domed-roof villages like Kufr Malik and Khirbit Abu Falah we watched men hauling in olives to the small village presses, and the smell of fresh bread rose from smoking outdoor ovens. Around Tel al-Ashur the sound of steel on stone led us to quarrymen stacking blocks and slabs amid clouds of white dust.

At Jericho, amid stands of date palms and

Tucking in a blanket *of snow over the countryside near Amman, a late winter storm descends on a goatherd bringing home his animals* ***(above)****. Though*

*snowfalls are not uncommon in the capital, which lies in the northern uplands, in recent years they have been the deepest on record. This storm brings out a playful spirit among city residents who skirmish with snowballs (**below**) and dress up a snowman (**below left**) with an umbrella, an Arab kaffiyah, and a pack of cigarettes.*

Built for pleasure *as well as protection, King Herod's fortified palace* ***(above)*** *on the West Bank contained a garden, bathhouses, and "costly royal apartments," as described by a historian of the time. Situated on a hill, with 70-foot walls and 100-foot towers, the Herodium was the Judaean king's favorite fortress, his chosen tomb, though his burial place is unknown.*

During the first Jewish revolt against Rome, in A.D. 66-70, the great circular bastion sheltered rebels from Roman legions. There is a story that defenders here, among the last Jewish groups to fall, chose mass suicide over surrender.

BRIAN BIRD

MYSTERIOUS FIGURES unearthed at Ain Ghazal, an archaeological site in Amman, may be among the oldest human statues ever found. Made of plaster and dating back to 6000 B.C., they were discovered by a team led by Gary Rollefson of Yarmouk University, in cooperation with Jordan's Department of Antiquities, and Alan Simmons of the University of Kansas, with support from the National Geographic Society. The figures probably played a role in the ceremonial life of what was then one of the largest population centers in the Middle East, nearly three times as large as Jericho. This pre-pottery community, researchers believe, represents a crucial stage of social development. The semi-nomadic life of hunting and food gathering was giving way to the settled life of farming and animal herding—a change that led to the birth of the city.

bananas, we had coffee and sampled local oranges, mangoes, and avocados. Of the fabled walls breached by Joshua and his trumpeting armies, there remains no trace.

As we went along, Kamal pointed out Israeli settlements; some 150 are already installed or under construction. Some seemed little more than small military observation posts; others, like Ramot or Neve Yaacov on the northern edge of Jerusalem, were high-rise subdivisions housing thousands.

Past Jericho we paused at the Arab village of al-Auja, where dried-up orange trees were being cut for firewood.

"The nearby Israeli settlement of Yitav drilled deep-bore wells and now controls the water in this area," Kamal explained. "Restrictions and high costs make it almost impossible for Arabs to drill for irrigation.

"Nearly half the land on the West Bank is under direct Israeli control," he added, "although the 25,000 Israeli settlers there make up less than 4 percent of the population."

Kamal's university, Birzeit, one of four Arab colleges here, is a focus of Palestinian nationalism. The large house of its Christian founders, the Nasir family, later linked with other houses in the village by stone walls, forms its small main campus.

Israeli soldiers, citing terrorist activities, have closed down studies three times in a year. "They have beaten students and broken up classes," said Albert Aghazarian, assistant to Birzeit's acting president. "We are under intense pressure. But despite the harassment, we are building a modern campus nearby. Our enrollment, about 40 percent women, has grown to 2,400—including some in 'graduate school.'"

"Graduate school" is Birzeit slang for Israeli prisons.

I DROVE through the Bethlehem district with an agricultural expert from a Christian service group based in the United States. Offering technical advice on irrigation, roads, cistern construction, and vine trellising, the group is trying to help the small farmer. Not far from the birthplace of Jesus, we turned off the main road to where the four Hamamrah brothers were refurbishing terraces and cisterns with the adviser's help. Women of the families pitched in too, carrying baskets of wet concrete up the slopes.

"For years this hillside was only good for grazing sheep," said Jaber Hamamrah. "Now we hope to harvest table grapes, olives, and almonds here."

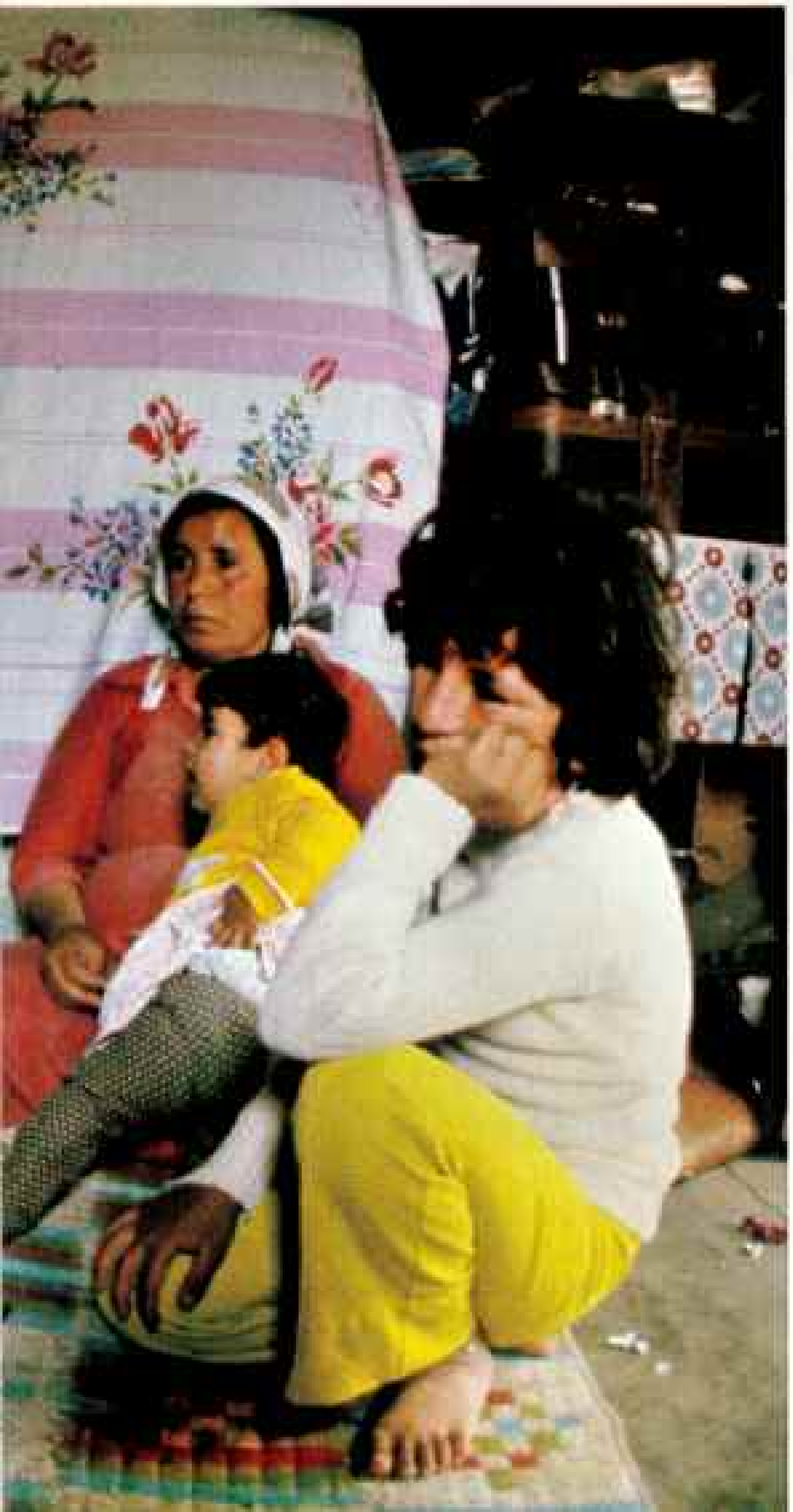
The reclamation project could mean not only greater profits for the Hamamrah brothers but also greater security: Worked land is more difficult to appropriate. Already Israel has closed a fourth of the 142 square miles of grazing land in the Bethlehem district for "legitimate military use."

ISRAELI SETTLERS I met never doubted their right to land in the West Bank. To them it is "Judaea and Samaria." In 1969 Orthodox Rabbi Moshe Levinger and his wife, Miriam, made their home in one of the first Jewish settlements on the West Bank, Kiryat Arba, just above Hebron. A decade later, with six other families they moved into the heart of the Arab city to forcibly occupy and refurbish a cluster of houses for the Gush Emunim—the "bloc of the faithful."

"We are fulfilling the prophecy of God, as part of the return from exile," Mrs. Levinger said, her voice laced with emotion and a trace of her Bronx origins. Rabbi Levinger had fled the Germany of the thirties. We talked over coffee in her dining room.

"Look, this land has belonged to us since the beginning of time," Mrs. Levinger said. "We will populate it again. I didn't have 11 children just for the fun of it. God commanded me: 'Be fruitful and multiply.'"

Site of the Tomb of Abraham, Hebron is holy ground to Jew and Muslim alike. For centuries it housed a Jewish community, but in 1929, during violent sectarian strife in Palestine, Arabs killed some 60 Jews



A mother's grief *moves a woman* ***(above)*** *to display a homemade Palestinian flag, outlawed on the West Bank. Her son had been killed when youths stoned an Israeli army patrol. On a Nablus street* ***(top)*** *soldiers stop two young men to check their papers.*

Left for dead by rampaging Christian militia in Beirut, a Palestinian merchant ***(left)*** *describes to family and friends at the Baqaa refugee camp near Amman how he survived the Sabra and Shatila camp massacres of September 1982. His family had fled to the Jordanian camp earlier.*

Instant suburb, *the new Israeli town of Maaleh Adumim flanking Jerusalem is expected to house 12,000 people by 1985. One of the largest of about 150 Israeli settlements of all sizes on the West Bank since 1967, Maaleh Adumim is attracting a new breed of settler. Unlike early religious zealots who came to*

claim the area they call Judaea and Samaria, most newcomers are middle-class commuters taking advantage of housing heavily subsidized by the Israeli government. Though Israel has never formally annexed the West Bank, the number of Israeli settlements steadily increases.

Veneration of Abraham *draws both Jews and Muslims to the site at Hebron where, according to tradition, the patriarch and his family were laid to rest almost 4,000 years ago. Such reverence for Abraham, called "Friend of God" in Islam, has done little to bring peace to a town that has seen violence take the lives of both Arabs and Jews.*

here; by 1936 the last Jewish families had left Hebron. Four years ago six armed settlers died in an ambush in the center of town. A Jewish seminary student was stabbed last summer, his submachine gun stolen. Angry youths still stone Jewish buses.

"At times it can be a nightmare," Mrs. Levinger said. "But we're not running a popularity contest. At least here in Israel, our own country, with an army behind us, we can protect ourselves."

ARAB SCHOOLBOYS pelted *my* car with stones next day as I searched the streets of Nablus for the house of Bassam Shak'a. With more than 100,000 people, Nablus is the largest city on the West Bank, outside Jerusalem. The yellow Israeli license tags on my rented Ford—Arab tags are blue—marked me as one of the enemy.

Stubbornly resisted here, the occupation has left its scars on Nablus and its people, especially on Mayor Bassam Shak'a. Israeli authorities exiled mayors of West Bank cities who refused to cooperate with the occupation, but Shak'a did not leave. In 1980 a car bomb, widely believed to be the work of Israeli terrorists, blew off both his legs. I found him at home, once more under house arrest.

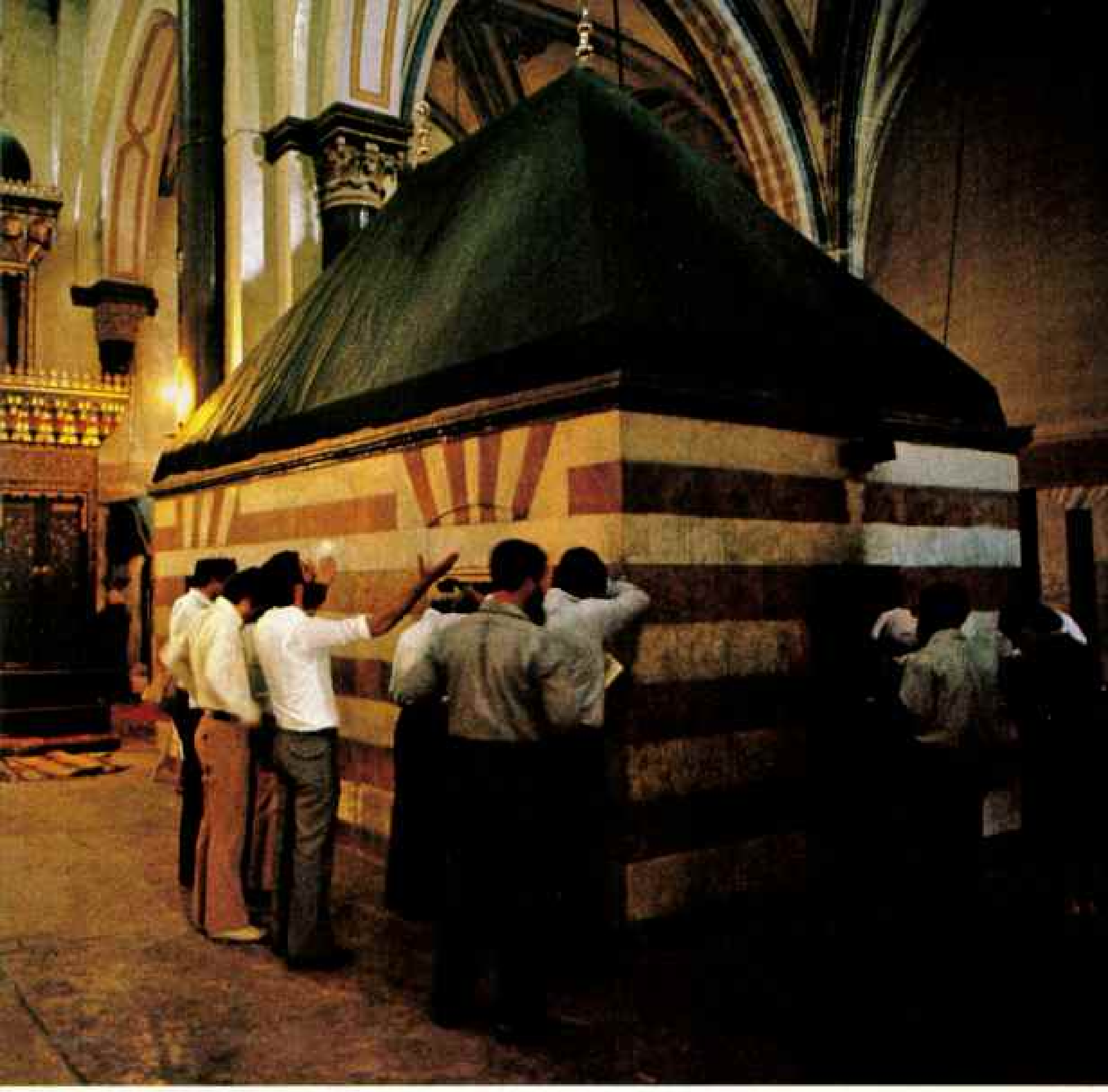
"The authorities shut me out of my office because they said I was an agent of the PLO," Shak'a said. "When no Arab would accept the job, they appointed a Mr. Shlomo Cohen to run this Arab city, then replaced him with a retired Israeli army captain. But, legally, I am still mayor."

Some Arabs do cooperate with Israeli autonomy plans. Farmers and villagers must apply to the offices of Israeli-erected Village Leagues to, say, hook up to electric service, get a building permit, or passes to travel. But Village Leagues are widely despised. Shak'a dismissed them all as "collaborators, traitors."

When I visited his heavily guarded office in Hebron, electrical engineer Muhammed Naser, then director of the Village League of the Hebron District, defended his role.

"Do you think any of us are happy about the occupation? No! But we at least are facing fact," he said. "And the fact is that the Israelis are in control, and probably will be for a long time. To survive, we must learn to negotiate with them. Unlike those distant exiles in the PLO, we stayed on the land. We are the ones to decide its future."

On my drive out of Hebron I passed the



gray stone mosque over the traditional tomb of Abraham (above), ancient patriarch of Jews and Arabs alike. Frequently the focus of confrontation, this holy site symbolizes the struggle for coexistence amid bitterness, for part of it serves as a synagogue.

A SPECTACULAR VIEW of the West Bank, its buff hills, white towns, and green valleys, unfolds from the Jordanian side, from a mountain northwest of Amman called Yusha. On a clear day the eye can sweep from heights above the Dead Sea along the whole Jordan Valley to lower Galilee. Yusha is Arabic for Joshua, reflecting belief that the warrior leader who succeeded Moses rests under the small green dome atop the hill. Another tradition holds that it is the tomb of Hosea, a latter Hebrew prophet revered by Christians and Muslims as well.

"For they have sown the wind, and they shall reap the whirlwind."

That warning from God, which he relayed (Hosea 8:7) to his contemporaries, might well be taken by extremists on both sides of today's conflict. On the drive back to Amman, a Jordanian friend reflected, "Small wonder God dispatched so many of His prophets to the Holy Land.

"No place on earth needs them more." □

MANTIDS
The Praying Predators

By EDWARD S. ROSS
Photographs by DWIGHT KUHN
and the author

LEAN AND HUNGRY, the stalking hunter lashed out with eye-blink speed. One moment I saw the angular creature—an insect stick figure—clinging stock-still to a twig, inches from an unsuspecting katydid. The next instant the praying mantis struck; within a twentieth of a second the predator seized the victim and skewered it on saw-edged forelegs.

In the deadly clasp, the hopper was impaled with closure action like the snap shut of a jackknife blade. A bite through the neck was the coup de grace.

As often as I have seen the praying mantis capture and eat its victims, I marvel at the sheer ferocity of the act. The French naturalist Jean-Henri Fabre called the mantis "the ogre in ambush that demands a tribute of living flesh."

The praying mantis, because of near-human mannerisms, has awed and intrigued man from earliest times. Many old cultures held special beliefs about these remarkable insects and regarded them with reverence and respect. The often upright stance, with powerful forelegs raised as if in supplication, the alert expression of bulging eyes, the free-swiveling head—these features, taken together, may have inspired the ancient Greeks to name the insect *mantis*, their word for soothsayer, prophet, diviner.

The prayerful posture of the mantis appealed from the start to man's anthropomorphic inclinations. No wonder that the Swedish naturalist Linnaeus in 1758 gave the name *Mantis religiosa* to a common Old World species that, transplanted

Hiding in plain sight *as it poises for attack, a rare praying mantis (Hymenopus coronatus) blends with its lair—a pink orchid in the Malayan jungle. The suppliant position of its forelegs inspired the creature's name, but "preying" mantis would better describe its rapacious behavior.* 65 MM (2.5 IN.); EDWARD S. ROSS

across the ocean, has become abundant also in parts of the United States. At least 1,800 species of mantises (or mantids, as they are also called) exist throughout the world, where warm or mild climate permits.

Apart from its outsize forelegs, the mantis's most distinctive feature is a highly mobile head loaded with optics—a sophisticated periscopic device. The rest of the insect's sensory organs are subordinate to these penetrating eyes, eyes that keep frontally locked on any moving object, even if to do so the head must all but twist itself off.

I recall, deep in a Malayan forest, focusing my camera on *Melastoma* blossoms. A praying mantis's head pushed the magenta petals apart to identify the intruding object. The green face, inquisitively cocked, seemed intelligent, supercilious—even disdainful. Of course, the entomologist side of me resisted such human analogies. Yet to a mantis's victims, that cold and steady gaze is the visage of death, a hypnotic stare that is the final apparition to many a small creature before it is trapped in a spiny embrace and soon consumed.

A pair of large compound eyes, made up of hundreds of lens facets, are widely spaced on the cranium, enabling a mantis better to triangulate the position of a victim. These eyes rapidly adjust to abrupt light contrasts in a sun-dappled leafy jungle or to dawn-to-dusk variations in light intensity. Mantids, however, are day creatures; none have exceptional nocturnal vision. Nevertheless, in the dark of night, they are attracted to artificial illumination—entomologists catch many specimens this way—where they feast on insects drawn to the light.

The pupil-like dot in each eye, a feature common to many insects, seems relentlessly to follow an observer and heightens the impression of bespectacled wisdom. The dots are simply portholes into the dark depths of the insect's eyes.

THE PRAYING MANTIS eats nothing but live food, mostly insects. Prey is taken only from flowers, leafage, twigs, bark, or the ground—never while the potential victim is in flight. Many species have wings, but they seldom use them.

A mantis's rapacity—at times for prey even larger than itself—is served by surprisingly small mouthparts similar to those of its cockroach ancestors. Big jaws would require a big head, with less mobility. For grasping, the insect uses powerful, raptorial forelegs. These traplike appendages represent the key innovation of the order Mantodea, an adaptation attested by its persistence in all species over millions of years.

To extend its reach, the mantis's foreleg is greatly elongated and very robust. Inner faces of the femur and tibia are grooved, ridged, and heavily armed with rows of vicious spines. A scimitar-like claw at the tip of each forelimb hooks the prey; in defense it can seriously damage the eyes of small attackers such as birds.

At bay against a predator, or a teasing human, a mantis raises its forebody and forelegs and spreads its wings menacingly. In some species, appendages are even

Dr. Edward S. Ross is curator of entomology at the California Academy of Sciences, San Francisco. Free-lance photographer **Dwight Kuhn**, of Guilford, Maine, also teaches high-school biology.

Getting the jump *on a grasshopper proves easy work for a Chinese mantis (*Tenodera aridifolia sinensis, ***facing page****). Bulging eyes, with hundreds of facets, and a head that can swivel 180 degrees help a mantis zero in on prey. Within a twentieth of a second, forelegs lash out and impale victims on sharp spines that are meticulously cleaned after dining (****above****).*

ornamented with eyespots to amplify the defensive bluff.

With their bizarre appearance, human mannerisms, and "two speed" life-style—lie-in-wait immobility and lightning-bolt strike power—praying mantids always have been objects of superstitious awe. They are known to some countryfolk as "devil's rear-horses." In the Deep South some farmers call them "mule killers," because the "tobacco juice" that spews from the mouth when one of the varmints is mishandled is alleged to be fatal to mules.

THE ANCIENTS in some lands held that the mantis was created to show humans the proper attitude for prayer. Many Muslims still believe that a mantis faces Mecca as it assumes its reverential pose. Shepherds I met during a recent trip to Morocco, on the other hand, declared that if one of them is lost and comes upon a mantis, the insect will point with its foreleg to the north.

Some Africans I've traveled with, especially Kalahari Bushmen, held the mantis in cautious respect. They seemed concerned as we collected the insects, but—all right! We could live dangerously if we liked—as long as *they* didn't have to take such risks.

In parts of Europe, tradition imbues the mantis with magic power. According to country lore, if an Italian peasant becomes sick, "a mantis has looked at him." In Provence the belief used to be widespread that a mantis, if properly petitioned, could direct a lost child homeward with a gesture of the foreleg. Sardinian hill people believe that killing—even touching—a mantis brings bad luck.

To peoples of the Orient the praying mantis has symbolized bravery and ferocity throughout history. Its image appears on Chinese scrolls, lacquer ware, and woodcuts. Called in Japanese *kamakiri* (sickle cutter), the aggressive and combative mantis inspired designs on old-time Japanese sword guards. Mantis images were placed to face the samurai's opponent (page 280). In China a certain posture in the martial art of kung fu imitates the mantis.

Today the insects are cherished pets in many parts of the Far East, readily accepting human handling. But people there also have been known to bet on mantids pitted against each other in fights to the death within bamboo cages.

Attitudes of the Japanese toward praying mantids are ambivalent. Some, while admiring their form and color, associate them with the dark side of human affairs, in a class with deathwatch beetles, whose faint tickings as they bore into household timbers are thought to presage death.

9 MM (0.35 IN.)

The mantis is entwined in Chinese medicinal lore and practice. As long ago as the Confucian era in the fifth century B.C., the residue from mantis egg masses boiled in water was considered a specific for many ailments—even preventing infection in a warrior's knife or arrow wound. In old-time China, mantis egg masses were prescribed to cure cramps and remove warts, to alleviate gonorrhea, asthma, and bladder troubles, to remedy hip pains, bed-wetting, and impotence. To this day Chinese herbalists prescribe egg cases and the cast-off skins of molted mantids.

In some regions—particularly Southeast Asia—nutritional needs overcome the traditional awe of mantids. Along with grasshoppers and other insects, they add vital protein to many farmers' diets.

OVER MILLIONS OF YEARS of evolutionary time, mantids have occupied all accessible regions that have a suitable climate. They abound especially in tropical and subtropical areas and have adapted by protective color and form to a variety of habitats.

In a tropical forest, for example, green-foliage mantids occupy leafy levels, from shrubs to forest canopy, while brownish, leaf-litter species thrive on and near the forest floor. In a multiplicity of variations, there are flowerlike, twiglike, antlike, lichenlike, barklike mantids—and more.

Similar adaptive evolution has occurred in grasslands, savanna, scrublands, and desert. So it's easy to understand why the 1,800 species—grouped in hundreds of genera in several families—inhabit much of the earth. Sir Julian Huxley, however, noted that most of this proliferation of species is mere "frill of diversity." There is really only one basic mantis way of life.

Mantids satisfy their gluttony by eating bees, wasps, butterflies, moths, crickets, and grasshoppers as well as foliage-eating larvae. This diet puts them in a useful role in the natural control of insects, yet it is impossible to expect to marshal an army of them to advance against plant pests, for they eagerly eat one another, even their mates, their own offspring, and their siblings. This cannibalistic trait accounts for mantids' sparse distribution—one to a bush, so to speak.

Still, as massive consumers of insects, they have special appeal as bug controllers in household gardens (mantids are death on Japanese beetles), and they have been widely introduced in farming areas to combat plant pests, although the economic benefits are not clearly measurable.

Mantids themselves are popular on the menu of birds, monkeys and other small mammals—skunks and opossums, for

EDWARD S. ROSS

Dewdrop reservoir *slakes the thirst of a six-day-old Chinese mantis (**left**). Nymphs soon shed their natal skin, the first of six to nine molts that mark stages of growth and permit mantids to blend with the colors of surrounding foliage.*

*Strictly carnivorous, mantids feed on a wide variety of insects, thus serving as a valuable tool in nonchemical pest control. To combat cotton bollworms, Brent Spradling (**right**)—assisting his father—sets out mantis egg cases in a cotton field near Abernathy, Texas. After hatching, a mantis has only to look about for a feast.*

__Taking a chance on love__ can cost a suitor—even a successful one—his life. Cannibalism is common, and a male, usually smaller than a female, often ends up as a meal as well as a mate. Sensing the female's pheromones, a Chinese mantis approaches stealthily, then makes a sudden flying leap onto her back (__above__). As mating proceeds, the female clutches the male around the neck and begins to feed on his head (__right__). Though now decapitated, the male has a nervous system that enables him to continue mating (__below__), sometimes for hours. Looking on the bright side, some scientists have suggested that the male thus benefits his offspring by providing protein for the female during egg production.

instance, relish them—and some reptiles. Once seen, and these cryptically shaped and colored insects are hard to see, most mantids are easily caught, their usually ungainly gait and fluttering flight ineffective in escape.

Some of the ground-dwelling species, however, and those that live on tree bark are fleet of foot. The bark-adapted mantids are hued and blotched to resemble the surface they cling to (pages 278-9), and their low, flat body form casts almost no outlining shadow.

IF DANGER IS IMMINENT, a mantis may explode into action, scurrying with crablike speed upward and around to the opposite side of the tree. Well do I know how frustrating it is to play run-around-the-tree trying to get pictures of such mantids!

Mantids function as patient sit-and-wait

predators that waylay victims blundering within reach. They station themselves where insect traffic is heaviest. Many spend most of their lives in flowers and have come to match their floral surroundings.

As evidence of the praying mantis's instinct for strategic positioning, there was the experience of Elizabeth Kimball of Sacramento, California, a bird lover who maintains a hummingbird feeder. She was surprised one summer to find mantids sitting on the feeder, alert to snatch up honeybees visiting the container of syrup.

One day a hummingbird hovering at the feeder inspected a big mantis, then returned to sipping sweets. Suddenly the mantis struck at the bird. Both tumbled to the ground, where the mantis began to tear at the hummingbird's feathers. The bird, apparently stunned or bewildered, offered

no resistance. Mrs. Kimball rescued it, and her husband killed the mantis.

IN ALL BUT A FEW parthenogenetic species, the mantis life cycle begins with mating. A male is drawn, probably by the scent of his prospective partner, to the female's close, but dangerous, vicinity. He approaches her cautiously from behind, sometimes taking more than an hour to traverse an intervening foot. Ultimately, mounting is quick, though copulation may go on for some time.

Often the male walks away unharmed. Frequently, however, the female twists her head and begins to eat his head and forebody during the reproductive act. Having fulfilled his primary role, the male now is most useful to his species as food.

Even a decapitated male can continue to mate, because a chain of nerve centers, including the one activating his genitalia, extends the length of the body. Some scientists believe that decapitation of the male may simply be the way the female herself avoids being eaten.

Two days or more after mating, the female, usually standing head down, begins to spew from the tip of her abdomen a button of frothy, plastic material onto the surface of a twig or other chosen site. Intermittently, between layers of the froth, the eggs are laid and the porous material hardens.

Shape, size, and color of the completed egg mass (some are glossy, others bright green or gold) are unique to each species. Usually a mass consists of fewer than 100 eggs, but a large species may lay as many as 400. A well-nourished female may produce ten masses during a season. In cold climates the masses, with their excellent insulation, serve as overwintering cocoons. In desert

TENODERA ARIDIFOLIA SINENSIS

Protective custody: *Laid in the fall, frothy egg cases (**above**) harden to ward off harsh weather and predators. Nymphs emerge in the spring (**right**) and begin feeding on tiny insects—and each other.*

55 MM (2.2 IN.); EDWARD S. ROSS

Provoked and pugnacious, *a female mantis (Prohierodula congica) in Zaire rears up at the intrusion of the author's camera. Dots on the thorax serve as bogus eyes to startle enemies. That the spread-eagle posture, a universal threatening display of her kind, occurred atop her egg case may be only coincidental. Scientists debate whether the creatures intentionally protect their young.*

Masters of deception, *most of the 1,800 mantid species employ camouflage to escape their own enemies while duping potential victims into venturing near. Some imitate not only the color but also the shape and texture of their surroundings. Flattening itself against a twig, a mantis of Angola (genus* Tarachodes, **above***) casts virtually no shadow, a further aid in its disappearing*

50 MM (2 IN., ABOVE); 75 MM (BELOW LEFT); 50 MM (BELOW RIGHT); ALL BY EDWARD S. ROSS

*act. The hoodlike appendage of a Costa Rican mantis (*Choeradodis rhombicollis, **below left**) *enhances its resemblance to green leaves. The dead-leaf mantis of Peru (genus* Acanthops, **below**) *even sways back and forth, simulating wind-tossed foliage. Several species avoid danger through their resemblance to other insects that are distasteful to predators such as birds and monkeys.*

NATIONAL GEOGRAPHIC PHOTOGRAPHER STEVE RAYMER

Healer and destroyer: *Two aspects of the praying mantis find recognition in Japanese culture. Dried, the insect is stocked by druggists* ***(above)*** *to be ground and dissolved in tea as a cure for a host of ailments. Its aggressive nature earned it an honored position as an embossed figure on the guard of a 19th-century samurai sword* ***(below)****.*

NATIONAL GEOGRAPHIC PHOTOGRAPHER VICTOR R. BOSWELL, JR.
SWORD PHOTOGRAPHED AT THE PEABODY MUSEUM, SALEM, MASSACHUSETTS

species they effectively withstand long dry seasons, usually attached to the undersides and protective edges of stones.

VERY OFTEN a female, apparently defending her egg mass, will present remarkable displays, even against a human. I recall, in a Congo forest, finding a camouflaged dead-leaf mantis attending her egg mass, attached to a fern. I prodded her, and she reared up, adopted a "hands up" posture, and spread her wings to flash their brilliant red undersides. The startling display suggested a black-attired Dracula suddenly exposing the red lining of his cape. Two eyespots on the underside of the raised forebody heightened the terrifying effect.

Bluff, however, cannot protect mantids from a more serious risk. A number of species of tiny parasitic wasps habitually lay their eggs in those of mantids so their larvae can feed on the host eggs. The females of some wasps, such as *Podagrion*, even ride on the bodies of pregnant mantids, ready to lay their own eggs upon the mantid eggs as they are extruded.

The mother mantis normally abandons her egg mass and therefore never sees or cares for her numerous progeny. From parallel rows of escape hatches along the outer surfaces of every egg mass, the slender, encapsulated offspring ooze out, forming a festooning mass that gravitates downward. At first each delicate baby wears a "swaddling cloth"—a membranous sac that apparently protects it from abrasion. Once the nymph is clear, blood pressure in its head causes the shield to burst and release the young.

Marauding ants carry off many mantids as they are born. But once free and active, the spindly babies disperse at once, escaping the instantly manifested predatory instincts of their siblings.

The pale, black-eyed mini-mantids at first can eat only tiny insects such as aphids, but as they grow during a sequence of skin sheddings they take on larger prey. Over the weeks, however, few of the original clutch survive environmental hazards.

After its final molt, a mantis is mature and, in most species, fully winged. Now the leggy insect is ready to search for prey, mate, lay eggs, and repeat the ageless reproductive cycle. □

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...a new magazine, National Geographic Traveler

A GOOD TRIP VS. A GREAT ONE: The difference usually comes down to one thing—how much you know about a place before you get there. I've learned that the hard way, and so have Society members.

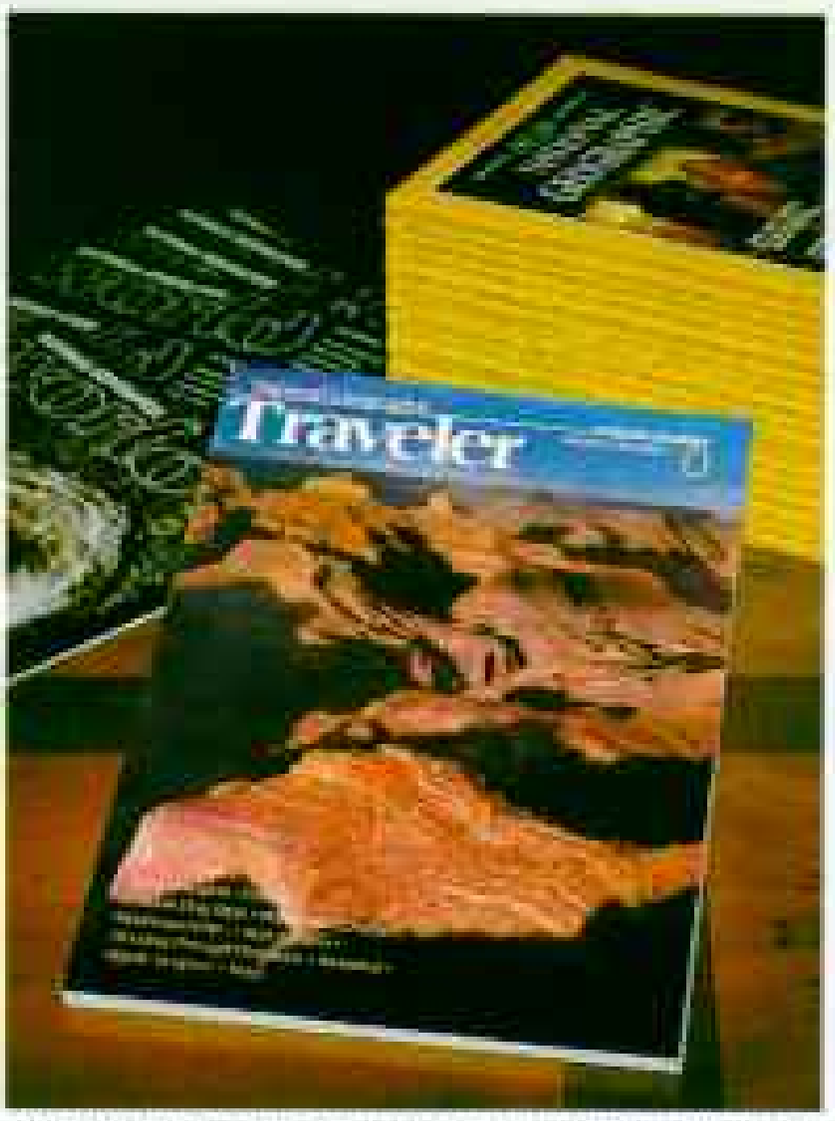
Over the years we have had more member requests for travel information than for any other kind, so I'm pleased to report that this March the Society will offer a new magazine, NATIONAL GEOGRAPHIC TRAVELER, to be published quarterly. Its purpose will be to give subscribing members travel information that is accurate, timely, diverse, comprehensive, and educational.

To find out what would be most useful to members, we sent interviewers to all regions of the country. Hundreds of Society members were generous with their time as they answered questions and evaluated a sample magazine format and table of contents.

Members told us they needed a single, reliable source of travel information. They expected Society standards of accuracy and photographic excellence, *and* they also emphatically wanted detailed, practical information on the specifics of travel—the what, where, when, and how, so that they could confidently make vacation plans. Three-fourths of members surveyed rated the sample contents very good to excellent. Many were willing to enroll for a subscription immediately, and most of those said that they would find relevant advertising useful in their travel planning.

Armed with the reactions of Society members, TRAVELER Editor Joan Tapper and her staff began working on the first issue. Among its ten major features will be the Grand Canyon and Washington, D. C. Those articles, and every other, will provide in-depth geographic information to make readers' trips more interesting. Articles will also include maps and be supplemented by a section of practical information that details how to get there, highlights what to see and do, and lists representative places to stay and to eat.

As editor Tapper says of the Grand Canyon, "It can be experienced in many different ways. People want to have a sense of the historical and geographic background, so that they understand what they're seeing." Information also will be there for TRAVELER readers who want to reserve rooms or campsites, or take mule trips down to the canyon's Phantom Ranch.



NATIONAL GEOGRAPHIC PHOTOGRAPHER JOSEPH D. LAVENBURG

A regular column called "Traveling Easy" will detail travel-related topics. In the first issue, Society photography director Bob Gilka will pass along some of his vast experience.

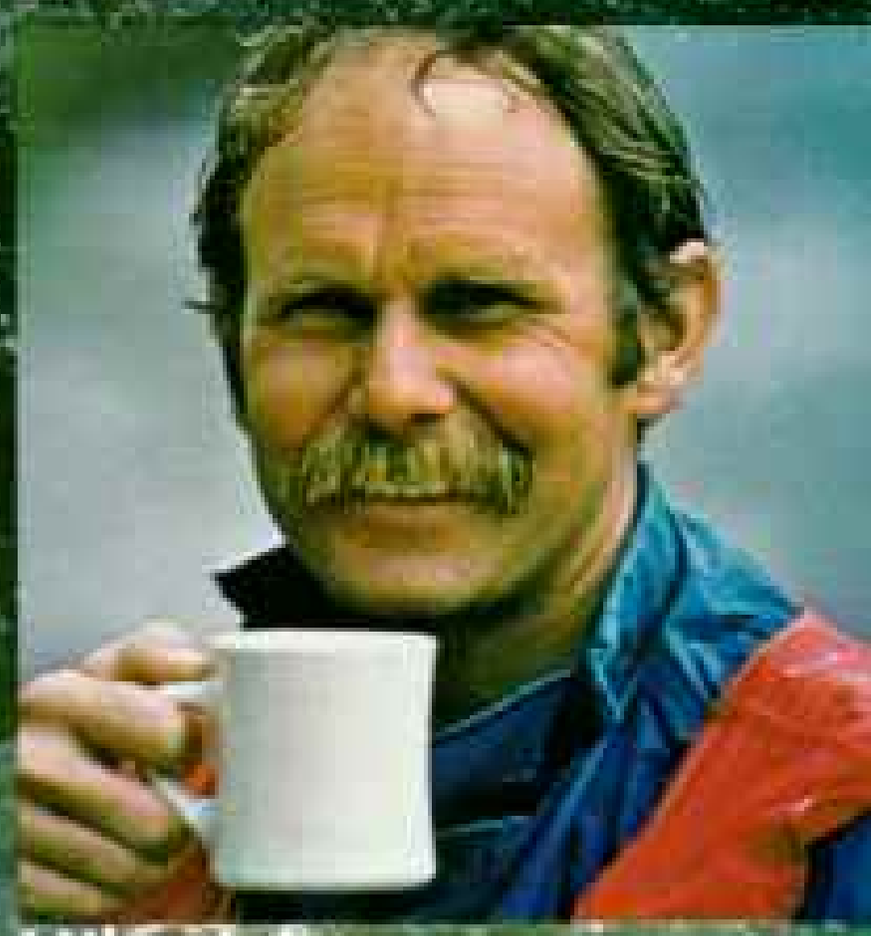
TRAVELER will also print a seasonal calendar to cover significant happenings—festivals, museum exhibits, sports events—all across the United States, as well as in Canada and Mexico. These should benefit members both on the road and near home.

Recently I sailed across Chesapeake Bay to a small port and passed a quiet weekend. I didn't know that a nearby town had a festival in progress, with a display featuring the local art of waterfowl decoys. I'd dropped anchor in the wrong place. I had the right charts, but no TRAVELER.

Gilbert M. Grosvenor

PRESIDENT, NATIONAL GEOGRAPHIC SOCIETY

"What other coffee would I choose?"



Mike Johnson,
Kayak Instructor.

Sanka
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Members Forum

Kamehameha

Your November 1983 article on "Kamehameha —Hawaii's Warrior King" was carefully researched, masterfully written, and perfectly timed. We received copies of the article in time to present it as testimony in a congressional hearing October 18 to consider designating Fort DeRussy in Honolulu as Kamehameha the Great National Monument. I presented the article as a lasting statement on Hawaiian and, thus, American history. I very much appreciate your honoring the Hawaiian people through recognition of this great man.

Cecil Heftel
Member of Congress
1st District, Hawaii

The jaw depicted on page 566 is not that of a warrior but that of a six- to seven-year-old child. This is based on the presence of a six-year molar and five deciduous teeth in the lower left quadrant.

Thomas H. Wingo, D.D.S.
Hammond, Louisiana

We were aware the jaw is that of a child. But, as we pointed out, such remains are revered in Maui as symbolic of the battle of Wailuku, which may have involved warriors' families. The bones, however, have not been dated and may be more recent than Kamehameha's time.

Honduras

My congratulations to Gen. Gustavo Alvarez Martínez of Honduras (November 1983) on being elected by his Congress as commander in chief. However, his position is not unique in the world. The commander in chief of the army of Switzerland is elected by the joint sessions of both houses of the Swiss Federal Assembly in case of war or mobilization of the army.

Ladislaus G. Stampa
Scarborough, Ontario

The U. S. commander in chief, the President, is also elected—by the people—every four years.

I was amused to discover in your article on Honduras that when people fight against a regime in Nicaragua, it is called "rebel forces" against a "leftist regime." Yet when the same thing happens in El Salvador, the words chosen are "terrorist" or "guerrillas" against "U. S.-backed government troops." Peace in war-torn Central America cannot be achieved until all outside

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interference is ended, whether it be of Communist or capitalist origin.

Douglas Steeves
Edmonton, Alberta

Decoys

I can only conclude that you are trying to test those of us who recently purchased the new National Geographic Society *Field Guide to the Birds of North America*. The photo on page 657 of the November 1983 issue shows a flock of shorebirds referred to as "dowitchers" in the caption. The birds are clearly dunlin, as evidenced by their shorter, decurved bills and black bellies.

Richard R. Eakin, Ph.D.
Westbrook College
Portland, Maine

It's a tough call, since the flock in the background is on the wing, but you pass with flying colors. Experts agree with you—the birds are dunlin, not dowitchers.

Martin Luther

The generally excellent article "The World of Luther" (October 1983) opens with the statement that Luther challenged "the mightiest power on earth in his day, the Roman Catholic Church," with his theses of 1517. While the Roman Church may have been the mightiest in *his* world, the Chinese Empire, under the Ming Dynasty, in 1517 had a larger population than all Europe and was wealthier, better organized, and in innumerable ways more sophisticated. Catholic expansionism in the New World and elsewhere would not yet have changed the overall picture. To an extraterrestrial surveying the planet in 1517, China, not Rome, would have certainly appeared the seat of the earth's mightiest power.

Robert Ellwood
Professor of Religion
University of Southern California, Los Angeles

Intending no slight to China, we were, of course, referring to the world that Luther knew.

I just finished reading "The World of Luther," by Merle Severy. His choice of the word "demonic" to describe Luther's energy in his last years is a particularly unfortunate one.

Richard J. Lafer
Pastor, Gonvick Lutheran Parish
Gonvick, Minnesota

The author used the word in the sense of having great drive, as in "he's a demon for work." Given the more restrictive definition of being possessed by demons, he regrets its use in a religious context.

In Luther's world, almost five centuries ago, the Zuider Zee in the Netherlands was not blocked

by a dam as in the painting by Allen Carroll. The dam enclosing the Zuider Zee was finished in 1932. The Zuider Zee ceased to exist; the new lake is the IJsselmeer.

Chris K. Werkman
Voorburg, Netherlands

Since it would have been impossible to determine the correct coastline for all Europe in Luther's time, we elected to show it as it is today.

Aleutians

The article on the Aleutians (September 1983) was very interesting. A Japanese soldier in a picture was identified by his brother, who says he was electrified the moment he saw the picture. The soldier never came back to his wife and child. The soldier's wife says the hardship she has had since he was killed is beyond description. They would like a print of the picture. I hope old enemies will turn out to be permanent friends.

Teruo Nishijima
Sapporo, Japan

A print of the original picture has been sent to the family of the soldier, the one on the right.

Satellites

The article "Satellites That Serve Us" (Sept. 1983) implied that the NAVSTAR satellites of the Global Positioning System are useful only to official U. S. agencies (military and NASA). However, a 1980 invention made as part of NASA research directed toward earthquake prediction allows the NAVSTAR satellites to be fully utilized with very high accuracy.

Initial applications will be for oil and gas exploration. Many other applications exist, such as for landing aids, search and rescue, air-traffic control, and collision avoidance. In this instance, as has happened so many times before, research in one field contributes to the solution of challenges in other fields.

Peter F. MacDoran
Pasadena, California

In a caption on page 321 of the September issue, it is stated that NASA is planning to send radar to Venus in 1988 to make the first map of the planet. But, according to the '82 World Almanac, radar maps have already been made of the entire planet. Please let me know who's right.

Joseph E. Duncan III
Shelton, Washington

Venus has been partially mapped by radar from the earth, but the resolution was poor. The 1988 project will give scientists the first nearly complete detailed look at the planet.

Members Forum

Sri Lanka's Wildlife

Sri Lanka is to be commended for its significant efforts (August 1983) to preserve and protect its wildlife, particularly the elephant. However, the Mahaweli dam project raises some questions. "Jungle corridors" and "link forests" were finally included in the plans to allow the elephants passage. Yet the Mahaweli development project poses problems for more than just the elephant. The natural habitat and biotic relationships that sustain the elephant may be subtly eroded and unobtrusively destroyed. The completion of the Mahaweli development scheme on the second peneplain region will inundate extensive tropical forest areas where at least 35 known endemic species habitats are threatened.

James V. Riker
Davis, California

Ultralights

Your article "The Bird Men" in August 1983 describes the ParaPlane as embodying Francis Rogallo's concept of a nonrigid wing. Reasonable research would have shown that the ParaPlane is an offshoot of Mr. Domina Jalbert's parafoil that entails ram-air construction, i.e. cells.

Edward Cayia
Fort Lauderdale, Florida

The concept of a soft rather than a rigid wing is Rogallo's. The ultralight pictured on pages 214-15 features a soft airfoil that employs Mr. Jalbert's cellular design.

Roadrunner—Again

Isn't it strange how some experts refuse to admit they are wrong. I refer to the answer given to Erwin G. Culley in the October Members Forum. The roadrunner (May 1983) does indeed fly. In the summer of 1982 I watched a startled roadrunner take to the air, fly a short distance, and then set its wings and glide to a landing. It attained a height of about 20 feet and flew and glided a total distance of about 100 yards.

Loran H. Parker
Fresno, California

Numerous readers came to Mr. Culley's defense, so we pursued the question with several experts. They acknowledge that roadrunners can indeed fly short distances when pressed, although "they prefer not to."

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.*

4-H

A Chance to

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40% of our customers actually believe we work hard to keep gas costs as low as possible.

They're 100% right.

One of the pleasant surprises we found, in our recent survey of our customers' attitudes, was that a sizeable percentage of our customers believe that we do work hard to keep gas costs as low as possible.

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In fact, they probably don't realize how right they are.

Because the fact is, according to a commonly used measure of efficiency, Northern Illinois Gas is *one of the most efficiently run natural gas utilities in the entire U.S.*

In effect, each of our employes takes care of 580 customers. And that 580-to-1 ratio of customers served per employe is the highest of any major gas utility in the country.

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Our estimated billing system allows us to read our customers' meters only every other month, thereby saving extra meter reader wages required when meters are read monthly.

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All in all, we can fairly say we don't just work hard to keep costs down, we work as hard as any utility we know of.

And that continuous effort helps minimize the price our customers pay for natural gas, which will be the subject of the next ad in this series.

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There's another side to Hawaii, the one you've always imagined. Hawaii's Neighbor Islands—Kauai, Maui, Molokai, Lanai, and the Big Island of Hawaii. Each a distinctly different version of Paradise. Each able to bring you alive as never before.

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Explore Hawaii's Neighbor Islands. And come alive in the Friendly Skies.

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Experience Hawaii's Neighbor Islands

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Young and vibrant. So big, we call it the Big Island. Soft, black sand beaches, snow-capped mountains, rolling ranchland, and world-class resorts—with a surprising amount of space between.

Maui

With its dazzling beaches and velvet slopes, it's a tropical playground worshipped by lovers of sun and fun.

Lanai, the Pineapple Island. A quiet Hawaiian country town.

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On Assignment

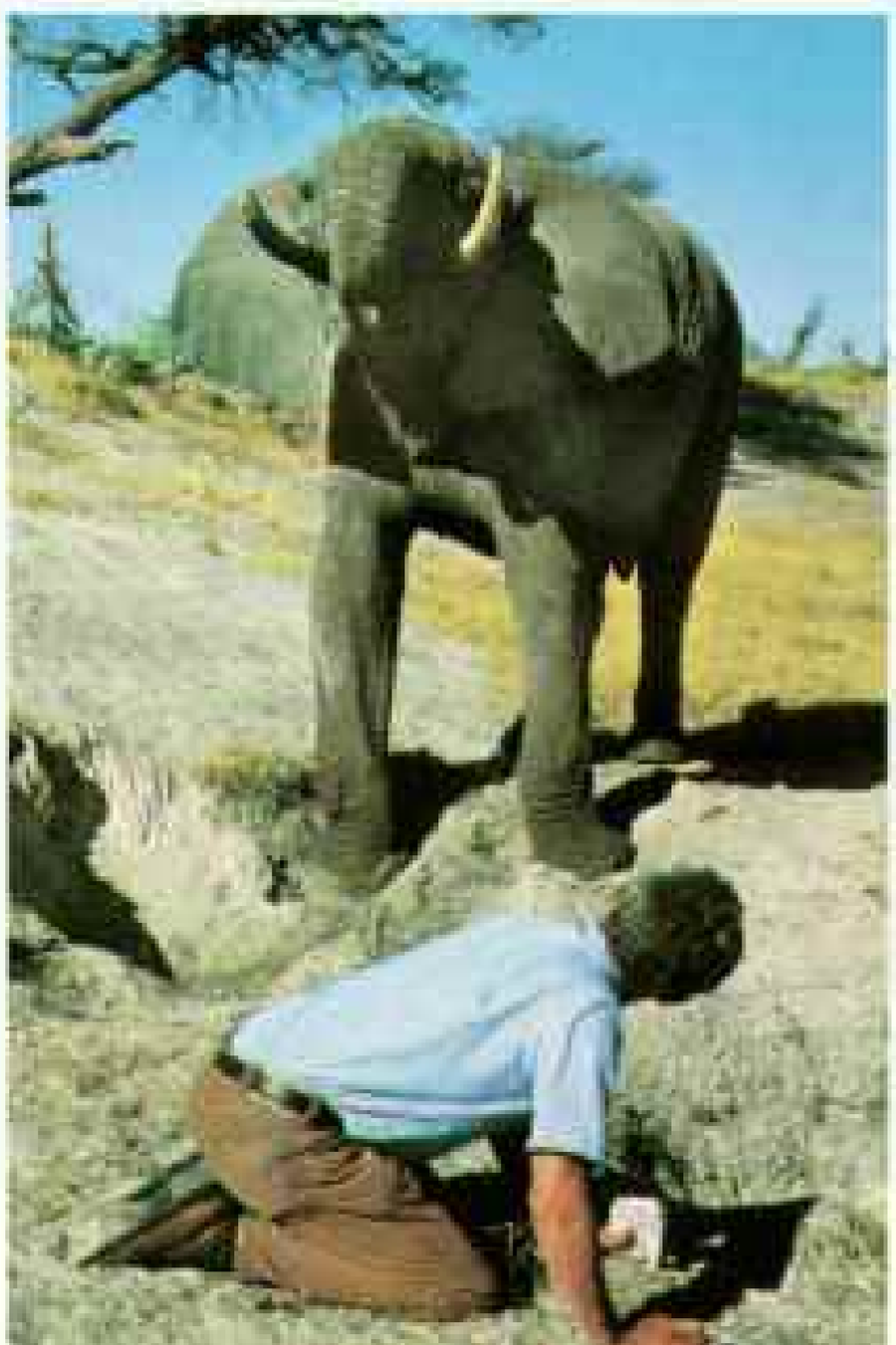
JOHN TROY CHAMBERS (ABOVE)

HANDS-ON EXPERIENCE can often go far beyond manipulating camera or notebook. In West Texas, photographer ***Dan Dry*** (***above***) learned the art of milking a cow, something not taught in an Athens, Ohio, high-school journalism class where, with a borrowed camera, he began his trade. Named Newspaper Photographer of the Year in 1981, Dan gave up a steady job at the Louisville *Courier-Journal* to roam the United States as a free lance, finding in Texas the grit of rural life. "Whatever happens out there—heat, dry wells, rustling, the people just roll with it."

Coming to grips with the reality of drought, Assistant Editor ***Tom Canby*** sent dirt flying from a dry riverbed in Botswana's Chobe National Park (***top right***). With conservationist Peter Joffe, at left, and Anton Walker, he scraped out a water hole for thirsty animals during severe drought prolonged by the worldwide weather disturbance known as El Niño. At a nearby hole Tom crouched for 15 minutes while an elephant hovered over him, yearning for water but lacking the resolve to approach the final yard to drink. When the writer crawled from the hole (***right***), the elephant eagerly moved in. "Keeping a low profile," Tom reported, "supposedly makes the animal less nervous—a thought I found most soothing."

Tom has reported on earthquakes, the terrible U. S. weather of 1976-77—related to an earlier Niño—the world food problem, and famine in Africa's Sahel region. "I don't like to question people in the time of their worst privation and suffering," he says, "but human beings are tough. They will go through the most unbelievable hardship and not lose hope or humor. Like the Australian farmer who had lost virtually everything and still could joke, 'Farming's what you do between droughts.'"

CLYDE WALKER (ABOVE AND BELOW)



Are any of your relatives diabetic?

There's a chance you are, too!

If anyone in your family has a history of diabetes—even a distant relative—treat it as a symptom! It should prompt you to have regular checkups because you are at greater risk of having the disease. Especially if you are overweight and over 40.

What is diabetes?
Diabetes is a disorder in which the body cannot control the levels of sugar in the blood. Normally the hormone, insulin, regulates the blood sugar level. But if your body does not produce or effectively use its insulin, diabetes results. Diabetes can threaten heart, vision, brain, kidneys and life itself.

What can be done about diabetes?
Often people don't realize that most diabetes can be easily managed by simple programs that bring blood sugar under control. Many diabetics need only weight reduction, the right foods and moderate exercise. And, if these changes are not enough, a simple oral medication is all that may be needed. Today, even those who need insulin can be better and more comfortably managed by their doctors than ever before.

Who has diabetes?
You'd be surprised at how many of your friends and fellow workers are diabetic yet lead full lives with no outward signs of illness. Even many famous athletes and celebrities have diabetes. With current therapy diabetics can usually lead a normal life with simple and sensible medical programs.

What are the symptoms of diabetes?
Warning signs are either absent or very subtle. You may drink more water than normal or urinate more frequently. There may be slower healing of bruises, cuts and infections, or you may experience more fatigue and feel "not quite right."

How will you know if you have diabetes?
You won't. Your doctor will. And again, if there is diabetes in your family—including cousins, aunts, uncles, brothers and sisters and especially a parent—then you should have regular blood and urine checks by your doctor. It is a relatively simple diagnosis.

Only your doctor can prescribe treatment.
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U.S. Postal Service

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Photographed by C. Allan Morgan *Jaguar: Genus: Panthera Species: onca*
Adult size: 152 – 183cm, head and body Adult weight: 45 – 113kg Habitat: Rain forests, marshes, scrublands and grasslands in Mexico, Central and South America. Once roamed certain portions of southern U.S. but extinct there since the early 1900s. Surviving number: Unknown

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

There has always been an air of mystery surrounding the jaguar. Some pre-Colombian American Indians considered it a god, whose spotted coat represented the star-studded night sky. The jaguar is an exceptional hunter and swimmer, feeding on fish, deer, tapirs and other small mammals. The jaguar has no natural enemies, but it has often been hunted by man for its fur and is now an endangered species.

The jaguar could never be brought back should it vanish completely. And while photography can record it for posterity, more importantly photography can help save it and the rest of wildlife.

In spite of all the stories, there is only limited scientific knowledge about the jaguar. An invaluable research tool, photography can help conservationists gather necessary information. In addition, photography can increase our appreciation of this largest of New World cats. It can show us the grace and magnificence of the jaguar and thereby deepen our understanding of nature.

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

Canon
Images for all time

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The inside story.

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Outside, a unique aerodynamic shape channels the wind over and around Tempo to help increase fuel efficiency. It also directs the airflow, reducing overall lift for improved stability and directional control.

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*Based on EPA Interior Volume Index.

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