DOUBLE MAP SUPPLEMENT: ONTARIO

VOL. 189, NO. 6 JUNE 1996

NATIONAL GEOGRAPHIC

Australia's Cape York Peninsula

OFFICIAL JOURNAL OF THE NATIONAL GEOGRAPHIC SOCIETY WASHINGTON, D.C.

NATIONAL GEOGRAPHIC MAGAZINE

The Uneasy Magic of Australia's Cape York Peninsula

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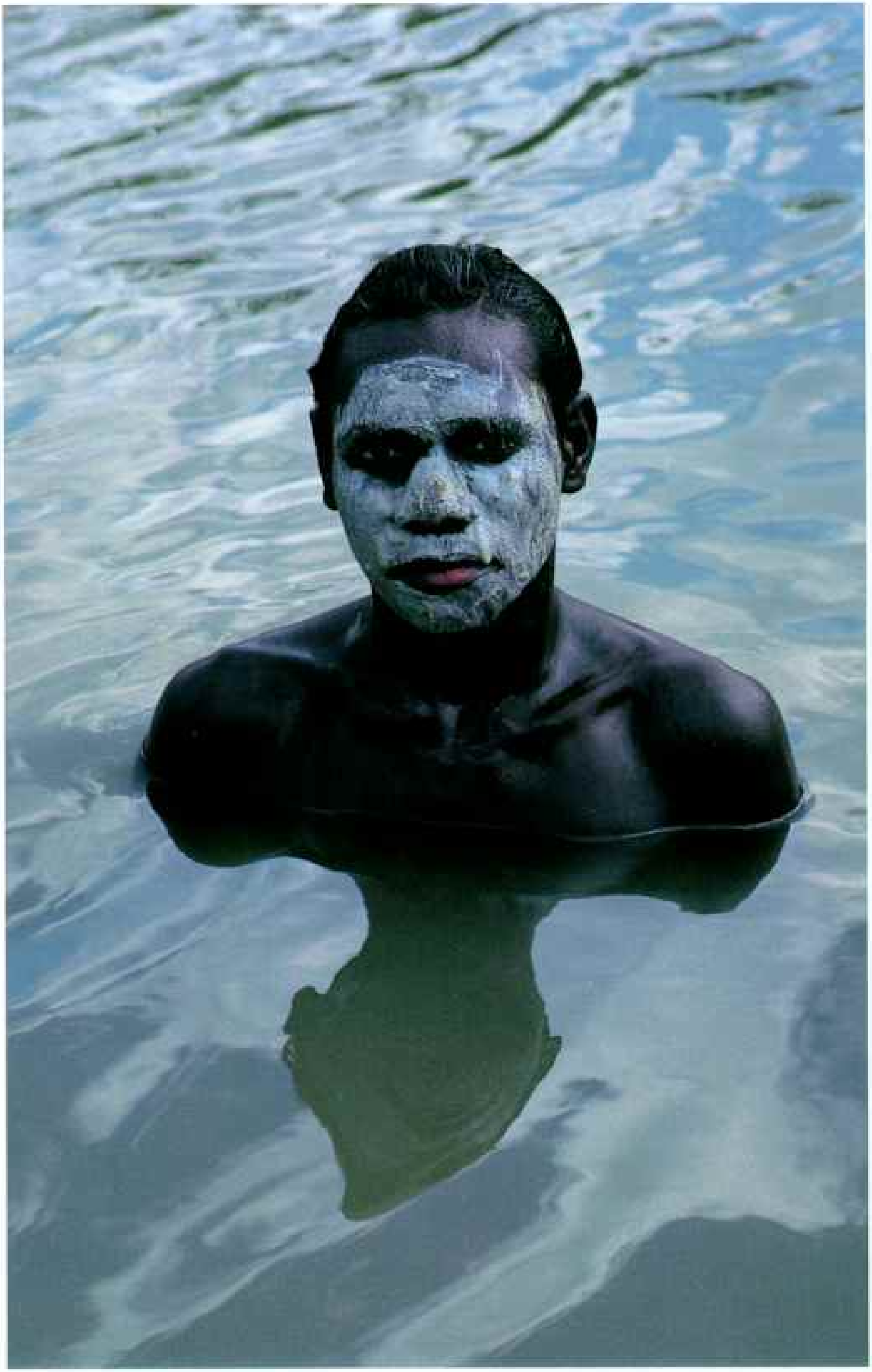
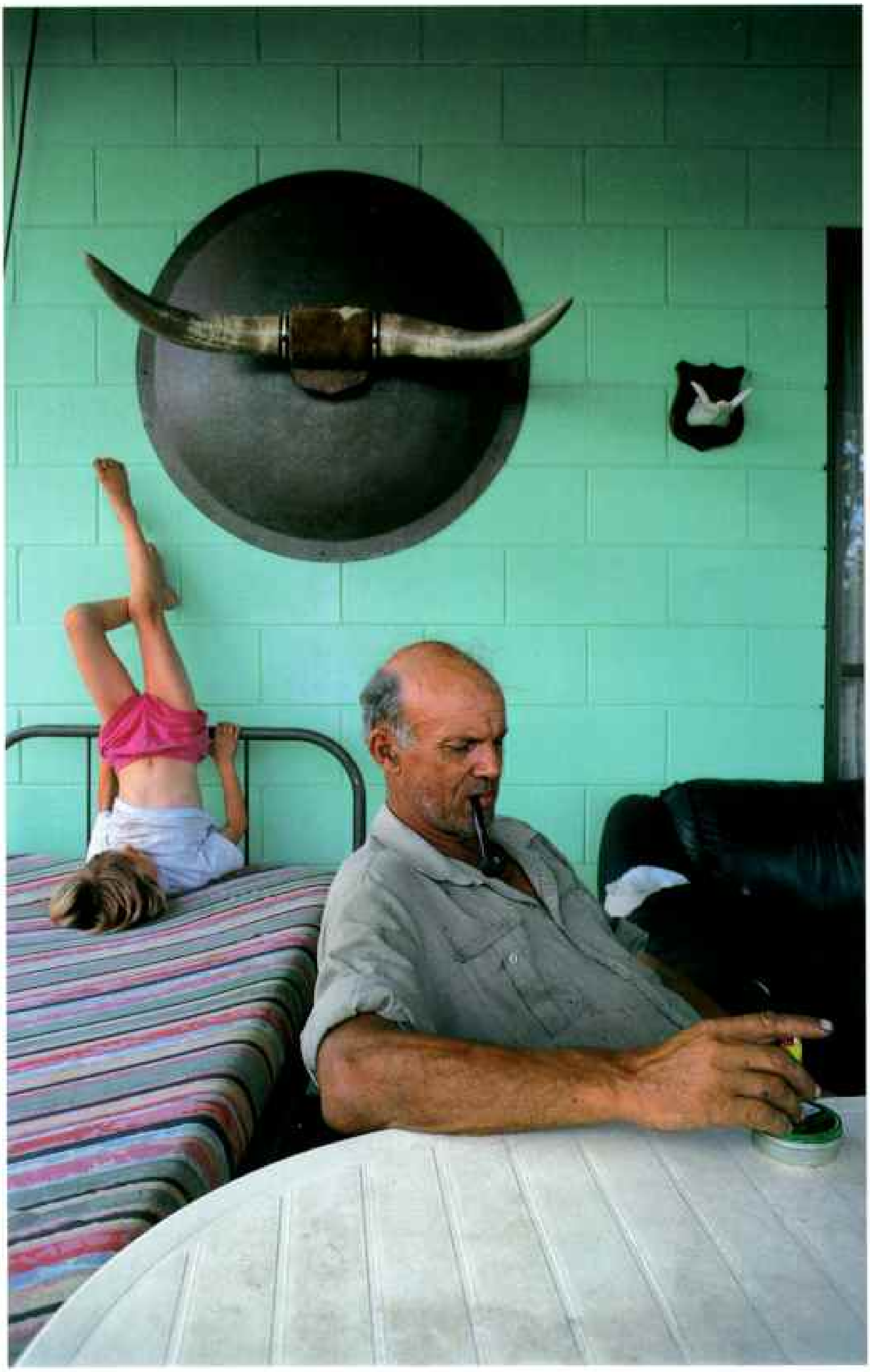
Conjuring an image as old as his ancestors, an Aboriginal teenager dons a mask of mud while swimming in a billabong, or water hole. For nearly 2,000 generations his people have inhabited this wild and strangely beautiful spike of land at the top of down under. Steeped in the supernatural, it endures as a stronghold of native culture and one of Australia's last frontiers.



SCORCHED IN ONE SEASON, *sodden in the next, Cape York Peninsula is a land of extremes. "The same country that's flooding in March may be burning in November," says naturalist Kerry Trapnell. Five months of monsoon rains cause rivers to burst their banks (preceding pages); then they evaporate during seven months of withering drought. During dry months rainless lightning storms set the bush ablaze; some fires burn unchecked for weeks. The schizophrenic climate coupled with obstinate terrain has been the peninsula's best protection, bankrupting developers and barring the motor home set. "It's a harsh land, not a place for freeloaders," says a longtime resident. "It develops character and weeds out those who don't belong."*



BECAUSE I COULDN'T SLEEP, Gladys Tybingoompa told her brother-in-law, Arthur Pambegan, to perform the smell-of-the-country ceremony.

"But only if you believe," she said, turning her black eyes on me.

My remark about insomnia had been dropped into the swirl of after-dinner conversation in the Aboriginal community of Aurukun on Cape York Peninsula. The peninsula, that green finger of land at northeast Australia's tip, points toward New Guinea.

After my confession Gladys leaned forward out of the shadows to say: "When you come to our country, you must ask permission from an elder and be welcomed. That way you will be safe and sleep well."

Then she turned to Arthur, a tall, dignified man with a furrowed face, and said something in Wik Mungkan, her traditional language.

Disappearing into the house, Arthur returned with a *woomera*, a spear-throwing shaft about three feet long, and, passing it under his arms, touched me on the shoulders and head while intoning a chant.

That night I slept. But several nights later the insomnia returned. Not even Arthur's blessing could keep it away for long.

Sleep did not settle easily on any of the other communities I was to visit in the weeks ahead. Nights were filled with the sounds of brawling men, wailing sirens, and barking dogs. Days brought glimpses of strange disjunctions. Four-wheel-drive vehicles and metal-tipped spears. Microwave ovens and lizards roasted on an open fire. The oldest surviving culture in the world was rubbing uneasily against modern society, and the abrasion was hard on everyone. No wonder I felt unsettled. It seemed everyone else did too.

To Gladys, all 54,000 square miles of Cape York Peninsula—indeed, virtually all Australia—is rightfully Aboriginal country. The Aborigines believe in community property, that they and their ancestors own this land collectively and share its fruits in perpetuity. But the white explorers who came brought a different idea of ownership—land grants and leases, fences and deeds.

Australia's early white settlers were mainly content to cluster along the coasts of this huge continent, leaving the Aborigines to compete for outback and wilderness lands. But "worthless" outback turned out to be rich in minerals. Cattle properties expanded from horizon to horizon, and the question of who owns the land, fueled by growing white sensitivity to Aboriginal rights and the struggle among Aborigines themselves to reclaim their ancestral land, no longer could be glossed over. Nowhere is that struggle starker today than on Cape York Peninsula, where ownership of as much as a third of the land is in dispute, being claimed by its original inhabitants and by those who came later.

It is the back of beyond, this triangle of land—a topographic collage of sweeping savanna, oozing wetland, tropical rain forest, scrub, and rivers that uncoil like pythons through thick, green wilderness.

To whites: wilderness. To Aborigines: homeland.

Of the peninsula's population of 14,000, nearly 7,000 are Aboriginal. Eleven Aboriginal communities scatter along the peninsula coast, ranging from 150 to more than 1,000 souls. They are rural ghettos, full of dust, despair, and rotting housing, some with no plumbing or electricity. Unemployment is endemic; more than 80 percent of working-age people draw welfare checks.

In such communities the lure of compact disc players and satellite dishes opposes the gravitational pull of tradition. Chris Roberts, a naturalist who has worked on Cape York Peninsula for four years, says, "It's computers in the morning; digging yams with a stick in the afternoon."

In the midst of limited resources is spiritual richness. Things an Aborigine can see, a white person can only glimpse. On Cape York Peninsula the beak of a sunbird rubbed on a baby's lips is believed to bestow the gift of speech.

IMAGINATIONS ROAM UNBRIDLED *on John Fraser's 608,000-acre cattle station deep in the peninsula's hinterland. While John tends 4,000 head and guides safari-style hunts for feral bulls and pigs, granddaughter Amanda attends school by radio and revels in hours of unprogrammed time. "I've never once heard her say she was bored," he reports.*

ISLAND OF INDUSTRY *in a wilderness sea, Comalco's mine at Weipa taps a mother lode of bauxite—the raw material for aluminum—and supports a company town of 2,500. At the processing plant, ore is washed and screened for shipping. The first load left in 1961. Says an employee, "We've hardly scratched the surface."*

The appearance of a brown crane on a rooftop brings tidings of death.

The land is full of song, of stories of ancestral beings who traveled across the continent when time began, conjuring a landscape, carving valleys, raising mountains.

Then, there is dinner at Aurukun, Arthur Pambegan, and the welcoming ceremony with the woomera. "Arthur is a famous sculptor of bonefish," Gladys says after the ritual ends.

"Ah, bonefish," I say, mentioning that on the day my brother was born, my father went fishing and caught a bonefish.

Gladys stares at me. "Arthur's totem is the bonefish," she says finally. "That makes him your brother."

THE VASTNESS OF OCEANS insulated Australia and its Aborigines for more than 50,000 years. Then, some 400 years ago, the Dutch ship *Duyfken* sailed down the west coast of Cape York Peninsula and landed at Cape Keer-weer. Before it sailed on, at least six of its crew members had been felled by spears. It was the first round of conflict between Europeans and Aborigines.

In 1770 Captain James Cook stepped on a slip of land off Cape York and claimed the east coast of Australia for Britain. To Cook the Aborigines appeared, by turns, indifferent and hostile. Gifts of beads met with disinterest. "All they seemed to want," he wrote in his journal, "was for us to be gone."

The Europeans returned in 1788 and settled. Many were convicts shipped down under from prisons in Britain. On Cape York Peninsula subsequent conflict came with the era of land exploration. After the discovery of gold on the Palmer River in 1872 raised the stakes, miners swarmed in, then cattlemen. Skirmishes between Aborigines and Europeans escalated into massacres.

Henry Reynolds, a historian, puts Aboriginal casualties on the continent at more than 20,000 during a century and a half of frontier settlement.

At the turn of this century, conflict gave way to paternalism. Though their culture had survived here through the millennia, Aborigines soon found themselves protectorates of the state.

"WHAT'S the road like?" Impassable is the typical reply during the monsoon "wet," which lasts from December to April. Nearly impassable, during the "dry." Boggy and slippery in the wet. Dusty and eroded in the dry. And bumpy. Always bone-shattering, axle-breaking bumpy. This is four-wheel-drive country. The blacktop disappears 150 miles outside of Cairns, then the road grows fainter with each passing mile.

Signs? It's assumed you know where you are. Otherwise, why are you here? At best, it's "take a left at the plastic lid nailed to the tree." Or "look for the fork marked by a tin can on a stone." Or was it a stone on a tin can?

"What's the road like this morning?" I asked our Aboriginal driver, Wally Moses, as photographer Sam Abell and I prepared to make the three-hour drive to Bamaga, 20 miles south from Pajinka Lodge, which sits at the tip of the cape.

"Jumpy," he replied.

It was the wet—when the road turns liquid, bleeds orange, and finally vanishes underwater, sometimes with a gurgle. Frequently we stopped, confronted by an upright tree branch, a totemic *(Continued on page 17)*

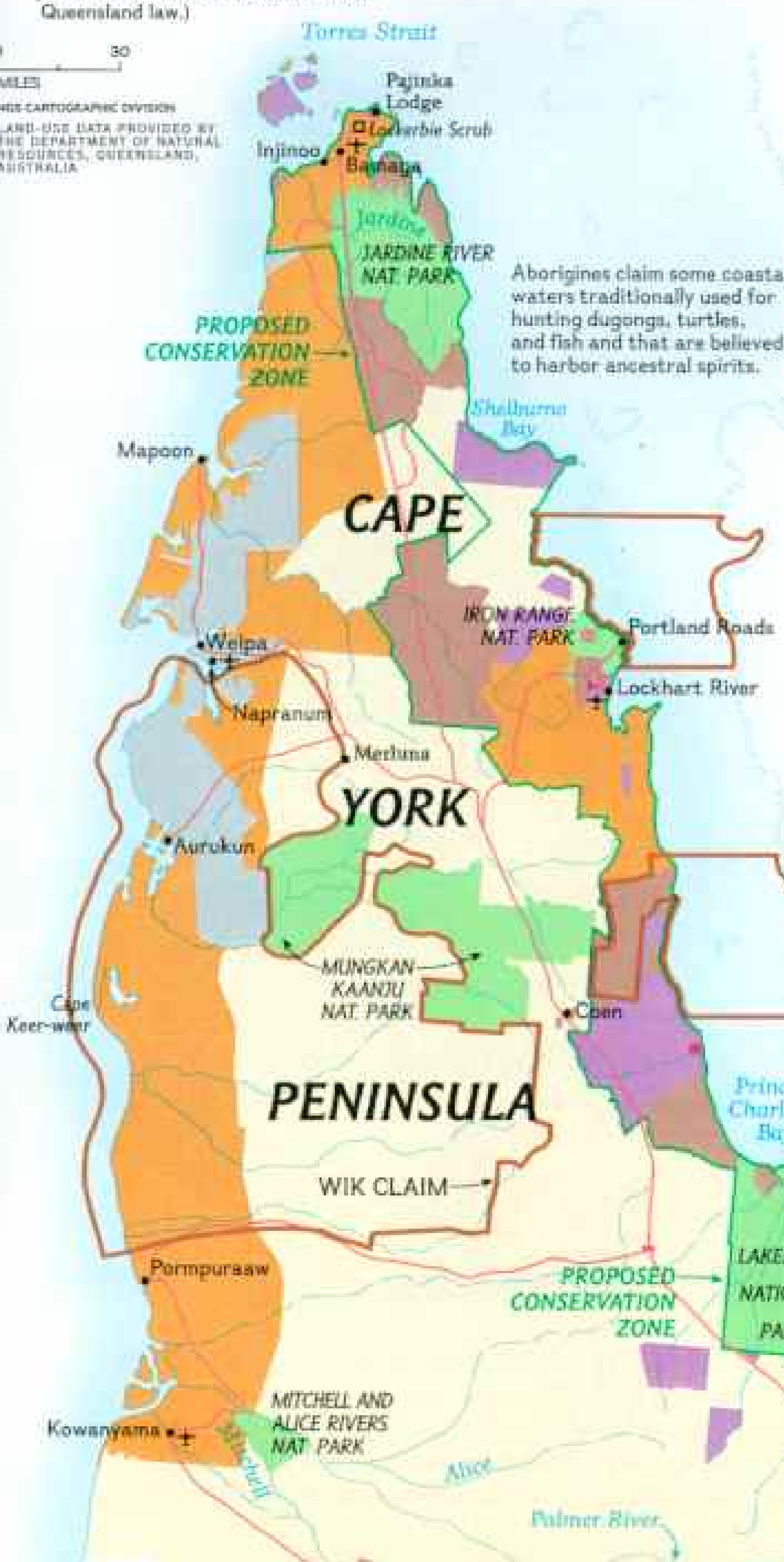
Parceling out the peninsula

ABORIGINAL LAND
(private and state)
PRIVATE LAND
QUEENSLAND LANDS
Grazing
Mining
National park
Reserves and unallocated land
Various uses
NATIONAL NATIVE TITLE CLAIM
(Other areas have been claimed under Queensland law.)

30
MILES
NGS CARTOGRAPHIC DIVISION
LAND-USE DATA PROVIDED BY THE DEPARTMENT OF NATURAL RESOURCES, QUEENSLAND, AUSTRALIA

DUBBED *the Land of Wait Awhile by cattle drovers often ensnared by its thorny tangles, Cape York Peninsula bristles with untamed splendor. Much of the east coast has been targeted for conservation and may form the core of a future world heritage site.*

JUTTING NORTHWARD *to within a hundred miles of New Guinea, the peninsula provided an ancient gateway through which nomadic tribes entered Australia more than 50,000 years ago. In recent times it has become a testing ground for social justice. Shoved aside during European settlement, native inhabitants have begun exercising newly won rights, negotiating land claims they hope will preserve the region's natural resources and their way of life. Indigenous clans may eventually reclaim a third of the peninsula—an outcome cheered by many wilderness supporters. "Much of the land will be handed back to Aborigines," asserts one environmentalist. "And removed from the kingdom of developers."*



"The Earth and Sea *of [their] own accord furnishes them with all things necessary for Life,*" *recorded Captain James Cook of the Aboriginal hunter-gatherers he encountered in 1770. Such largesse remains an important food source. Allowed a limited take of threatened dugongs—a close relative of the manatee—traditional hunters each year harvest about 100 of the estimated 10,000 mammals that dwell along the peninsula's east coast.*

warning: Road Closed. Then Wally heaved the car off the road, up the berm, and into the jungle to batter our way through brush.

We had left at nine; by ten we were bogged. Climbing out, we watched the car sink in mud the consistency of cake batter.

Wally looped a wire cable around a tree trunk to winch the car out. The cable broke with a snap. Four times.

"We may have to walk," Wally said.

"How long?" I ask.

"Five days," he seems to say.

"Five days?" I gulp.

"Five k's," he enunciates patiently, meaning kilometers.

A rescue vehicle sent out by the lodge spares us the five-k walk. Wally will return later to dig the truck out.

The land breathes magic. Not the conjurer's act of colored scarves and playing cards, but real magic. Weepy eucalyptus trees with scimitar-shaped leaves. Dazzling-white ghost gums. Termite mounds: some red and bulbous as a Henry Moore sculpture; others, black and delicate as the spires of a Gothic cathedral. A glory of birds—sulfur-crested cockatoos that lift from trees in clouds, tiny bee-eaters, iridescent as opals.

On Cape York Peninsula nature dazzles with 379 rare or endangered plant species and 85 rare or endangered vertebrates, including the green python and golden-shouldered parrot. Nature threatens as well, with deadly vipers like the brown taipan and death adder, with stinging trees and poisonous spiders.

In Iron Range, a mountainous carpet of rain forest along the east coast, my host warned me not to drop a crumb in the car. Once rats had chewed through his dashboard, short-circuiting wires. Fire broke out. Inside his house, nesting ants had destroyed his fax machine.

Even the grass harbors menace. In Lockerbie Scrub, just south of the tip, my guide, naturalist Kerry Trapnell, stripped down a stalk of grass to reveal a hypodermic-like point. Spear grass, he said; the tip burrows into hide, the wound festers, the victim dies. You will see no sheep grazing the peninsula.

"TO THE NORTH of this city lies one of the great wildernesses of the world," says Peter Stanton, senior conservation officer at the Queensland Department of Environment and Heritage. I sit in his office in Cairns,

THE RICHLY TEXTURED LANDSCAPE *gives rise to an extraordinary diversity of wildlife. Rain forests harbor the rare green python (top). Savanna woodlands studded with termite mounds shelter the endangered golden-shouldered parrot (above). Magpie geese (opposite) nest by the thousands in coastal wetlands. As native people regain traditional lands, the peninsula's natural treasures will increasingly be entrusted to Aboriginal hands.*

75 miles south of where the peninsula begins.

"It's our richest in fauna and diversity," he says. "You can go from rain forest to grassland to heath to wetland. It must be one of the most complex regions left on earth."

Stanton has known and loved the peninsula for 30 years. In younger days, in the field, he ripped out his truck's air-conditioning, not wanting to be lulled into a false sense of comfort in a land that was anything but.

"This land resists large-scale schemes," he says, ticking off the reasons: infertile soils, grass so nutritionally impoverished a cow could gorge and still starve, a seven-month dry season, torrential rains in the wet.

Despite such adversity, entrepreneurs persist. Stanton speaks of developers who cleared tens of thousands of acres for crops or cattle, then went belly-up. And now fleets of four-wheel-drive vehicles and tourist buses add to the pressures. Only the peninsula's thorny remoteness has kept it from being overrun.

Stanton sighs. "The land is holding on until a more enlightened age."

That age just might be dawning. Last year Queensland Premier Wayne Goss announced the creation of a Cape York Peninsula Conservation Zone, a protective mantle over nine million acres along the length of the eastern coast. The zone more than doubles the peninsula's protected area.

The conservationists exulted. But the cattlemen fumed.

The zone required the state to revoke the leases on 11 pastoral properties—all owned by the state but run by families, several of which have ranched here for five generations and consider the land to be theirs. "More wilderness?" scoffed Alan Holmes, chairman of the Cape York Peninsula branch of the Cattlemen's Union of Australia. "The only wilderness is between Wayne Goss's ears."

"Nothing is secure," said Bob Wincen, another advocate for pastoral interests. "Goss says 'we will take your land.' And why? To give to someone else, and you know who. . . ."

I waited for him to fill in the answer.

"The Aborigines," he said bitterly. "It starts on Cape York Peninsula. Where does it come to an end?"

Ultimately the conservation zone will be turned over to the Aborigines, who will manage it in cooperation with the Queensland Department of Environment and Heritage. In effect, the land will serve as a park for all Australians, though Aborigines will retain the right to hunt.

The arrangement is loaded with unsolved problems. Peter Harris, a district manager in the department, who will help administer the zone, said: "We're taking the first tentative steps in a journey of a thousand steps."

Six months after my conversation with Harris, Goss's Labor government suddenly toppled. The opposition conservative party squeaked to a majority. Perhaps the conservation zone may not be such a sure thing after all?

"No, no," Noel Pearson, director of the Cape York Land Council and the key Aboriginal leader on the peninsula, reassured me. The greening of Australia embraces liberals and conservatives alike. "No matter what the political persuasion, everyone concedes that Cape York is a conservation zone."

Everyone concedes, as well, that Australia stirs with a new responsiveness to Aboriginal needs, but the dog-eat-dog world of market economics leaves limited space for cultural sensitivities. And the Aborigines, after years of deprivation and haphazard accommodation to the material world, often are poorly equipped to cope with Western civilization.

Noel Pearson says, "When we engage with discos and this really seductive Western thing that happens down in cities like Cairns, we engage with it disastrously. We're disillusioned. We come up against horrific racism. We end up in the gutter. We end up losing out."

"SOMETIME," said Kerry, as we drove through the scrub on the way to Kowanyama on the peninsula's west coast, "we ought to just stop the truck and walk ten minutes into the bush, far enough out so you can't see anything of the truck. There's a narrow fringe of land the road impacts. Get beyond that, and you are in country no one else may ever have set foot on.

"You walk carefully in the bush. A twisted ankle is bad news." Because of snakes, you also walk slowly, heavily. Snakes sense vibration and will flee the tread of a boot.

Don't linger by water—particularly not "crockie water," tea-colored rivers, where an 18-foot saltwater crocodile may be lurking.

"Turn the wrong way, and you have a 300-kilometer walk to the coast," Kerry said. "You wouldn't make it." I nodded. "So you sit and hope someone finds your truck, then finds you."

One afternoon on the way to Cairns from Cooktown, he braked the truck and marched me into the bush, casually pointing out animal trails and termite mounds.

After a few minutes the truck was no longer in sight.

"Close your eyes," Kerry said. "Turn around three times, and tell me where the truck is."

I hadn't a clue.

THE INVISIBLE statistic. Not until 1967 were Aborigines even counted in the census. "I remember a tea towel, and on it a wombat, a kangaroo, and an Aborigine. As if the man were part of the wildlife," says Chris Roberts, a white biologist with the Cape York Land Council.

Beginning in the 1870s and continuing until the 1960s, the Queensland government moved Aborigines from their homelands, relocating them on government reserves and missions.

"Rounded up like cattle and corralled," Gordon Pablo, an elder of the Wuthathi tribe, told me. "My family was shifted out of Shelburne Bay to Injinoo in the 1920s. Our traditional land became crown land."

Under this policy of assimilation, Aborigines were taught European ways. The use of traditional language and customs was discouraged, sometimes even banned. Before white settlement some 45 indigenous languages were spoken on Cape York Peninsula; only a few remain.

Often, Aborigines were completely swept off their land. In 1957, following the discovery of bauxite on the west coast of the peninsula, more than 800,000 acres of land set aside as Aboriginal reserve was whittled to 308.

"It's easy to condemn what was done. Much easier than to see compassion, however misguided," said David Hurse, a former Presbyterian minister who is white. He spoke of the Reverend Bill Mackenzie, who ran the mission at Aurukun from 1923 until his retirement in 1965.

"Mackenzie tried not to interfere with traditions," Hurse said. "He encouraged people to retain links with the land. He also insisted that the kids go to school and that men and women learn work skills. He brought the first education and health care to people here."

REDUCED TO HANDOUT DEPENDENCY *by a broken wing, a cockatoo accepts bread from McNaught Ngallametta. To lessen their reliance on the government dole, McNaught moved his family to a remote camp called an outstation. Though spartan, their concrete dwelling provides sturdy shelter when tropical cyclones threaten.*

Even so, the sorrow remains.

In Kowanyama, an Aboriginal community of about 1,200 people on the west coast, where the Mitchell River fans out into the Gulf of Carpentaria, I walk past a small wooden church with Alma Wason, an elder of the community.

"The dormitories stood there," she said, pointing to a vacant lot. They had housed girls who were taken from their parents and taught domestic skills. "We had numbered blankets on a hard wooden floor. I was number six," she said matter-of-factly. "The manager sent his dog to find us when we tried to hide. At 9 p.m. they locked us up."

"I was living in nature and with my relatives, really happy," Peter Costello of Hope Vale, an east-coast community, told me. He is a man of 80, a trusted figure in his community, active in his church and in the political life of the peninsula.

"When I was six, my mother was captured, raped, chained up, and they shipped us away to Hope Vale," he said.

"I remember my mom on the jetty. Crying over footprints in the sand. The only trace left of her children."

He paused. "I lost her forever."

"There is baggage on the shoulders of every Australian," says Noel Pearson of the Cape

ROISTERING PROSPECTORS *once ruled the streets of Cooktown on the peninsula's east coast. In the 1870s, during the height of the Palmer River gold rush, 30,000 fortune seekers rollicked here at dozens of bars and brothels. Today 1,500 inhabitants pursue quieter pleasures: During the "wet," circulation at the local library soars.*

York Land Council. Still, a cultural identity refuses to die.

"I grew up knowing very clearly who I was and where my country was, even though I'd never seen it," he tells me in his office in Cairns.

"Everyone knows it. Old people tell you it. The spiritual relationship with the land is still something they talk about. They believe in their ancestors' spirits. They can feel them returning to their traditional homelands."

Such beliefs survived, Pearson adds, in decades when no one imagined Aborigines would ever regain ownership of their land.

"That's what we are, spiritual survivors," another Aboriginal elder agrees. "It was the only form of survival we had."

As this man talks, I find myself staring at his feet. They are wedge-shaped, with nails that curve over toes. Black as the earth he stands on. So black, in fact, I cannot tell where his feet stop and the ground begins.

"THE EARTH IS MY MOTHER," I often heard Aborigines say. Throughout the peninsula, in search of that nurture, hundreds of these Australian natives are returning to their homeland in a migration known as the outstation movement.

An outstation is a permanent camp in the bush—as simple as an open shed to keep off the rain. It may not solve all problems, but it's an escape from the desperation of settlements and the degradation of alcohol that inevitably poisons them.

Near Aurukun, 14 outstations scattered throughout the rich wetlands and scrub forests are being provided with permanent housing. A teacher goes out several times a year to teach in the "school of the bush," and nurses are flown in by small plane to provide medical care.

Other outstations are more primitive. During the wet, I visit a woman named Nagi Crowe at Atambaya, an outstation connected with the community of Injinoo, near the tip of the peninsula. She has no telephone. No electricity. An oil drum serves as stove. Home is a shed with a corrugated-metal roof and dirt floor. Sheets of metal enclose a garden. Chickens strut in and out of the shade.

"We short of tea bags," Nagi apologizes. She frowns at her inability to offer this bit of hospitality, reflects for a second, then adds: "I don't want to live anywhere else. I put my trust in my ancestors. This is where they used to walkabout the bush.

"My mother died when I was five," she continues. "My two youngest brothers died. My husband left. He went down south, left me with my boys. But I keep going."

EVOKING TOMBSTONES ON A CHARRED BATTLEFIELD, *termite mounds are in fact pillars of life in the ecology of the peninsula. No earthworms live in this seasonally arid region, so termites assume the vital role of enriching the soil by recycling dead wood and grass. Likewise, dry-season fires release nutrients, sparking a conflagration of green when rains return. "It's magic when it rains," says a cattleman. "You can almost hear the grass growing."*

SHARING A "CUPPA" AT THE START OF THEIR DAY, *Geoff Guest and wife Norma teach troubled youth from across the peninsula how to handle horses, cattle—and life. Learning to be tough, and tender too, one of their charges (above) consoles his horse after a rampaging bull slashed its stomach, disgorging a loop of intestine. With the nearest veterinarian 250 miles away, Guest stitched the wound with a needle and strands of hair from the horse's tail. The horse got up and survived.*

THOUSANDS OF HANDS grab at Cape York Peninsula—miners, cattlemen, tour operators, conservationists, Aborigines—not to mention 55 federal and state agencies, which tend to intrude from time to time.

But the big question remains—Who owns the land?

"How can you ask?" says Fran Seagren, Mayor of Cook Shire, the municipality that takes in most of the peninsula. "There's enough here for everyone."

"The land belongs to the people who've committed their lives to it," says David Hurse, the former Presbyterian minister.

"The land belongs to Aboriginals," a long-dead Australian native named Johnny Flinders proclaimed with frightening intensity in an interview preserved on tape. "This country here, we won't give it to you. It's our land, not yours. It's our land where we will die."

Our land, not yours. In 1992, in a case brought to the Australian High Court by Eddie Mabo, a Torres Strait islander, the court ruled that indigenous peoples could

claim ancestral land, that native title did exist. That ruling overturned terra nullius, the doctrine under which Captain Cook claimed Australia. Terra nullius, no-man's-land, was a legal presumption, upheld for centuries, that Australia was unoccupied when Cook landed.

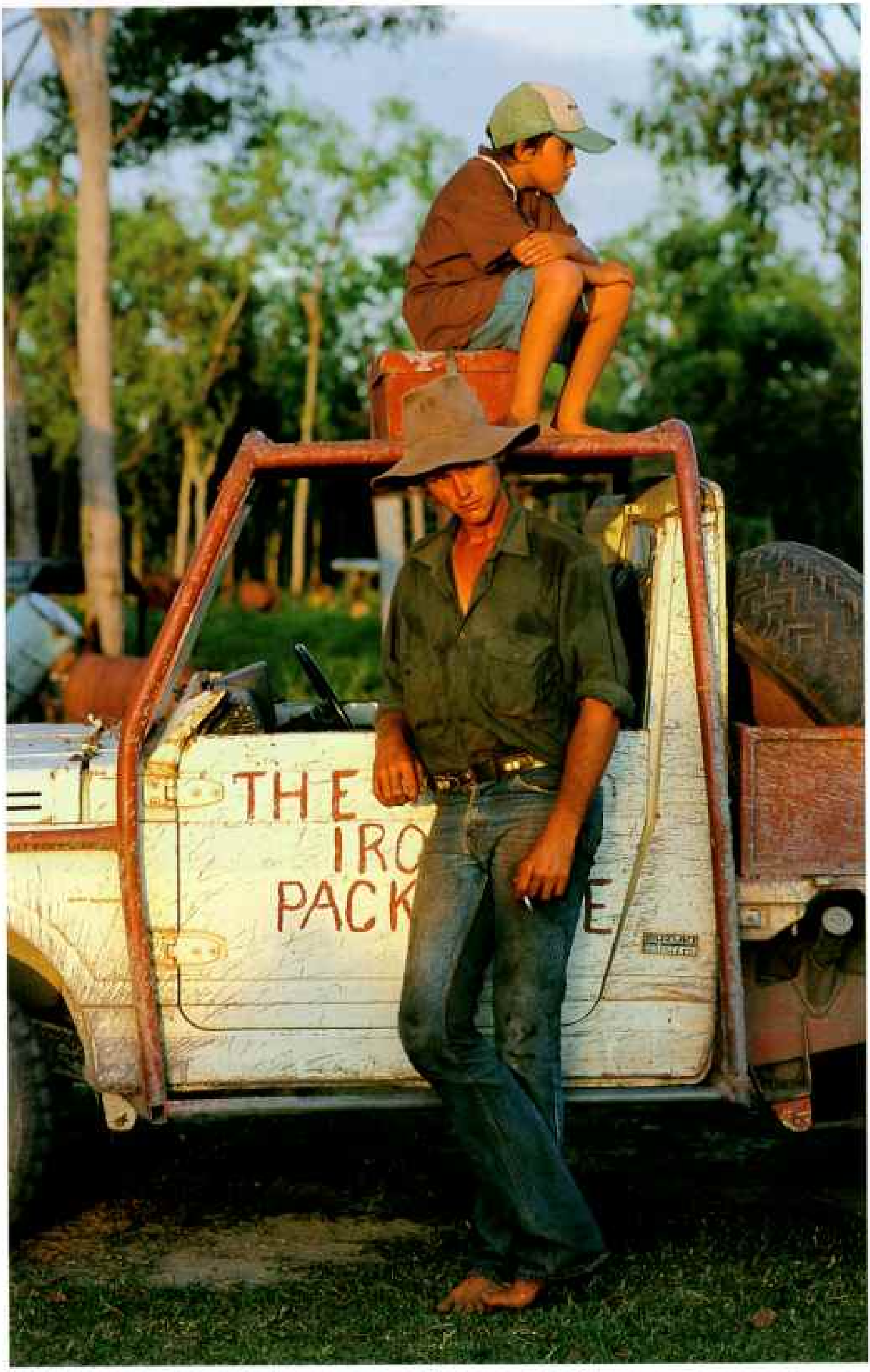
But only crown land, which belongs to the government, may be claimed. Under the 1992 ruling, freehold land, that owned by individuals, is exempt.

As in the United States, where Native American claims recently have been given new respect, no one entertains the fantasy that an entire continent could or should be returned to its original inhabitants. In Australia, some five percent of the land can be legally claimed. But on Cape York Peninsula, 30 percent is claimable.

"Aboriginal people are telling white landowners: 'We know you have an attachment to the land. Please imagine what our attachment must be,' " says David Byrne, himself a white and the deputy director of the Cape York Land Council, adding that compensation will be paid to ranchers who are leasing land.

Currently 40 claims are being sorted through on Cape York Peninsula. The biggest case there, indeed in all of Australia, is the Wik claim. It pits 188 traditional Aboriginal claimants, members of Wik-language-speaking groups, against 19 defendants. These include the Queensland government, the Australian Commonwealth, nine cattle operators, and Comalco Aluminium Limited, a mining company.

What's at stake? More than 10,000 square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WATCHING FLAMES DEVOUR GRASS MEANT FOR HIS CATTLE, *stockman John Lempriere surveys grazing land turned to tinder during the "dry." "When it gets this parched, even a glass bottle left in the sun can set off a blaze," he says. Taking shelter from the smoldering sun beneath a wide-brimmed hat, a "ringer," or station hand (left), relaxes with a young friend at the end of a hard day.*

miles of crown land on the west coast—a fifth of Cape York Peninsula. The claim includes part of one of the richest bauxite deposits in the world, the mine at Weipa, which each year produces 180 million dollars' worth of the red ore that is refined into aluminum.

"The first priority for Aborigines is to get their land back—or access," explains James Fitzgerald, one of five lawyers for the claimants. "We've never been in a position to stop mining; we just want to get better terms and ensure minimal disturbance of the land."

But who in the tangle of tribal affiliations and land ties can legitimately claim to be the Wik? And which traditional owner has rights to which piece of land?

The case is a judicial swamp. "We believe our legal position is sound and our mining claim valid," says Greg Walker, general manager of external relations for Comalco, during a phone conversation. Even so, he indicates the company will soon reach a settlement. "No one wants to see this drag on for a decade," he says of the case, which has slogged along for more than two years.

James Fitzgerald says: "A bit of a nightmare. No one knows what the law will allow."

CLIVE QUARTERMAINE looks out the kitchen window at the poinciana flush with crimson blossoms and in a low, gravelly voice asks: "How would you feel if you had worked as hard as me and my wife have done?"

Clive's ranch, Merluna, is one of nine named in the Wik claim. Families like his, raising cattle on the peninsula, live simply. Nothing fancy about their houses or lives — just hard work from dawn to dusk.

Although only 116,000 of Merluna's 832,000 acres are at issue, Clive thinks that's enough to sink him. Margins are slim here.

For Clive, the worst part about the claim that hangs over Merluna is the uncertainty. "We need a new water tank, but we aren't putting one in," chimes in his wife, Betty, a small but strong woman, burned brown by the Queensland sun. "It's a waste of time and money if we don't know if we can stay."

Clive speaks of his first year in ranching, 1973. Within his first six months a cyclone

pummeled the ranch, and the cattle market crashed. He speaks of the perils of ranching: Tuberculosis infests a herd, the market plummets, wildfire burns up a paddock. He speaks of crushing costs: $2,300 a mile for fencing, and a couple hundred miles need fence.

Clive had a heart attack seven years ago. Take it easy, doctors told him after a triple bypass. Instead, he returned to Merluna, working. "Must have rocks in the head," he says.

After lunch we go for a look at the property. The truck kicks up plumes of red dust and squeals to a stop in front of one of 12 paddocks so Clive can put salt licks down for the cattle. "G'day, old man," he says to a large gray Brahman as he knifes open the wrapping on the salt block. "I hope you're working hard."

Driving back, he speaks of the wet. "I fell in love with the rain here," he says. He means *real* rain. The drumming down, soaking rain of the wet—not the paltry sprinkle of western Queensland where he grew up.

He speaks again about the claim against Merluna. Clive faults the lawyers more than anyone else. It's not the Aborigines who are to blame, he says. It's the lawyers with dollar signs in their eyes, as well as the anthropologists who make a living from testifying in land-claim cases. "*They* don't have their life savings and sweat in the soil," he says in a voice filled with rancor.

"We want black people to have a fair go; we want white people to have a fair go too," he says more quietly. "It really is the good earth. I hope we can keep it."

Sometime after my visit I learned that the courts had turned down the Wik claimants. They promised to appeal.

Still, there may be some security for both sides. Cattlemen, Aboriginal groups, and conservationists signed a regional land-use agreement in February. It guarantees secure land title for pastoralists in exchange for right of access for Aborigines. Now it's up to the politicians to make it legal.

"I hope they get off their toes," said Clive in a phone conversation.

And the new water tank for Merluna?

"I'll put it under consideration."

PASSION was the common denominator on Cape York. Humans, separated by culture, were tied by a fierce—almost sacred—love of land.

"There are places I don't take anybody," said David Hurse. After retiring from the ministry, he ended up managing Lakeland Downs, a failed agricultural scheme on the southern peninsula. He sat across from me in a chair in Cairns, his mind 125 miles away, sweeping over the gentle red hills that backdrop the Laura River.

"My 'sulking holes,'" he said of his sacred sites. "Pools of water where I'd sit and smoke and meditate. And those hills. I lived with them for a long time but rarely saw them the same way; the light was always changing."

To an Aborigine a sacred site is a story or song passed down. A personal mythology—a Dreaming—that defines not just a place but a man, his family, his clan. That's not just a mountain: It's a quail that walked from Aurukun to Coen. That's not just a river: It's the coiling path of a rainbow serpent. To forget such stories of one's Dreaming turns a land to "rubbish country."

One morning an Aboriginal elder from Injinoo, the community that sits near the tip of the peninsula, showed me a place sacred to him alone. We stood on a ridge, above the beach. From it you could see a sea frothed by stiff wind. "I was born under that tree," he said, "that coconut palm. And when I was born, my mother took the placenta, wrapped it in wax, and buried it there."

There is no closer tie with earth than that, I thought. Except for the easing down into dirt when we die.

IT IS THE SEASON OF DUST. The dry. The air tastes metallic. In the melaleuca forests, black ash from wildfires carpets the floor. Tree trunks are scorched. The luminescent green of the wet has dulled to olive and beige. The red clay is cracked. Everyone watches for the sky to bring the monsoon.

"You wait and wait and wait," says a white property owner in Iron Range. "You go to bed. Turn on your fan. You can't sleep. You think, I can't carry on."

The stale air suffocates. The chest-crushing heat frays nerves. Tension pushes people to the edge of crazy. "Going troppo" some whites call it.

But for many Aborigines, wet or dry, the crazy time never ends. On the Friday I arrive in Aurukun, some 23,000 dollars' worth of government support checks are to be handed out. There's a football game tomorrow. The moon is full.

All day I hear the buzz of a small, twin-engine plane making the 20-minute run to Weipa for beer. When the Aurukun canteen was closed four years ago, a lucrative trade in bootleg alcohol—sly grog—blossomed.

The economics of sly grog: Cost of renting plane to bring it in, $230. Ten cases of beer, $180. Sale price of ten cases of beer, $760. Profit, $350.

The arithmetic gets compounded in ugly ways. Alcohol often translates into domestic violence, juvenile delinquency, infant mortality, death. Indeed, alcohol-related diseases are among the most common causes of premature death in Aboriginal communities.

"Alcoholism itself is a symptom, not a cause," explains Bill Glavin, an executive of the Peninsula and Torres Strait Regional Health Authority. "These problems stem from being dispossessed. The answer lies in solving the problem of how they can live their own culture and interact with ours. We're kidding ourselves otherwise."

He spoke of life expectancy for Aborigines running 20 years shorter than for other Australians and of infant-mortality rates double the national average.

"Until we can solve the spiritual, social, and economic problems, all we can do is pick up the pieces," Dr. Glavin said.

Until then there will still be scenes like the out-of-control football game on the field adjacent to the Aurukun State School. Twenty-six football players. Five hundred drunk spectators. A woman spins wildly, hands overhead, in the middle of the scrimmage while referees try to shoo her off.

The game ends in an all-out brawl among the Aborigines, and police dogs are brought in.

"At times I feel suffocated by a blanket of darkness," a community worker who has lived in the area for many years tells me over dinner that night. The conversation, bleak, heavy with pain, centers on the story of a respected Aboriginal leader.

The leader had run for the Aurukun council on a platform of making the community dry. She won and closed the canteen where liquor was sold. Two years ago two of her sons died in an accident running grog. Last year her brother committed suicide. A sister wanders the

CRADLING INNOCENCE *in her arms, the Reverend Mary Eseli—the first native woman ordained to the Australian Anglican priesthood—baptizes the newest member of her flock. Another recent arrival to the community is less welcome. "We discourage our kids from watching television," she says. "We give them books instead."*

RACING A RISING TIDE, *frantic travelers mired on a remote beach signal the photographer's plane for help. "The pilot radioed authorities in Brisbane, more than a thousand miles away, and they alerted the nearest Aboriginal settlement," says Sam Abell. Rescuers—armed with a mighty winch—arrived before high tide. Scant infrastructure and roads that resemble motocross tracks make adventure one of Cape York Peninsula's biggest moneymakers.*

streets in Cairns, ravaged by alcoholism.

How can she bear such loss?

The reply is so soft I lean forward to hear.

"She goes bush."

To go bush. To escape, for a while, into nature. To draw sustenance from the land. Physical sustenance. Spiritual sustenance.

For a few hours I go bush, drive outside of town, stop and gulp the astringent eucalyptus-scented air.

"Come, look," says my guide, Kerry, and in the spindly arms of a mangrove tree shows me the bower of a fawn-breasted bowerbird. It is a delicate structure. Two parallel rows of slender branches that curve toward each other, lined with bits of green glass and shells plucked from the banks of a nearby river. An elegant ruse by the male to attract the female for mating.

It is quiet. The bower—exquisite. Forgotten are the heat, dust, and flies of Aurukun. The blanket of darkness lifts. Momentarily, I feel restored.

THE BOWER OF A BIRD. The hush of a swamp. A glimpse of the tender connection between the Aborigine and the land. How it nurtures. How it heals.

Redistribution of land won't solve all problems, of course, but it's a start toward

ON A SACRED MISSION, *Gordon and Alick Pablo—elders of the Wuthathi, or "white sand people"—return an ancestor's skull to their homeland at Shelburne Bay. After years of frustrated efforts to win back their lost domain, the peninsula's native people are at last gaining ground.*

reconciliation, a mending of wounds between white and black Australia. The business, says Isaac Hobson, former chairman of the Aboriginal Lockhart River community, of "putting my people together."

The reconciliation process will be painful, David Hurse cautions.

How long will it take?

"It's taken a couple of hundred years to get where we are now. It'll probably take as long to make it right."

After restitution of land, what then?

"My vision of the Aboriginal role in the Australian scheme is that we will be custodians of the country's ecological heritage," says Noel Pearson, the Aboriginal leader. "Most of the pristine areas in Australia are those where there is present or potential Aboriginal land ownership."

We talk about some of the innovative programs that meld Aboriginal and Western ways. At the school in Aurukun, classes are divided into clans instead of grade levels—kinship is paramount in the culture—and relatives assist in the classroom full-time to provide support and encouragement for the children. In Kowanyama a justice council made up of community elders has replaced the police in dealing with offenders. In one year juvenile delinquency has dropped to a fraction of former levels.

Clearly there is strength to be drawn from the traditional, but how relevant is it to a distracted younger generation?

"We're still grappling with these issues," Pearson admits. "Are we trying to preserve an anthropological zoo? Are we battling the inevitable?"

He seems to frown.

"A lot of us are playing this a day at a time."

ONE MORNING I went to a white crescent of beach at Shelburne Bay on the peninsula's east coast to watch Gordon and Alick Pablo bury a skull. The skull had been found on this beach last year and sent to Brisbane for examination. It was the skull of an Aborigine, 200 years old, according to a forensic pathologist in Brisbane. Now the skull was in the custody of elders from Injinoo. Two hundred years old. Perhaps that same Aborigine stood on this beach in 1770 when Captain Cook skirted the reef.

On a stretch of shore fringed by the exposed roots of mangroves, Gordon Pablo dug until the hole was thigh deep. He flung out dirt and smoothed the hole with his bare feet. Lifting the skull from its cardboard box, he stroked it as gently as if it were the brow of a feverish child, kissed it, and at last placed it in its freshly dug grave.

"Skull is coming home," he said. □

Australia's Saltwater Crocodiles

Sixteen feet of reptile missile, a saltwater crocodile blasts from the Adelaide River, southeast of Darwin in Australia's Northern Territory. For the past decade crocs have been leaping for food offered carefully by the crew of the Adelaide River Queen *and other tour boats. Nearly hunted to extinction by the mid-1960s, "salties" have made a mighty leap back from oblivion.*

ARTICLE AND PHOTOGRAPHS BY DAVID DOUBILET

I am in the water, drifting down the Jardine River, which meanders across the tip of Cape York Peninsula. Above, the sky is a mild September blue decorated with chugging, white clouds. The water is delightfully warm and clean enough to drink. I am terrified.

For the Jardine River is also home to *Crocodylus porosus*, the saltwater or estuarine crocodile, largest and perhaps most dangerous of all 23 species of crocodilians. The Jardine, according to river guide Dave Donald, is the best place to photograph crocs underwater, one of the few really clear rivers in northern Australia. Dave sits in the 17-foot aluminum river pram that I cling to as I drift.

"We're too late," he says, looking at the empty banks, where the crocs sun themselves in winter to get warm. "The water is now warm enough for them all the time."

Twelve miles upstream is the ferry crossing for the Cape York road, where a croc killed a man a few years ago. Farther upriver, where it's shallow enough to ford, another man disappeared, presumably eaten by a crocodile. His body was never found.

My colleague, photographer Joe Stancampiano, sits in the boat and looks at me nervously. Dave's assistant cradles a semiautomatic rifle.

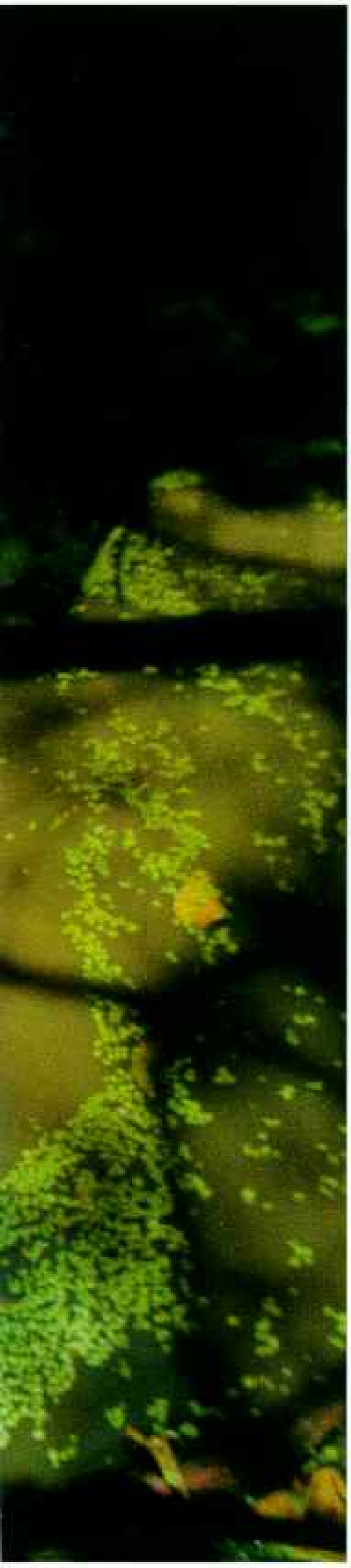
We float over holes and past dark caves undercut in the bank. Everything—every shadow, every movement—is a crocodile. I hear only my breathing. Then up ahead in the shadow of a log I see a croc and switch from snorkel to scuba, camera ready. The crocodile explodes from the bottom, tucks its front and back legs in, and with three sculls of its armored tail disappears.

Two more heart-stopping days and we switch tactics—we go at night. Our spotlight soon reveals crocs beneath the water-lily pads (above left). At one in the morning we find an enormous croc swimming across the river, black and scarred around the head from fighting. We lean over to position the cameras. The boat tilts precariously. Dave motors closer, closer. Then by accident the spotlight cord is pulled off the battery. We plunge into darkness. Joe screams, "Run away!" We do. Then we drift back and try again.

DAVID DOUBILET covered tarpon for the January 1996 magazine.

In the dark shallows *of the Jardine River, we drift up on a crocodile, a 15-footer at least, almost as long as our boat. He waits; he has plenty of time. A saltie can stay submerged for more than an hour, slowly pumping blood through its four-chambered heart. We edge closer; we ease the boom-mounted camera in his direction. He could flip us in an instant, but he stays hidden, just waiting.*

DAVID DOUBILET WITH JOSEPH S. STANCAMPIANO, MSS, AND GARY BELL



DAVID DOUBILET WITH JOSEPH S. STANCAMPIANO, NGS

Cassius, *largest crocodile in captivity, lunges after a camera that has been substituted for his weekly meal of a pig's head. The palatal valve in his throat is shut, a necessity to avoid drowning when a croc opens its mouth underwater.*

Cassius lives in Marineland Melanesia, a wildlife park owned by George J. Craig, a veteran of 40 years of croc hunting. "He is a true 18-footer and weighs about 1,600 pounds. He would be, I reckon, 90 years old.

"They don't change much in captivity. I've put a female in with him and that keeps him happy. If there was another male in there, he'd kill it.

"His eyes will let you know what's going on. After I drop his food, they'll still follow me. Even after all these years, if I make a mistake, I've had it," Craig says. Cassius snaps his jaws shut with a soft thunderclap and falls back into his duckweed-filled pond.

Hidden *somewhere deep in the corridors of the mind is that most ancient of fears—being eaten alive. Rob Bredl has buried that fear. He makes a small splash with a stick, and Hanibal, a 13-foot, 700-pound male crocodile, materializes out of his muddy pond at the Airlie Beach Wildlife Park (right). "He's 22 years old; I hatched him from the egg myself. He's knocked all his teeth out fighting with other males."*

Rob gets as close to crocs as any human can. "I've spent my life with crocs; if I have a philosophy, well it's common sense and logic. The croc will be what he wants to be. I leave him to be a crocodile."

I wonder if Hanibal is still dangerous without his teeth. Rob announces: "Watch this!" and takes a pink plastic food bucket and throws it straight into the croc's mouth. The jaws snap shut, pulverizing the bucket.

"In the wild they can go without food for months. And they can grow to 20 feet. It's a myth, though, that they can run as fast as a horse. They are big creatures with little short legs. But they can strike with amazing speed," Rob says.

They prove it daily at the Cairns Crocodile Farm, where they come out of the water, sprint on those little legs, and consume whole chickens (opposite).

Before large-scale hunting began in the 1940s, more than 150,000 crocs roamed from Western Australia to Queensland.

"In the 1970s," says Rob, "I went up 13 rivers in Queensland and saw only 64 crocodiles." The crocodiles were all but gone. In 1969 Western Australia passed legislation to protect them. The Northern Territory and Queensland followed a few years later. Now the population in the Northern Territory, at least, is booming.

Amazingly adaptable, saltwater crocodiles will swim a hundred miles inland where the water is completely fresh, and they have been spotted 150 miles at sea. The species' range includes waters from the eastern coast of India to islands east of New Guinea.

Farming *crocodiles is like farming dinosaurs, animals that crocs once competed with and have long outlasted. At the Cairns Crocodile Farm, owner Keith Cook (below, at left) assists Brian Hesketh and Colin Bailey, who subdue a male croc. The animal flipped the men off several times, and the farmers scrambled for their lives.*

Crocodiles mate during the wet season and lay about 50 eggs. "That's the most dangerous time," Keith says. "We draw straws to see who collects the eggs. You have to carefully put a pencil mark on the top of each egg as it sits. If the egg is turned over, the embryo smothers under the egg mass. The person who collects the eggs doesn't have a stick to push the crocs away, just that bloody pencil."

After the eggs hatch, the young must be protected

from any stress. At night the pens of young crocs look like fields of jewels when their eyes are illuminated by an electronic flash (left).

In about three years six-foot animals are ready to harvest. They are washed (below), skinned, and salted. Australia exports about 5,000 skins a year. Most go to Paris, where a crocodile-skin purse can sell for $10,000.

In the Northern Territory, which contains Australia's largest population of crocs—an estimated 65,000—biologist Grahame Webb has led the way in establishing programs that help crocs and humans coexist. A leading conservationist, Webb has devised programs for public education, removal of problem crocs from populated areas, and creation of farms so landowners can benefit commercially from the crocs.

A yearling rises *to take a small sniff of air on a warm morning along the Jardine River. For a peaceful moment the crocodile seems safe as it swims over a sandbar yards away from its home territory near a shady bank. The little croc has nothing to fear from one of its major predators—man. Fellow crocodiles—the other major predator—watch and wait in the softly flowing river.* □

IN FOCUS

BOSNIA

Picking through the wreckage of Sarajevo, a Muslim couple hunt for firewood. Their homes and utilities in ruins, the people of Bosnia and Herzegovina face the grim aftermath of the costliest war on European soil in half a century. With 200,000 dead, almost 5 percent of Bosnia's population paid the ultimate price for the breakup of Yugoslavia. Ethnic pluralism, once Bosnia's trademark, became its curse when it declared independence in 1992, triggering nearly four years of war.

TOM STODDART, IPG/SABA

THE REPUBLIC of Bosnia and Herzegovina is like a trauma patient kept alive through heroic measures and invasive technology. The attending physicians are the United States and European powers, which prescribed the Dayton Peace Accord last December, ending nearly four years of internecine war.

Since then 60,000 NATO-led peacekeeping troops from more than 30 nations, including 20,000 from the U.S., have been dispatched to separate the combatants—giving Serbs, Croats, and Muslims a chance to recover from the worst atrocities and destruction in Europe since World War II.

From a population of 4.3 million Bosnians in 1991, 200,000 are now dead; 200,000 more are injured, including 50,000 children. More than 2.5 million Bosnians have been driven from their homes.

The last time it was healthy, Bosnia (shorthand for the republic) was one of the six republics that made up Yugoslavia, a federation of contentious peoples pulled together in 1945 by communist strongman Josip Broz Tito. Today that federation is history, and Bosnia has been divided into hostile political entities and subdivided into military sectors controlled by the U.S., France, and the United Kingdom. Bosnian Serbs are entrenched in the Serbian Republic, and Bosnian Croats and Muslims grudgingly share the Federation of Bosnia and Herzegovina. A central government, the Republic of Bosnia and Herzegovina, will handle such matters as banking, foreign policy, trade, customs, and immigration.

The solution satisfies no one: Many Bosnians had wanted to preserve a multiethnic state; Serb and Croat nationalists wanted to destroy it. Before the first shot was fired, Serbia and Croatia had agreed on the partition of Bosnia. Why they wanted it is rooted in 19th-century nationalism, intensified by the memory of the savage struggle during World War II between Tito's multiethnic, communist-led Partisans, members of Croatia's Nazi-allied Ustashe movement, and royalists called Chetniks, who wanted to restore the Serbian monarchy. Today Bosnians who had lived together peacefully for decades once again do not hesitate to say they hate. Mutual revulsion is so deep that when Bosnian Serbs fled Sarajevo to avoid living in a Muslim area, some took with them the remains of their relatives.

Cynics assume that the Dayton accord is an interim step that will allow the Serb and Croat entities to link up with Serbia and Croatia proper, but only after another round of bloodshed. "It's a fragile, two-headed monster," says a State Department official. "If they want to go back to war, they'll go to war."

Bosnia and Herzegovina spreads across the gnarled reaches of the Dinaric Alps, a region possessed of enough bracing mountain beauty, enterprise, and gusto to have landed the 1984 Winter Olympics at its capital, Sarajevo. Even in this rugged corner of the Balkan Peninsula, the wash of empires—Roman, Byzantine, Ottoman, Austro-Hungarian—deposited layer upon layer of culture.

As William E. Curtis reported from a calm Sarajevo for the February 1903 issue of NATIONAL GEOGRAPHIC ("The Great Turk and His Lost Provinces"), "In the bazaars may be seen daily examples of every national costume worn from the Straits of Gibraltar to the Yellow Sea of China; and they all live together in peace and harmony. . . ."

The Bosnians themselves are descended from Slavs who migrated into the

The Fragmentation of Yugoslavia

Related by blood, Balkan Slavs embraced ethnic identities based on religious background during the nationalistic 19th century. Today's animosities are rooted as well in World War II, when clashing political ideologies led to internecine fighting. The country that was pulled together by Josip Broz Tito—leader of the winning side—has splintered into five sovereign republics, with Serbia and Montenegro aligned as a rump Yugoslavia.

Slovenia

Voting to secede from Yugoslavia in December 1990, Slovenia—which has few restive minorities—declared independence in June 1991. After a ten-day standoff the Serb-led Yugoslav Army, then mired in Croatia, withdrew, and Slovenia escaped war.

Croatia

Secession in June 1991 unleashed a savage military response from Belgrade, which was sympathetic to Croatia's large ethnic Serb minority. Croatian Serb separatists, with the help of the Yugoslav Army, seized the region of Slavonia. Croatian Serbs in the west declared their own sovereign state of Krajina. Croats recaptured Krajina in 1995; eastern Slavonia is under UN occupation and will be returned to Croatia.

Bosnia and Herzegovina

Muslims, who made up 44 percent of Bosnia and Herzegovina's pre-war population of 4.3 million, are Slavs whose ancestors adopted Islam under Ottoman rule. Roman Catholic Croats made up 17 percent. Eastern Orthodox Serbs 31 percent. Many Serbs and Croats joined the insurrections inspired by Belgrade and Zagreb that ripped the republic apart.

In the 15th century the southern region attained brief autonomy under a *herceg*, or duke: It has been known as Herzegovina ever since.

Serbia

Serb nationalism and the dream of a Greater Serbia gathered force after the 1980 death of Tito, the maverick communist who enforced a federal system while he lived. A Croat himself, Tito curbed Serb influence within the Yugoslavian state by creating within the Republic of Serbia two autonomous provinces: Vojvodina in the north and Kosovo and Metohija in the south. The latter, populated 90 percent by Albanians, poses a challenge to Serbian authority.

Montenegro

Eastern Orthodox Christians, Montenegrins have little significant history to distinguish them from Serbs, with whom they have joined in a remnant Yugoslavia. Largely ignored by the Ottoman Turks, they alone in the Balkans remained free in their mountain stronghold.

Macedonia

Macedonians speak their own language and share their land with a large Albanian minority. Theirs was the only republic to secede from Yugoslavia without conflict. Once part of Serbia, it had become an independent republic within Tito's Yugoslavia.

A Turbulent History

1463-1878
Ottoman Rule in Bosnia
After the Ottoman Turks conquer Bosnia in 1463, Sarajevo becomes the provincial capital. Native landowners gradually convert to Islam, while most peasants remain Christian.

1878-1918
Austro-Hungarian Tinderbox
Peasant uprisings for land reform in Herzegovina help spark Balkan rebellion and the Russo-Turkish War of 1877-78. The Treaty of Berlin awards Bosnia and Herzegovina to Austria-Hungary; official annexation in 1908 is fiercely resisted by Muslims and Orthodox Christians. The 1914 assassination in Sarajevo of Austrian Archduke Franz Ferdinand and his wife by a Bosnian Serb student starts World War I.

1918-1945
Yugoslavia: Born and Sundered
In the wake of World War I, southern Slavs join together in the Kingdom of Serbs, Croats, and Slovenes, renamed Yugoslavia in 1929. Unity collapses in the bloodletting of World War II, as 1.7 million Yugoslavs die—the majority in a war between communist-led Partisans, Serbian royalist Chetniks, and the Ustashe forces of Nazi puppet Croatia.

1945-1991
The Final Decades
Charismatic leader of the Partisans, Tito incurs Stalin's wrath by forging the independent socialist state of Yugoslavia. Aided by the West, the country becomes a leader of the world's nonaligned bloc, splitting up as political changes sweep Eastern Europe and the U.S.S.R.

Balkans in the sixth and seventh centuries A.D. War and conquest plagued the region throughout the Middle Ages, but these were not ethnic conflicts. As John Fine, professor of Balkan history at the University of Michigan, recently told the GEOGRAPHIC: "These were wars between nobles or factions of nobles against the king, fighting for land and hegemony. Bosnians maintained independence through the Middle Ages but succumbed to the Ottoman Turks in 1463, then to Austria-Hungary in 1878."

The Slavs who settled Bosnia likely preceded the Slavs who migrated into what is now Croatia and Serbia. Unlike most Europeans, Bosnians were indifferent to formal religion, and three Christian faiths—Roman Catholic, Eastern Orthodox, and a Bosnian Catholic sect—coexisted. Under Ottoman rule many landowners converted to Islam to take advantage of tax breaks offered to Muslims.

Ethnic identity became important only in the mid-19th century, when nation-states centered on common ethnicities and religions began to emerge in the Balkans. "Then, in Bosnia, if you were Catholic, you were automatically assumed to be a Croat," said Fine. "If you were Eastern Orthodox, you were a Serb. This was the first time the labels Serb and Croat were used in Bosnia."

When Robert Paul Jordan analyzed Yugoslavia for the magazine in May 1970 ("Yugoslavia: Six Republics in One"), a Serb journalist could still catalog his countrymen with humor: " 'We're all Slavs . . . shaped by time and place. Slovenes and Croats are industrious, methodical, reserved. Macedonians are poets at heart. Montenegrins make better warriors than workers. Bosnians and Hercegovinians are more stubborn.'

"And the Serbs?

" 'Ah!' exclaimed this Serb, revelation upon him. 'We are short-tempered, rude, and spiteful. We mind our neighbor's business. We yell and curse and make jokes, and our critics call us uncouth. . . . Yet they envy us for our pride and independence. We have spirit.' "

BOSNIA in the last days in the life of Yugoslavia was 44 percent Muslim, 31 percent Serb, and 17 percent Croat. Intermarriage—chiefly in the cities—had blurred the lines between the groups, religious devoutness within any group was rare, and urbanites in such cities as Sarajevo, Mostar, and Tuzla paid little attention to ethnic labels, preferring to think of themselves as Yugoslavs. All spoke the same language, Serbo-Croatian. But large Croat and Serb communities in the countryside of Bosnia held tightly to their historic grievances against each other, and against Islam and the Turks.

By the time the magazine published "Yugoslavia: A House Much Divided" in August 1990, Tito had been dead ten years, and with him the strong central power that kept old animosities in check. "Six republics—six bows drawn tight," wrote Kenneth C. Danforth. "The bowstrings sing of hatred, group against group."

When the Yugoslav federation collapsed, politicians fanned the flames of nationalism. The Serbs had always seen themselves as the dominant culture in Yugoslavia: The federal capital, Belgrade, was in Serbia, and the army was staffed largely by Serb officers. Serbs had felt thwarted under Tito.

In 1991 Serbia's president, Slobodan Milošević, contrived a new Yugoslav federation under Serb leadership, attracting only Montenegro. Slovenia and Croatia took advantage of the government's paralysis to break free. Only Macedonia managed independence without armed conflict.

Bosnians were left with two disastrous choices: capitulate to the Serbs or go it alone, provoking violence from rural communities of Croats and

DAVID TURNLEY, BLACK STAR

Serbs, whose fear of the Sarajevo government had been sharpened by television propaganda from Serbia and Croatia that painted all Muslims as rabid fundamentalists. Radical Bosnian Serbs, led by Radovan Karadžić, a man now under indictment by the war crimes tribunal in The Hague, made rumblings about forming their own republic in November 1991, and Serbia's Milošević stoked the fire by claiming that if Bosnia declared independence, its 1.3 million Serbs would be forced from "Yugoslavia" against their will—Yugoslavia and Serbia now being the same. He called for a Greater Serbia to include Serb-dominated Bosnian as well as Croatian territory.

When Bosnians voted for independence in March 1992, with Alija Izetbegović, a Muslim, as president, the Yugoslav Army was still based there in large numbers. In the countryside the self-styled Karadžić government conscripted a Bosnian Serb army of marauders and told them to defend Christianity and Serbian civilization by routing the Muslims. Militant Croats, equally contemptuous of an independent Bosnia, set up their own political fences around Mostar and other Croat enclaves in the south.

Thus began, in the spring of 1992, the abhorrent process of "ethnic cleansing," the siege of Sarajevo, the concentration camps and massacres, the panicky exodus of Bosnians—Serbs, Croats, and Muslims alike—from their homes of generations.

The war for Bosnia defied reason, confounded diplomats, raged on through cease-fires, and frustrated and humiliated the United Nations. Even topography conspired against peace. In mountainous isolation entire

Ethnic Cleansing

Leaving behind a more "ethnically pure" Croatia, 200,000 Croatian Serb refugees cross Bosnia to reach Serbia after Croat forces expelled them from their self-proclaimed Krajina republic in August 1995. Some settled in Bosnian enclaves recently "cleansed" of Muslims and Croats. All told, more than three million former Yugoslavs have been forced to leave their homes.

villages were destroyed by their neighbors without the world knowing.

Harry Bader, a University of Alaska professor, spent two months last winter crisscrossing the countryside in an armored Land Rover with graduate student Jonathan Andrews. They were matching infrared satellite images taken over Bosnia during the previous five years with sites on the ground, to prepare damage assessments for the UN.

"The destruction is enormous," said Bader. Sixty percent of the houses in Bosnia, half the schools, and a third of the hospitals have been razed or damaged. Power plants, roads, water systems lie in ruins. Fields and vineyards are abandoned, rivers contaminated by toxic wastes from bombed-out industrial plants. The soil is polluted with millions of leg-shattering land mines.

The satellite images will disclose disturbed areas that could be mass graves. They will also help locate areas where refugees could be resettled. Meanwhile, a biologist in Zagreb, who reports that brown bears have stumbled onto deadly land mines, is using the images to identify the best remaining wildlife habitat.

"We have to determine where reclamation efforts should be focused first," Bader said. "I liken it to environmental triage."

The immediate task is to repair the infrastructure, create jobs, and bring people home. Anne Willem Bijleveld, the representative from the UN High Commissioner for Refugees to the U.S., calls it "the most complex and the most challenging operation we've ever done. We are giving some type of assistance to 90 percent of the people in Bosnia."

The World Bank, organizing an international economic-recovery effort in Bosnia, estimates that at least five billion dollars over three years is needed. Michel Noël, a World Bank official, said, "All that we do is on the condition that NATO succeeds—that people and goods can move unimpeded. This is a shattered place—both physically and psychologically. Every person you meet has a son or daughter, a husband or wife, maimed or killed."

Although the prognosis for Bosnia changes daily, each day of peace improves its chances for survival. "The major asset in Bosnia is the skill and dedication of the people," Noël said. "They are absolutely determined to rebuild the nation. In Sarajevo I heard someone ask President Izetbegović how they would cope. 'Life will take care of it,' he told him. 'The only solution is life.' "

—Priit J. Vesilind

Front Lines

Massacres, rapes, torture, concentration camps: The horrors of war beset Bosnia after it raised its flag of independence. Virtually every community suffered, but Sarajevo and a handful of others stand out.

1 Bihac
Holds out under siege until Serbs retreat in late 1995.

2 Prijedor
Serbs run a notorious concentration camp here following 1992 cleansing.

3 Banja Luka
Bosnia's largest Serb-held city and scene of extensive ethnic cleansing.

4 Tuzla
Fighting off the Yugoslav Army in 1992, the city becomes a symbol of free Bosnia and its major refugee center, growing from 160,000 to 900,000 people.

5 Srebrenica
Some 7,000 men disappear after a Serb attack on the UN-protected Muslim city in July 1995.

6 Zepa
Serb anti-Muslim atrocities in July 1995 lead to war crimes tribunal.

7 Mostar
The ethnically mixed city divides in the Muslim-Croat sub-war of 1993.

CROATIA

BOSNIA AND HERZEGOVINA

SERBIA

MONTENEGRO

Nova Gradiska
Slavonski Brod
Dakovo
Vinkovci
Backa Palanka
Bosanska Gradiska
Bosanski Brod
Derventa
Modrica
Zupanja
Orasje
Sremska Mitrovica
Brcko
Banja Luka
Prnjavor
Laktasi
Doboj
Gradacac
Bijeljina
Sabac
Srebrenik
Lopare
Ugljevik
Tuzla
Kalesija
Zivinice
Lukavac
Teslic
Tesanj
Maglaj
Zavidovici
Banovici
Kakanj
Zenica
Travnik
Novi Travnik
Vitez
Visoko
Sarajevo
Ilidza
Hadzici
Ilijas
Vogosca
Pale
Gorazde
Foca
Visegrad
Rogatica
Mrkonjic Grad
Jajce
Gornji Vakuf (Uskoplje)
Konjic
Mostar
Siroki Brijeg
Capljina
Ljubuski
Stolac
Trebinje
Dubrovnik
Neum
Korcula
Niksic
Podgorica
Berkovici
Foca
Cajnice
Visegrad
Zepa
Srebrenica
Zeleni Jadar
Bratunac
Milici
Han Pijesak
Olovo
Kladanj
Vares
Breza
Visoko
Kiseljak
Fojnica
Kresevo
Rakovica
Jablanica
Konjic
Ostrozac
Prozor
Tomislavgrad
Livno
Posusje
Grude
Ljubuski
Capljina
Metkovic
Ploce
Opuzen
Neretva
Trebisnjica
Sutla
Bosna
Drina
Una
Vrbas
Sava
Lim
Ibar
Tara
Piva
Drina
Sutjeska
Neretva
Trebisnjica
Dayton accord line
(2.5-mile-wide demilitarized zone)
Roads portrayed may be impassable due to wartime damage.
Elevations in feet
0 20
MILES
NGS CARTOGRAPHIC DIVISION
ADRIATIC SEA
17°
18°
19°
45°
44°
43°
18°E
19°

Bosnia: Before and After

The ethnic mosaic that Bosnia and Herzegovina presented as a Yugoslav republic in 1991 had been altered by war (below) when talks began last November. The December 1995 Dayton Peace Accord carves the now sovereign nation into two autonomous regions separated by a demilitarized zone. Parties must relinquish control over strongholds being ceded to the other side: Serbs yielding to Muslims and Croats on the eastern periphery of the newly created Federation of Bosnia and Herzegovina; Croats and Muslims yielding in a large western enclave of the Serbian Republic, ceded to grant Serbs 49 percent of the nation's territory.

NATO's 60,000-member multination Implementation Force (IFOR) is headed by three powers, each responsible for a zone of administration. A contingent of 20,000 Americans has been deployed along the U.S. sector of the thousand-mile-long separation zone.

CROAT

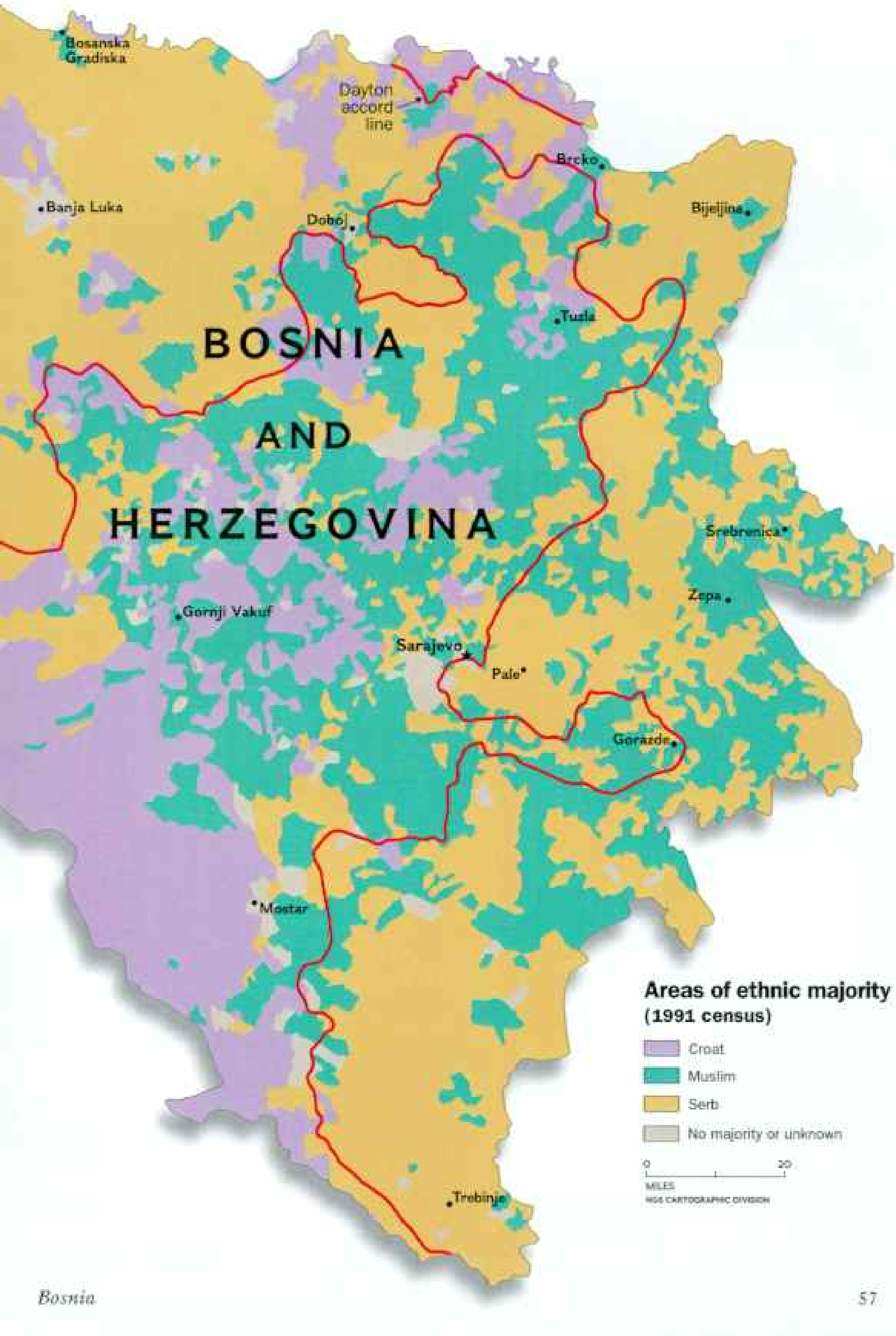
Only 17 percent of prewar Bosnia's population, Croats briefly proclaimed much of the Herzegovina area and its principal city, Mostar, their own. As reluctant, sometimes hostile partners with Muslims in a new federation, they are now challenged to reintegrate with them.

SERB

Serbs were the majority in large swaths of rural Bosnia, though only 31 percent of the total prewar population. Still unresolved: control over the mostly Muslim city of Brcko and the adjoining corridor linking Serb holdings in the east and west. Russians, under U.S. supervision, will police this corridor.

MUSLIM

Once scattered throughout Bosnia and Herzegovina, Bosniacs, as the Muslims now call themselves, were especially concentrated in the urbanized heartland. Their winning of the Gorazde enclave and its narrow corridor was the result of intense and bitter last-minute negotiations.


Bosanska Gradiska
Dayton accord line
Brcko
Banja Luka
Dobój
Bijeljina
Tuzla
BOSNIA
AND
HERZEGOVINA
Srebrenica*
Zepa
Gornji Vakuf
Sarajevo
Pale*
Gorazde
*Mostar
Trebinje
Areas of ethnic majority
(1991 census)
Croat
Muslim
Serb
No majority or unknown
0
20
MILES
NGS CARTOGRAPHIC DIVISION


Adriatic Sea
Dinaric Alps
Mount Igman
Sarajevo
Miljacka River
North
Romanija Mountains

ITALY

CROATIA

Dinaric Alps

Target: Sarajevo

A sitting duck for enemy fire, Bosnia's capital is seen from a vantage point above the Romanija Mountains. From there Serb artillery pounded the city relentlessly for most of the war. Gunfire from Serb neighborhoods south of the Miljacka River claimed even more victims during the siege, which began on April 6, 1992, when snipers fired into a crowd of demonstrators rallying for a free Bosnia.

Bosnia's mountainous terrain—a worry for nations committing troops to the peacekeeping force—is exaggerated in this computer-generated mosaic of NOAA, Landsat, and SPOT satellite images. Such remote-sensing data are helping NATO monitor the Dayton Peace Accord.

IMAGERY FROM SPACE AND RECONNAISSANCE REQUIREMENTS DIVISION, USAF HEADQUARTERS; PROCESSED BY AUTOMETRIC, INC.

Reaching for Peace

DAVID TURNLEY

In a Sarajevo apartment, Mirza Muminović celebrates his nephew's first birthday with a medieval Bosnian custom, cutting a lock of hair—and by giving him a toy tank. Muslims, the Muminovićs cherish memories of their once vibrant, multiethnic city, which hosted the 1984 Winter Olympics.

Many from all sides of the conflict remember that happier past in the same way. After a long and painful separation, two Serbs reunite in tears (far right) after the reopening of the Bridge of Brotherhood and Unity, connecting Sarajevo's largely Muslim center with its nearest Serb neighborhood.

Cultural center of Herzegovina in Ottoman times, the once exquisite city of Mostar (top) suffered some of the war's worst shelling when Croats, thinking Bosnia was about to be partitioned three ways, began carving out a territory of their own. Now in control of most of the city, Croats must welcome back Muslims they pushed out.

Without restored harmony between those two groups, even a divided Bosnia has little chance of success. □

JOSEF KOUDELKA, MAGNUM

ROGER HUTCHINGS, NETWORK/MATRIX

Peru's Ice Maidens

Unwrapping the secrets

After 500 years in a frozen tomb an Inca mummy reveals the details of her last days. Barely in her teens, she was sacrificed to the gods on a Peruvian peak. Two others met the same fate there—an unprecedented discovery that promises insights into an empire at the height of power.

By JOHAN REINHARD

Photographs by
STEPHEN ALVAREZ

Recently reawakened, the Nevado Sabancaya volcano stirs as the author climbs Nevado Ampato. Drifting ash has darkened the snow here. Absorbing heat from the sun, it melts the snowcap, forming ice pinnacles and exposing ceremonial remains.

SHE HAD long black hair, a thin, graceful neck, and well-muscled arms, and when she gave her young life to the mountain god of Nevado Ampato, the Inca maiden was dressed in colorful garments of the finest alpaca wool. She died five centuries ago on the summit of Ampato, a 20,700-foot volcano in the Peruvian Andes, in a ritual ceremony presided over by a small group of Inca priests.

The girl shows no signs of a violent death, either by strangulation or a blow to the head, as was sometimes the case with Inca human sacrifices. Perhaps she had already died from exposure when she was wrapped in a cocoon of textiles and set to rest in an earthen tomb. Placing offerings around her—miniature statues, coca leaves, and corn—the priests would have prayed to the gods of the land, sky, and underworld.

A RESEARCH PROJECT SUPPORTED IN PART BY YOUR SOCIETY

To the Inca, Ampato was sacred, a god who brought life-giving water and good harvests, and, as a god, claimed the highest tribute: the sacrifice of one of their own.

Miguel Zárate, my Peruvian climbing partner, and I were unaware of this as we slogged up the ash-covered ridge that leads to Ampato's summit. It was September 8, 1995, and recent eruptions of a nearby volcano, Nevado Sabancaya, had spewed ash more than a mile into the sky, blanketing Ampato. Two years earlier Miguel's brother Carlos had reported that the summit ridge was thickly coated with ice and more than 30 feet wide. Now it was no more than three feet across. The dark gray ash had absorbed the sun's warmth, melting the ice and snow and causing the ridge to collapse.

I stopped to take notes, and Miguel, with whom I had climbed numerous peaks in the Peruvian Andes over the years, kept moving.* Then I heard a whistle and saw his ice ax raised in the air. When I reached him, he pointed to a tiny fan of reddish feathers protruding from a nearby slope. We both knew instantly that they were part of a headdress of the sort found on Inca ceremonial statuettes.

I secured Miguel with a rope, and he extracted from the steep incline first one, then two more, Inca statues with feather headdresses. Classic Inca figurines made of gold, silver, and rare spondylus shell, they had been buried facing the highest point of Ampato's summit. They wore colorful textiles that looked as good as new. The feather tips that had caught our attention were also nearly perfect, so they must have been exposed only briefly to the elements.

We looked around and saw, perched at the head of two gullies, large stones that formed a corner of what had once been a walled structure—likely an Inca ceremonial platform. The gullies dropped out of sight to a maze of ice pinnacles in the crater about 200 feet below. Wondering where the rest of the structure and any other falling objects might have landed, I wrapped two rocks in yellow plastic and tossed them down the gullies.

We climbed off the ridge and, just where the slope met the pinnacles, saw one of the rocks. Not far beyond it, on an icy outcrop, was what appeared to be the cloth bundle of a mummy.

This seemed so unlikely that Miguel said, "Maybe it's a climber's backpack." As we drew closer, we saw that the object, wrapped tightly in textiles, was indeed an Inca mummy. I felt a jolt of excitement. In 15 years I'd climbed more than a hundred peaks in the Andes and conducted various high-altitude archaeological excavations, but not once seen a mummy bundle like this on a mountain.

Near the mummy, strewn about on the ice, were pieces of cloth, a miniature female figurine made of spondylus shell, llama bones, sherds of pottery, and two cloth bags containing corn kernels and a corncob. After I'd photographed these objects, Miguel used his ax to free the mummy from its icy pedestal. He turned it on its side for a better grip, and we found ourselves looking into the face of an Inca girl.

Only a very few frozen mummies have been found anywhere in the Andes—and none is a female. This girl, in her early teens, must have been ritually sacrificed and buried on the summit of Ampato. Sometime after 1993, when the summit ridge began disintegrating, ice and rock slid downslope, taking with it the mummy and her tomb. The tomb broke up and was lost, leaving only the remnant of the summit platform.

The impact of the mummy's fall tore off one of her outer

*See "Sacred Peaks of the Andes," by Johan Reinhard, in the March 1992 GEOGRAPHIC.

Anthropologist JOHAN REINHARD is a research associate of Chicago's Field Museum of Natural History and the Mountain Institute of Franklin, West Virginia. STEPHEN ALVAREZ specializes in adventure photography. This is his first NATIONAL GEOGRAPHIC article.

Rescuing a mummy from near the top of Ampato, climber Miguel Zárate sees her face for the first time. A gift to the mountain gods, this young woman was buried with ritual goods on the peak's summit, the area's highest. An avalanche, caused by extreme melting, tore open her grave and spilled its contents down the slope.

JOHAN REINHARD

The sheer cliffs that crown Ampato offered the summit mummy no landing place. "She did a vertical drop, then went bang, bang, bang down the slope," says the author, who found her body as well as the grass-covered Inca campsite. He later returned with a team to find two more burials.

wraps, spilling the cloth bags, shell figurine, and other burial artifacts onto the slope above the outcrop where she lay.

The girl's facial features had dried out in the sun, so we assumed that her body too was desiccated. But when we had to strain to lift the ice-encrusted bundle—it must have weighed 80 pounds or more—we knew the body was still largely frozen.

We faced a dilemma. If we left the mummy on Ampato, the sun and volcanic ash would damage her further, and looters could plunder the site. What's more, this was the time of year for the weather to change; any day a heavy snowfall could bury the summit.

There seemed no alternative but to carry the mummy and as many artifacts as we could down the mountain. We'd then take her the hundred miles to the archaeology department at Catholic University in Arequipa, my academic base in Peru. There, in a freezer, she'd be safe.

"IT'S A DISCOVERY of worldwide importance—she's better preserved than the Iceman," was Konrad Spindler's reaction when he came to Arequipa to examine the mummy. Spindler heads the continuing studies in Austria of the famous Tyrolean "Iceman."*

Mummies of Inca human sacrifices have been found before on Andean mountaintops but none so close to Cuzco, the heart of the Inca Empire. The frozen male mummies from Cerro El Plomo in Chile, from Cerro Aconcagua in Argentina, and from Cerro El Toro on the border between those two nations were largely freeze-dried. The girl from Ampato, nicknamed Juanita, is the first frozen Inca female, and her body may be the best preserved of any found in the Americas from pre-Columbian times.

Because we know that the Inca came to this region after 1450 and the Spanish conquest occurred in 1532, we can assume that the girl died about 500 years ago. This makes her a baby compared with the Iceman (about 5,000 years old) and some Chinchorro mummies from

*See "The Iceman," by David Roberts, in the June 1993 NATIONAL GEOGRAPHIC.

JOHAN REINHARD

coastal Chile, which go back 7,000 years.*

The intact body tissues and organs of naturally mummified, frozen bodies are a storehouse of biological information. Future studies of the mummy may reveal how she died. Her DNA should enable us to identify not only the region she came from but also who her living relatives are. Analysis of her stomach contents may yield insights about the Inca diet. A feather-covered bag we found near her held coca leaves—sacred offerings 500 years ago, as they are today; using modern techniques of biochemical analysis, we hope to locate the actual valley where those plants grew.

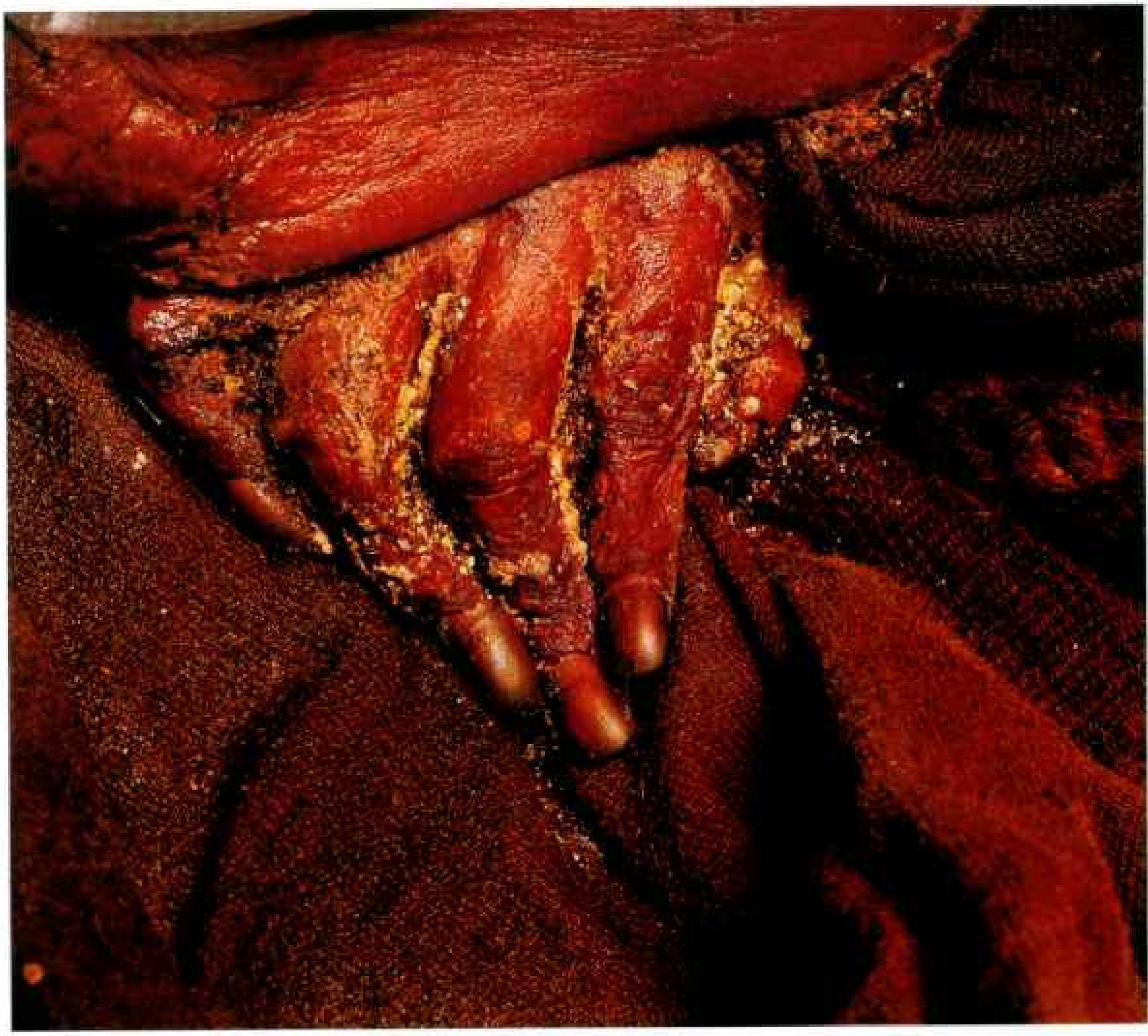
The girl's clothes are no less remarkable—richly patterned, dazzling textiles that will serve as the model for future depictions of the way noble Inca women dressed. Some of the garments appear too big for her, indicating that perhaps the Inca perceived she would exist in the afterlife as an adult. When William Conklin, an expert on pre-Columbian textiles at the National Gallery of Art in Washington, D.C., saw her *lliclla*—a bright red-and-white shawl beneath the outer wrappings—he declared it "the finest Inca woman's textile in the world." Conklin's impression fits with what Spanish chronicler Pedro de Cieza de León wrote, in 1553, about Inca women's clothing: "The dress of the ladies of Cuzco is the most graceful and rich that has been seen up to this time in all the Indies."

AS A MOUNTAINEER and an anthropologist who has lived more than 23 years in the Andes and the Himalaya, I have long been drawn to the study of mountain worship. Artifacts in high-altitude sites can be exceptionally well preserved because of the cold conditions, and such places also have a better chance of being untouched by looters. By examining objects in their proper contexts, we gain a deeper understanding of ancient customs and beliefs.

In the Andes every clearly identified ceremonial site above 17,000 feet belonged to the Inca culture. By 1532 the Inca Empire extended 2,500 miles from Colombia to central Chile—the largest and one of the most advanced civilizations the Western Hemisphere had ever seen. If we have come to admire the Inca for their architecture, so splendidly displayed at Machu Picchu, for their engineering feats, from durable roads to great terraces for growing crops, and for their rich ceremonial life, we can't help but shudder at their practice—albeit infrequent—of performing human sacrifices.

It had always seemed to me that Ampato, with its icy summit, was an unlikely prospect for an Inca ceremonial site. Yet the Spanish priest Cristóbal de Albornoz, writing in 1583, described the mountain as one of the principal deities in the Colca

*See "Chile's Chinchorro Mummies," by Bernardo Arriaza, in the March 1995 magazine.



Canyon region. Three years later Juan de Ulloa Mogollón, a Spanish official, noted that the Inca in this part of Peru appeased the mountain gods, who were said to supply water to their villages and fields, with children as sacrifices. He also wrote that the Cavana and Collagua people of the Colca Canyon area bound their children's heads to make them resemble the mountains from which they believed they were descended.

Modern practices are less severe: Paul Gelles, an American anthropologist who recently spent a year in Cabanaconde, wrote that a villager won an international hairstyling competition with the "Hualca Hualca," a multitiered cut modeled on one of Ampato's neighboring mountains.

I had climbed Nevado Hualca Hualca in 1982 but had seen no evidence of ceremonial sites on the ice-covered summit of that 19,770-foot peak. Nor have any been reported on volcanic Sabancaya. My main interest in climbing to the summit of Ampato was the chance to get close to an erupting volcano—something I'd always wanted to do.

From Ampato's summit I would look down on smoking Sabancaya, which is a thousand feet lower. The last thing I expected to find was the frozen body of a girl sacrificed 500 years ago.

THE GIRL may have come from Cuzco—certainly the pottery, statues, and textiles buried with her are classic Inca and of a quality representative of that great city. If not, she probably lived in the vicinity of the Colca Canyon—possibly even in Cabanaconde, where Miguel and I began our adventure. When we arrived in the village, the annual planting festival was under way.

"We make offerings to Pachamama [Earth Mother] and the mountain gods, including Ampato, for water and good crops," a villager explained. Before leaving for the mountain, Miguel and I joined the villagers in making an offering of corn beer to the

Exposure turned the summit mummy's face to leather. It also dried her brain, a small shadow in an X ray. Another image shows muscle on her thigh, offering hope that the cold has preserved all the rest of her. So far, research in Arequipa indicates that it did. One of Peru's leading mummy experts, Sonia Guillén, examines the hair (bottom). Then clothing comes off inch by inch until flesh emerges (far left). Studies of this tissue as well as organs, blood, and DNA will show how she lived and perhaps tell how she died.

mountain gods—in our case asking for a successful ascent.

On Ampato we made our way up the northern slope, an easy climb to 20,000 feet, where we encountered a jumbled field of ice pinnacles stretching ahead to a rounded lower summit at 20,400 feet. Just before reaching it, we noticed that the ice formations were streaked with wild grass. What was grass doing above 20,000 feet? When we stepped onto the lower summit, we were amazed to see that the whole area was covered with grass—hundreds of square yards of it.

Exploring the site, we saw pieces of Inca pottery and textiles, bits of rope, chunks of wood, even leather and wool sandals. The Inca must have used this spot as a resting-place before attempting to climb the final steep ridge to the summit proper. The remains of wooden posts suggest that tentlike structures once stood there. Flat rocks (one slab still had a rope around it) served as flooring, and a layer of grass provided insulation from the cold. Llama feces indicate that the animals had hauled up all this material, which surely weighed no less than two tons.

By now it was too late in the day to push on to the summit. Marveling that the Inca, laden as they obviously were, had managed to negotiate the icy slope, we descended 4,100 feet to our tent, arriving well after dark.

The next morning we moved our camp up to a small plateau at 19,200 feet, within easier reach of the summit. There we found the remains of other Inca structures, including wooden tent poles and an elevated stone-walled platform about two and a half feet high and five hundred square feet in area. This was probably a place where ritual offerings of food and drink were made. Grass and pieces of wood lined parts of the trail from the plateau to the summit.

In the dozens of high-altitude Inca sites I've investigated, I've never seen anything like this system of tented camps and grass-packed trails. Presented with a lack of building materials on Ampato, the Inca had brought—in some cases from miles away—wood for tents, stones for floors, blankets for tent coverings, and grass for insulation. They had also built a trail over the more difficult sections of their route to the top of the mountain.

IT WAS EARLY on September 8 when Miguel and I set out for the summit. We anticipated a good view of Sabancaya spitting ash. Instead we found the Ampato maiden.

Carrying an 80-pound mummy down the mountain to our high camp, 1,500 feet below, proved even more difficult than expected. We were, after all, at an altitude higher than Mount McKinley. We were both weak from having eaten virtually nothing the entire day, and I was further debilitated by diarrhea. The afternoon was drawing on, and to make matters worse, it had begun snowing. In the gathering gloom the ash cloud from Sabancaya took on a sinister aspect.

We wrapped the mummy in a plastic sheet for protection and tied her to the back of my large expedition pack. Dividing the artifacts, we put them in plastic

bags, which we wrapped in spare clothing. Miguel added most of my personal gear to his load.

On the way down I kept slipping on the ash-covered ice and gravel, and circumnavigating the ice pinnacles made the going even tougher. On the steepest parts of the slope Miguel—who was immediately below me—had to cut steps with his ax. Every time I slipped, buckling under the mummy's weight, I managed to prevent disaster by fast footwork or falling backward and using my feet as brakes. It then took several breathless minutes to regain enough strength to begin moving again. Time and again Miguel asked me to leave the mummy behind. Only later did he explain: "If you'd fallen on me with that load, we'd both have been swept down the mountain."

After dusk our headlamps barely illuminated the way, and I agreed to leave the mummy for the night. We found a level spot at about 20,000 feet and wedged her safely between two ice pinnacles. Even unencumbered, it took another two hours to reach the high camp, where we crawled, exhausted, into our sleeping bags.

I returned to the mummy early the next morning. It was frigid, but the sun was bright, and just as I was beginning to think our troubles were over, Sabancaya belched ash again. The powder fell like diabolical rain. While I was climbing down to the high camp, Miguel had taken the gear to our base camp at 16,300 feet and come back up.

"She's all yours," I said. As Miguel struggled to lift the mummy—and realized just what carrying her involved—I couldn't help but smile. The next part of the descent, over scree, was relatively easy. By 4:30 we'd reached base camp, where Henri Wamani, our burro driver, was waiting. Burro in tow, we continued down, stopping for the night beside a muddy stream at 15,300 feet.

At dawn we wrapped the mummy in our closed-cell foam sleeping pads to insulate her from the warm sun and loaded her onto the burro.

"Why are you tying cloth over his eyes?" I asked Henri. "Because he will bolt if he senses he's carrying a dead body," Henri replied solemnly. This sounded reasonable enough—after all, the last thing we needed now was a runaway burro dragging a frozen mummy across the mountainside.

Luckily the blindfold worked, and because most of the nonstop 13-hour trek to Cabanaconde held us above 14,000 feet, the temperature inside the sleeping pads stayed around freezing. It was also fortunate that our long final descent into the village, which lies at 10,780 feet, took place in the cool evening hours and not the midday heat.

We walked—or rather, stumbled blindly, because our headlamp batteries were now dead—into Cabanaconde at 9 p.m., in good time to catch the overnight bus to Arequipa. We decided to split up: Theft is always a possibility on a night bus, and we were both too

Inca clothing's true colors

"The dress of the ladies of Cuzco [the Inca capital] is the most graceful and rich that has been seen up to this time in all the Indies,"** wrote Spaniard **Pedro de Cieza de León** in 1553. **Adorned in the same fashion, the summit mummy provides confirmation of such contemporary descriptions.

She was wrapped in a dress, or aksu in Peru's Quechua language, and encircled by a chumpi, or belt. Her lliella, or shawl (left), was fastened with a silver tupu, or pin. "I always wondered how those rectangles worked out in real life," says textile expert William Conklin of the National Gallery of Art in Washington, D.C. "I see they were quite stylish."

Leather slippers covered her feet, but her head was bare. Perhaps the fall from her grave tore off a headdress similar to that worn by the second mummy found on Ampato: a plumed fan arching over a feather-covered cap.

Her garb was echoed by a small female figurine placed at the burial site as an offering (above). Wearing a headdress of feathers, the figurine might have represented an Inca goddess.

CHRISTOPHER A. KLEIN, NATIONAL GEOGRAPHIC ARTIST

Once wide enough for rituals around a ceremonial platform, Ampato's avalanche-narrowed summit now only admits visitors single file. Nevado Hualca Hualca, straight ahead, still receives offerings from villagers who revere the mountains much as their ancestors did.

tired to stay awake. Miguel, who lives in Arequipa, went ahead with the mummy, and I stayed behind with the artifacts.

By 9 a.m.—64 hours after we began our descent from the summit of Ampato—the mummy was in a freezer. That evening when I got to Arequipa, I immediately asked José Antonio Chávez, dean of the archaeology department at Catholic University, how much thawing had occurred. "There was still ice on her outer textile when we put her in the freezer," José said, and I felt the tension drain out of me.

JOSÉ AND I, as co-directors of the High Altitude Sanctuaries of the Southern Andes Project, now put our energy into assembling a full-scale archaeological expedition to return to Ampato. Within a month we were back on the mountain, thanks to speedy issuance of an archaeological permit by Peru's National Institute of Culture and grants from the National Geographic Society.

Fortunately it hadn't snowed, and at 19,200 feet the team discovered the remains of two Inca children in sacrificial burials 20 feet apart. The Inca may have chosen this site because it was too difficult to reach the summit, or possibly the children were less important "companions" to the girl buried on the summit. Both children were facing south, a direction the Incas may have associated with death, and both had been struck by lightning. (We know that the Inca believed —as do villagers today—that the mountain gods use lightning to show their power and even to mark people chosen to become their priests.)

One of the two bodies was completely charred. A silver male statue buried with it and the lack of shawl pins to secure the clothing suggest that it was a boy. The other body had shawl pins and, therefore, must have been a girl; we could tell from

her size that she was perhaps eight years old.

If we do eventually confirm that the former body is a boy, it may mean that these children were ritually sacrificed together in a symbolic marriage. In 1551 Juan de Betanzos, a Spanish soldier who married an Inca princess, described human sacrifices in Cuzco. "Many boys and girls were sacrificed in pairs, being buried alive and well dressed and adorned. With each pair they buried . . . items that a married Indian would possess."

The girl had been buried wearing a reddish brown feathered headdress, which caused great excitement. "I've never seen a headdress on an Inca female mummy," said José. Headdresses have been found before on female Inca statues but almost never on the body of an Inca female. The elegant plumes probably came from the macaw, a bird whose feathers are still used in headdresses and religious ceremonies.

The girl's textiles showed little damage, so when we later removed her headdress, we were dismayed to find that she too had been damaged by lightning. What seems to have happened is that the lightning penetrated the ground and charred her body tissues, harming the textiles only where they came in contact with metal objects such as shawl pins.

The soil in her tomb added further interest to the find. After digging through a few inches of volcanic ash, José and his crew came to red earth, which extended to a depth of about three feet. We know that red was a color of ritual significance to the Inca. They painted their faces red for some religious ceremonies, and red pigment has been found on human sacrifices from peaks in Chile and Argentina. The only red soil easily accessible on this route up Ampato is hundreds of feet below the site, so the Inca must have carried it up here.

Close to the bottom of the tomb, José encountered a rock-hard mix of gravel and ice. When the girl was buried, the ground must not have been completely frozen, because this ice was harder to crack than a solid block of concrete. The burials may have taken place during a drought or an eruption of Ampato or Sabancaya. Either event would have killed pasturage in the valleys below and polluted or depleted the water supply, which would explain why villagers felt compelled to make sacrificial offerings to appease the mountain gods.

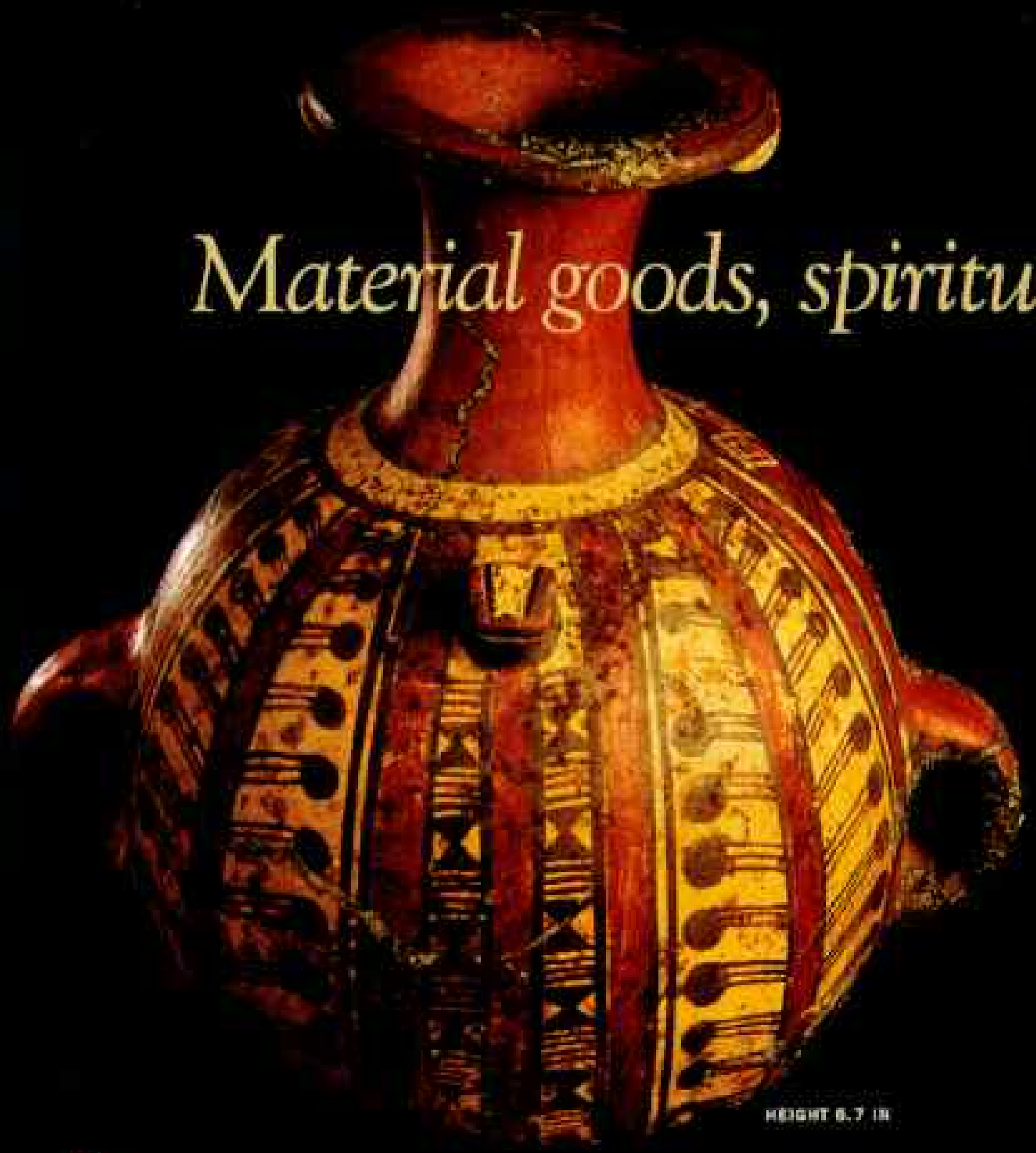
The team tried melting the sides of the tomb with a blowtorch, but that didn't work because there was so much rock and gravel in the ice. In the end we used water heated in teakettles to melt a channel around the body. This allowed us, after three days of heating, pouring, and picking away, to free the mummy without soaking her textiles. We worked without gloves so we'd be able to feel any textiles mixed in with the water-soaked soil. The pleasure in uncovering rare Inca artifacts more than made up for cracked fingertips, which stayed sore for weeks.

It was an emotional moment when we at last lifted the body off its flat stone at the bottom of the tomb. Miguel Zárate's 72-year-old father, Carlos Sr. — a legendary guide who had recovered his first Inca artifacts from a mountaintop 32 years before — unfurled the Peruvian flag and, to our surprise, the Stars and Stripes as well.

This excavation, one of the highest archaeological digs in the world, gives us a rare look at the complete context of an Inca sacrificial burial. The tomb produced nearly 40 pieces of pottery and other artifacts such as wooden ceremonial drinking vessels, spoons, weaving tools, and two cloth-covered offering bundles. But the most poignant find was a pair of tiny sandals, made of plant fibers and alpaca straps, which the little girl had taken with her on her last journey.

IT TAKES AN ACT of the imagination, informed by historical accounts and by our discoveries, to reconstruct the Ampato maiden's last journey. In particular, I wonder what the long trek to the summit was like for her—a pilgrimage that probably began as a lively procession winding out of the Colca Canyon. Priests and their helpers most likely led the way, along with the llamas and their heavy cargo, which

Material goods, spiritual matters



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Unruffled after 500 years on Ampato, a gold statue displays the same style of clothing as the young woman it accompanied in death. Spondylus shell pendants may evoke the ocean—Mamacocha, mother of all water—in a prayer for rain. Three similar figurines, also recovered, add their own pleas. The feathers of one, sticking out of a summit slope, alerted the author to the scattered grave contents below.

Lightning had clearly hit the third grave found on this peak. The bolt consumed a child's flesh, leaving bones and scraps of charred clothing. Some offerings, such as this jar (top left), show damage as well. Jagged scars mark spots where heat fused the surrounding earth to the ceramic finish. Inexplicably, a pair of wooden cups survived unscathed (bottom left). "The weirdest things can happen with lightning," says the author.

Many of the other artifacts also appeared in pairs, a common motif in Inca cosmology. A bird-headed plate (center left), for example, has a paler twin. Perhaps they symbolized hospitality, serving host and guest in equal measure.

Buried apart, a silver llama likely stood for the herds that petitioners hoped would multiply.

Each of these items played a part in the sacrifice. The fairest children were costumed, feted, and perhaps buried

HEIGHT 1.5 IN

alive with ceremonial objects in sacred locations.

The Inca saw mountains as especially important sites. Spine of the empire, the Andes brought both ruin and rejoicing, for they cast out clouds laden with ash and caught clouds heavy with rain.

HEIGHT 6 IN

included pottery, food, and ritual offerings. Behind them came the villagers, young and old, singing and dancing as they walked to a "base camp" at 16,300 feet. This consisted of several crude circular and rectangular stone structures and a stone corral for the llamas.

Next day the priestly entourage left with the llamas for a campsite at 19,200 feet. Progress in the thin air was slow, and by afternoon the girl may have been so weak that she had to be carried. At sunrise the following morning the priests probably made some simple offerings of food and drink to the mountain. The group, llamas included, then climbed the 1,200 feet to the grass summit, where they spent the night.

In the morning more offerings would have been made, and a ritual last meal prepared for the girl. She may have taken a drink of *chicha;* if so, the alcohol would have clouded her mind, which at this stage must have been dulled from exhaustion and lack of oxygen. The ceremonies concluded, they plodded on up the crater ridge to Ampato's summit.

We can only suppose what the girl's last moments were like. Although she must have been frightened, she may have felt honored to be selected as a sacrifice, imagining perhaps that she was entering a glorious afterlife with the gods in a palace within the mountain. If she came from the region, the local people may have believed she was returning to her ancestral home; they also may have considered her a direct intermediary between them and the gods. If so, in sacrificing the girl, they could in essence have deified her.

I am sometimes questioned about uncovering ancient burial sites, which, critics say, shows no respect for the dead. The sad reality, though, is that the looting of such sites by treasure hunters is inevitable—even in remote, high places like Ampato. I believe that meticulous archaeological analysis of sites and permanent protection of their contents in national or academic institutions are both essential and respectful. This belief is shared by the indigenous people of the Colca Canyon area, who have expressed their support for our work. The disrespectful alternative—the plunder of our human heritage for profit or for no reason at all—is unacceptable.

THERE AREN'T many people in the world who are expert at conserving partly frozen mummies: It's by no means as simple as just putting the body in the freezer. Sonia Guillén of the Mallqui Center in Ilo, who is an expert on mummies dried out by the sun, says the Ampato maiden is special. "Juanita is such a challenge because there are no

One of the world's highest archaeological sites yields to team members unearthing a silver figurine. This plateau at 19,200 feet held several such caches as well as two of the sacrifices. The body of a girl not more than eight years old rested in the tomb drawn in a cutaway at left. A world of objects surrounded her. Arranged in sacred red earth, they provide a rare look at how the Inca laid out a sacrificial burial. The plan apparently went awry in the end. A crushed headdress hid the mummy's face, as if it had been pushed down to fit in an inadequate space wrested from the permafrost.

CHRISTOPHER A. KLEIN

set rules as to how to work with a frozen body with 500-year-old textiles on it."

She sought advice from specialists abroad, notably the Iceman team in Austria, Juan Schobinger, an archaeologist at the National University of Cuyo in Argentina, and Silvia Quevedo, a physical anthropologist at the National Museum of Natural History in Santiago, Chile. Silvia had worked on both the El Plomo and Aconcagua mummies.

Ideally, these experts said, the girl's frozen body and textiles should be freeze-stored at a higher humidity than her desiccated head. After much discussion it was agreed to keep the freezer temperature between 0°F and 7°F and the humidity at about 80 percent.

Horst Seidler from the Institute of Human Biology at the University of Vienna, Austria, favored removing the textiles immediately to protect both the clothing and the body, which require different treatment. "First, second, and third, you must remove the textiles," he urged.

To avoid thawing the mummy, we initially limited her time outside the freezer to about 30 minutes a day. This meant that each unwrapping session proceeded with focused urgency and that overall progress was annoyingly slow.

After José Antonio Chávez, my co-director, decided to use ice packs to keep the body frozen, the sessions were longer but no less tense: The specter of an irreversible error—damaging the girl's skin or a textile—haunted the team.

The mummy's tumble from the summit had unraveled her rough outer garment, fragments of which were scattered on the slope above. The next textile layer—an unexceptional brown-and-white-striped cloth—showed damage as well, although the fabric was largely complete. Below that was her lliclla, the shawl that has caught the attention of textile experts like William Conklin.

The girl's pigtail was tied to her waistband by a thread of black alpaca, so other people must have helped dress her, either just before or just after she died. Silver shawl pins fastened her clothing; attached to these pins were threads hung with miniature wooden carvings: a box, two drinking vessels, and what looked like a dog or a fox.

When we uncovered the girl's right hand and saw that she was clutching her *aksu*, or body wrap, in a death grip, her humanity really hit us. We now have to figure out how to remove the textile without damaging the skin of her hand.

Outwardly perfect, the second mummy raised expectations in Arequipa. With her body packed in ice, researchers try to free her face. William Conklin (left, at left) and project co-director José Antonio Chávez help lift off her headdress. Yet under her clothing lay lightning-damaged bones—a disappointment balanced by treasures such as a tiny sandal from her grave. "Everything about these mummies has brought surprises," notes Conklin, "and there's lots more that we won't know for years."

At this point the mummy is only partly unwrapped, yet Conklin has reconstructed exactly how the girl was clothed. He has also ascertained that her textiles are strikingly similar to those on the female statues buried with her. The statues may have represented goddesses, and this young woman, who could have been deified through her sacrificial death, was dressed in a manner befitting her place in the spirit world.

On one statue a miniature textile made of prized vicuña wool has a weave count as high as the finest machine-made clothing. Only about two dozen Inca statues with well-preserved textiles have ever been found, so the ones from Ampato add another dimension to our understanding of this facet of Inca culture.

Taken as a whole, the Ampato discoveries promise many new insights about the Inca and their way of life. Our emphasis now is on building a climate-controlled research facility at Catholic University.

We are also seeking funding for a battery of studies by physical anthropologists, pathologists, microbiologists, parasitologists, biochemists, gynecologists, metallurgists, Inca ceramic specialists, textile conservationists, botanists—even ornithologists to investigate the headdresses. The list continues to grow. One company recently asked me if we wanted to collaborate on an experiment to fertilize human eggs that might be recovered from the mummy. We passed on that, but what we aim to do includes skeletal reconstructions, DNA analysis, and research on diet, diseases, and mortality.

In their early death, I cannot help but think, the Ampato maiden and the two other Inca sacrifices have given new life to the memory of their people—one of ancient history's greatest civilizations. □

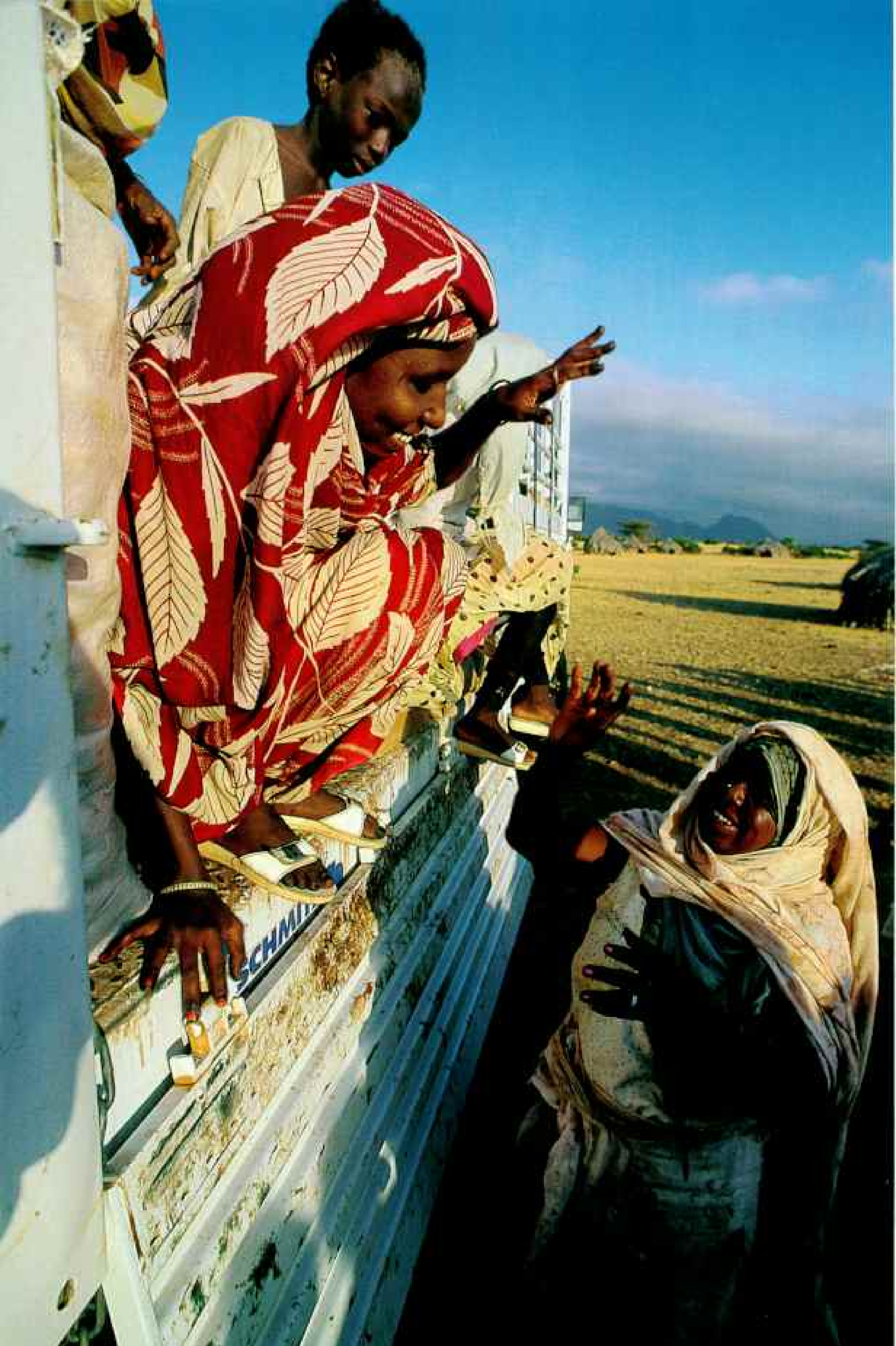
National Geographic EXPLORER airs "The Mummy Hunters" Sunday, June 23, at 9 p.m. ET on TBS.

Eritrea Wins the Peace

Its countryside littered with enemy tanks, Africa's newest nation emerges from the devastation of a 30-year rebellion against Ethiopia. For this villager, safe passage to market is an early peace dividend as former guerrillas set out to forge a democracy.

By CHARLES E. COBB, JR.
NATIONAL GEOGRAPHIC SENIOR STAFF

Photographs by ROBERT CAPUTO



A long time coming, a truckload of refugees joyously return to Eritrea after years of languishing in camps in neighboring Sudan. By day's end they will have unloaded their sparse belongings (above) at a new government-built town in the arid western lowlands. Most of their home villages were too heavily damaged to allow return. Nearly a million Eritreans remain refugees or exiles following the continent's longest war in this century.

OUTSIDE NAKFA, a small town deep in the mountains of northern Eritrea, a stooped figure zigzags across a rocky field. It is dusk, and the sounds of children at play have died down. The man, who is wearing a tattered army fatigue jacket against the chill, stops abruptly to peer behind a thornbush before moving on again. "My cows, my cows," he wails. "The Ethiopians took my cows." Then he disappears into the gloom, his distraught words floating back on the breeze.

In rural Africa if you lose your cows, you lose your dignity. Or, as it was with Gerie, the man from Nakfa, your sanity. Years earlier Gerie had left home to join the Eritrean People's Liberation Front (EPLF), a guerrilla army fighting for independence for the Ethiopian province of Eritrea. When he returned, a lucky survivor, he found that his hometown had been pounded to rubble by Ethiopian air raids and artillery shelling. His house and all his worldly possessions, including his cows, were gone. The loss was more than Gerie could bear, and his mind snapped.

Eritrea's war with Ethiopia began in 1961 and dragged on for three decades—the longest fight for independence in modern African history. More than 150,000 Eritreans died, 60,000 of them guerrilla fighters, and hundreds of thousands of Ethiopians. What this means for Eritrea, a place the size of England and with only three million people, is that virtually every family lost someone to the war. Given the magnitude of the suffering, it would not be unreasonable to expect many Eritrean families to be mired in the daily anguish of men like Gerie.

But Gerie seems a remarkable exception. Eritreans are adjusting to the effects of war

ROBERT CAPUTO has covered stories throughout Africa for the GEOGRAPHIC, including "Tragedy Stalks the Horn of Africa" (August 1993), which he both photographed and wrote.

Palm-skirted Liberation Avenue blazes a path at dusk through the unharmed capital of Asmara, home to 400,000 people. Espresso bars and art deco facades recall the years—1890 to 1941—when Italy ruled Eritrea as a colony. During the Ethiopian occupation rebels declined to attack the crowded city and thus found it preserved for their triumphal entry at war's end.

with composure, veiling their hurt with gentle smiles and ironic understatement. And sometimes even with dancing.

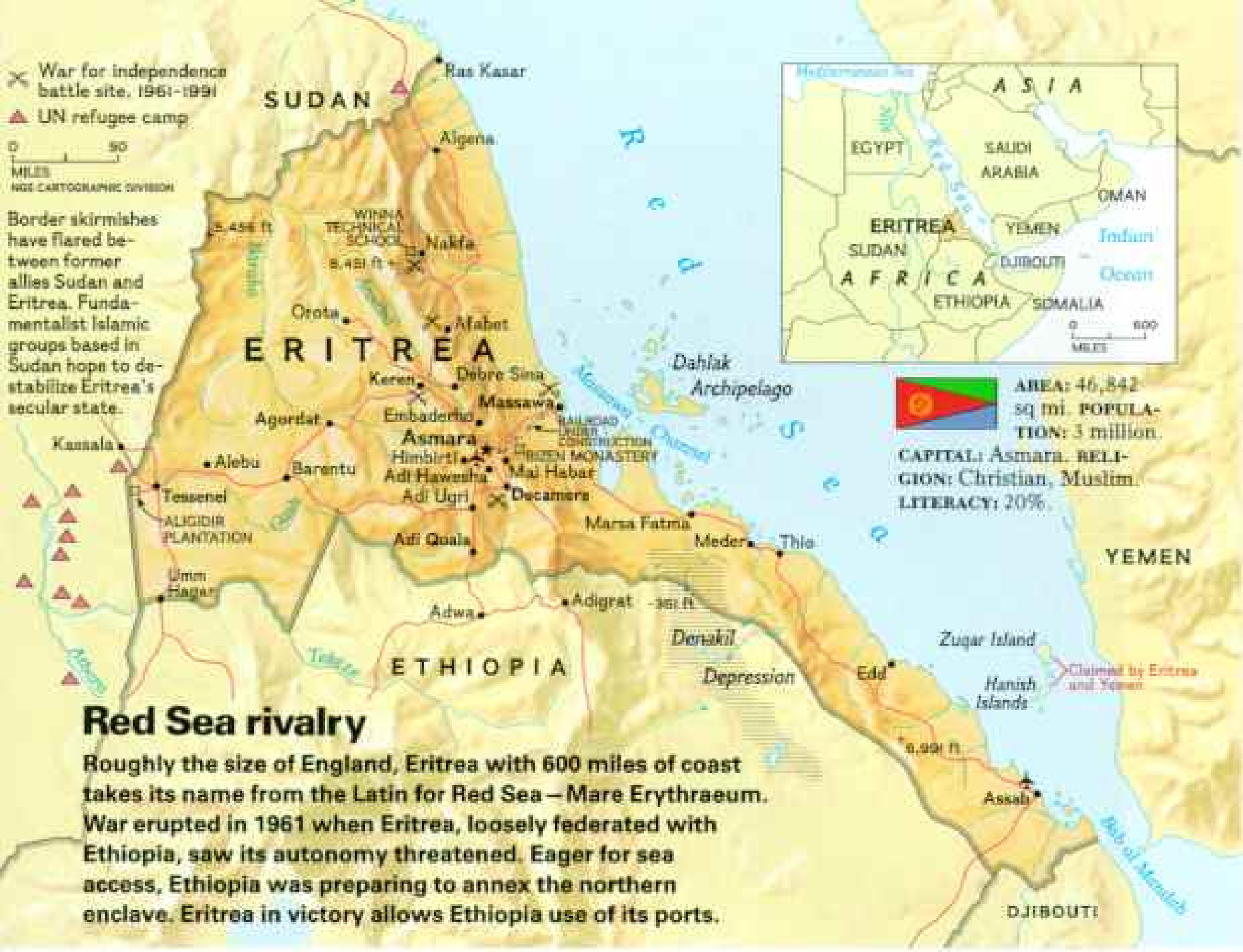
I met Saleh Hamid, a former guerrilla, at Mai Habar, a rehabilitation center for disabled war veterans 30 miles southeast of Asmara, Eritrea's capital city. Strolling through the camp one afternoon, I heard music coming from one of the dun-colored tents where more than 2,000 ex-soldiers lived while they recovered from their injuries. Inside, some two dozen men and women were sitting on *tolish*—straw mats that double as beds—playing cards and drinking coffee, soda, and tea. A few women were weaving colorful baskets from dyed sisal fiber. It seemed a timeless African village, basking in the communal gaiety that follows a good harvest, except for the row of wooden limbs hanging on the tent wall in front of me.

Someone shouted—a whoop that filled the tent. It was Saleh Hamid, standing on his one leg, looking across at me and laughing. Saleh (in Eritrea the first name is the correct short form) leaned over and turned up the battered transistor radio, which was playing an Ethiopian pop song. He began dancing, twirling about the tent, using a crutch for support while springing around the floor.

Saleh too had fought for the EPLF. One day during an Ethiopian air attack near the port city of Massawa, his right leg was hit below the knee. The leg was amputated in an EPLF hospital in the mountain redoubt of Orota, where an artificial limb was made for him.

"Don't feel sorry," Saleh said emphatically. "I have gained my country. We have freedom now."

The roots of the war for freedom can be traced to the creation in 1890 of the Italian colony of Eritrea. Its arbitrarily drawn borders brought together nine ethnic groups, including the agricultural, mostly Christian Tigrinya, the animistic Kunama, and the Afar and other Muslim groups who now make up half the nation's population. Neighboring Ethiopia, a 2,000-year-old feudal "empire" dominated by the Christian Amhara, continued to press its claim to Eritrea, which offered an outlet to the Red Sea.



Red Sea rivalry

Roughly the size of England, Eritrea with 600 miles of coast takes its name from the Latin for Red Sea—Mare Erythraeum. War erupted in 1961 when Eritrea, loosely federated with Ethiopia, saw its autonomy threatened. Eager for sea access, Ethiopia was preparing to annex the northern enclave. Eritrea in victory allows Ethiopia use of its ports.

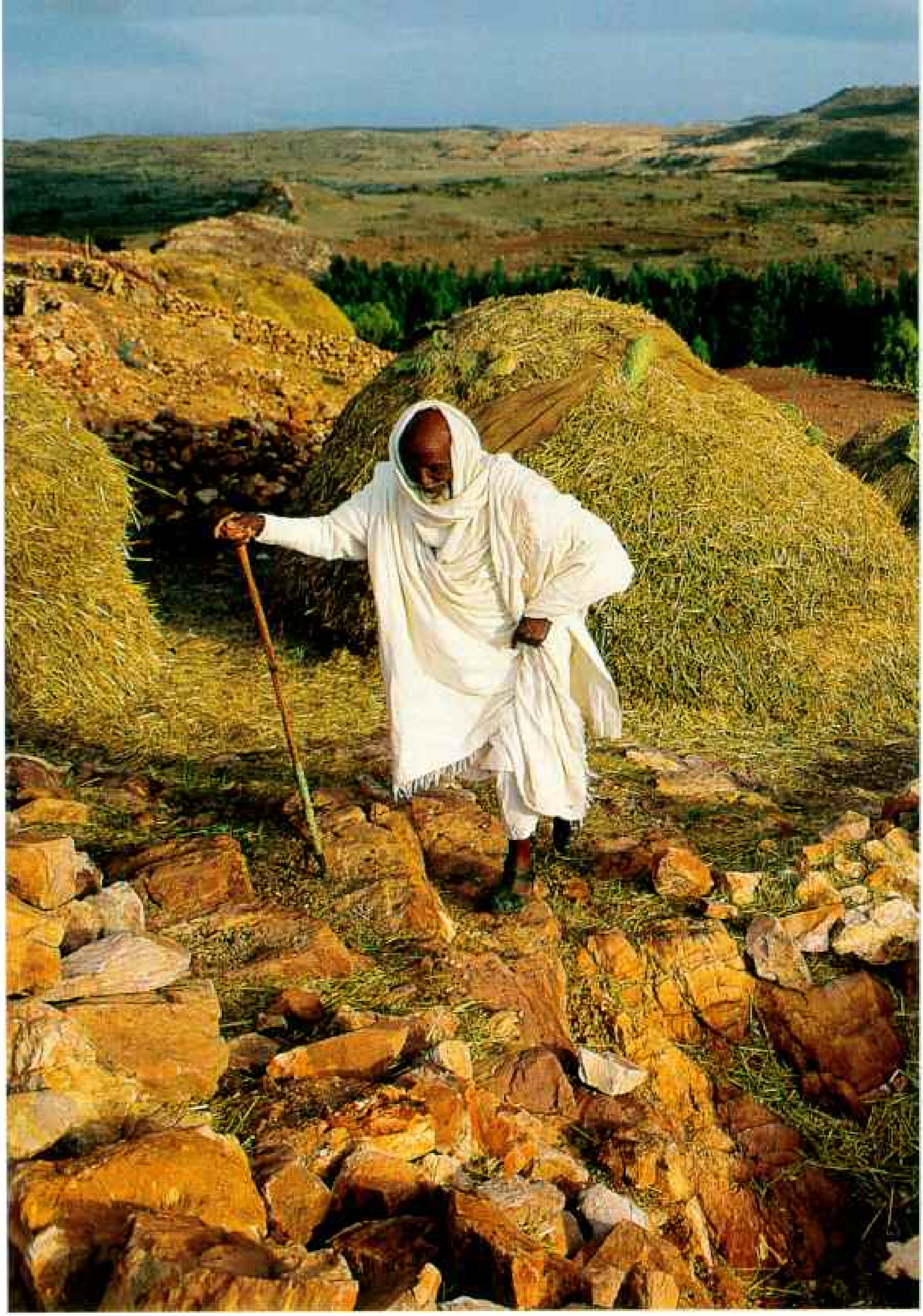
British rule replaced Italian during World War II, and in 1952 the United Nations, despite Eritrean calls for independence, made the colony an autonomous federated state within Ethiopia. The Ethiopian government immediately began whittling away at Eritrean identity, banning display of the Eritrean flag and requiring Eritreans to use Amharic, the official Ethiopian language. In 1961 a small group of Eritrean rebels armed with bolt-action rifles fired on an Ethiopian police post near Agordat in western Eritrea. The war had begun.

Emperor Haile Selassie's answer was to annex Eritrea as the 14th province of Ethiopia, dissolving the Eritrean parliament in Asmara. After Selassie's ouster by his military in 1974, torture and execution of Eritrean insurgents by Ethiopia's Stalinist rulers became routine, and the rebels' resistance grew stronger.

On May 24, 1991, EPLF forces marched into Asmara and took over Eritrea. It had been a lopsided war: One of Africa's largest mechanized armies, backed with billions of dollars' worth of sophisticated weaponry provided first by the United States and later by the Soviet Union, against go-it-alone Eritrea, whose fighters had to make do with weapons seized from the enemy. In April 1993, under UN supervision, Eritreans voted overwhelmingly for independence.

EVERYWHERE I WENT in Africa's newest nation, I encountered forms of Saleh Hamid's dance, even in towns and villages devastated by cluster bombs, mortar, and napalm. Rather than instilling bitterness and self-pity, this little nation's crusade has imbued Eritreans with consideration for one another and with self-reliance.

"We have accomplished a mission," Eritrea's president, Isaias Afwerki, told me in his sparsely furnished office in a drab government building in downtown Asmara. "Now there is another: constructing a nation from scratch." He paused. "We know we don't have the knowledge. We know we don't have the resources. We know we don't have the experience. Our conclusion is: Let's face it."



A Healing Land Wrapped in a traditional shawl, or *gabbi*, an elder from Adi Hawesha savors his walk home past the year's cut of fodder for village livestock. Too often fields yield little in a region prone to drought and insect plagues. To the natural perils are now

added the scourges of war: land mines, stripped-away forests, fields slashed by trenches. Undaunted, the new government has dispatched students and soldiers to repair the countryside. Vows one official: "*Everyone* will participate in the work of independence."

Isaias, a former engineering student, has spent 29 of his 50 years with the EPLF, guiding the movement through its transition from Marxist ideology to pragmatic nationalism. Wearing plastic sandals and an open-collared shirt, he projects a nonchalance that belies the difficulty of his mission.

"A homegrown Eritrean" was how a schoolmate described Isaias to me. "He is setting an example, which is really not the case in most of Africa."

For a start President Isaias turned down the official palace for a brick house in the middle-class neighborhood of Gejeret. He drives a 1991 Toyota. And like the other ex-rebels in the government, who hold the majority of senior positions, Isaias drew a stipend of only 125 birr ($20 U.S.) a month until July 1995, when his salary was set at 5,000 birr a month. Such self-sacrifice helps explain why U.S. Secretary of State Warren Christopher observed that Eritrea offers new hope for the Horn of Africa.

The human machine does all the work at threshing time on a remote highland plot. One side rests while the other pounds away at stalks to separate grains of sorghum, a staple for making bread and porridge. For years many fields went untended, leading to periods of famine. Even as rural areas revive, Eritrea depends on foreign aid for at least one-third of its food.

THE HORN OF AFRICA is stingy ground—not the stuff of breadbaskets. The western part of Eritrea is a parched lowland; in the south extinct volcanoes rise over expanses of lava. Much of the rest of the country is mountainous. The climate often betrays hope: Severe droughts periodically blister the region, and swarms of locusts devastate crops of corn, wheat, and lentils. During the war Ethiopian soldiers felled trees to deprive the EPLF of wood to conceal and fortify their network of trenches. Because of this—and constant cutting for fuel and housing by Eritreans themselves—erosion gullies scar the land where eucalyptus and acacia trees once grew.

The economic landscape is no less stark. Eritreans have a per capita income of less than $150, well below the $350 average for sub-Saharan Africa. The country's awkward shape hinders transportation; there is only one paved road in the long eastern panhandle. By the government's reckoning, repairing the war damage—including building houses, schools, hospitals, and roads—will take two billion dollars. The United States provided about 20 million dollars in economic assistance in 1995.

Skilled labor is scarce, and demobilizing some 50,000 guerrillas is a further drain. Eritrea's population is growing by 3.3 percent a year—one of the highest rates in Africa—and nearly half a million war refugees, most in Sudan, await repatriation. A further threat to progress comes from AIDS.

As Eritreans often said to me, "We are starting from below zero."

It was on the dusty outskirts of the 16th-century port city of Massawa where I began to appreciate the energy and ambition that freedom has unleashed in Eritrea. Tewelde Andu, the mayor, had taken me to see a work in progress—the rebuilding of the narrow-gauge railroad that once snaked down the fog-shrouded Arborobu escarpment from Asmara to the Red Sea coast. Before its destruction in the war, the railroad had been a vital, if antiquated, artery for goods flowing to and from the interior.

I watched a crew of about 20 men, all volunteers, pulling up corroded, twisted rails with

crowbars and shoveling rocks into wheelbarrows. They paused only to share swigs from one of their water bottles.

They had laid five miles of track, allowing trains to carry commuters between the port and the northern outskirts of the city. Meanwhile Asmara was 60 miles away—and up. Looking across the sweltering desert plain toward the distant mountains, I wondered how a few volunteers with hand tools could possibly complete the railroad.

Tewelde, as if reading my mind, acknowledged the magnitude of the task. "The Italian engineers we consulted said it was too costly," he said. "Maybe so, in the way they think, but we have unlimited determination. Come and see. In two years you will be able to ride from Asmara."

He yelled a greeting to one of the volunteers, a big man wearing an NFL T-shirt and plastic sandals. "Meet Giorgis Tesfamikael," Tewelde said, as the man came over, wiping dust and sweat from his face with a white handkerchief. "Giorgis is our minister of transportation." I shook Giorgis's toughened hand and expressed surprise at finding a minister of state in a work gang.

"Let them see that people in Africa do their own jobs," he shot back. "It's not all the time we ask for help."

Eritreans may not like asking for handouts, but judging from the condition of Massawa, help is clearly needed. Thirty years ago Massawa was a prosperous city of 80,000; today it has only 20,000 residents. When Ethiopia's defeated soldiers fled in 1990, they looted all the banks, and for ten months Ethiopian aircraft pummeled the city, gutting many of its grand old houses. The Imperial Palace overlooking the sea, used by Haile Selassie as a

Working a sea of plenty, fishermen net a shark off the Dahlak islands. The catch goes to Yemen for coveted shark-fin soup. Though the Red Sea is Eritrea's richest potential resource, citizens show little taste for fish, something a national promotion hopes to remedy. For economic growth Eritrea must rely on leftovers—Italian-built factories that date from when Eritrea was a successful trading state. At a reopened plant in Asmara, women turn out shoes as blue as the sea.

winter retreat, had been a splendid structure, with mahogany paneling, marble floors, and cornices trimmed with gold leaf. Now it's a mess of iron and brick, with pigeons roosting on exposed beams and daylight pouring in through a hole in the dome.

In the old quarter I walked past once gracious houses built out of pink coral rock and shaded by palm and eucalyptus trees. Many had gone up during the Ottoman era, from the mid-16th to the mid-19th centuries, and although scarred by napalm and tracer bullets, they recall Massawa's days as "the pearl of the Red Sea." Arched passageways and streets barely wide enough for a donkey and cart lend mystery to Eritrea's oldest city, built at the hub of trade routes that linked Egypt and Greece before the birth of Christ.

COMMERCE is the goal of Dessu Tesfazion, general manager of the Red Sea Trading Corporation, headquartered in a nondescript concrete house set back from a quiet side street in Asmara. At first I thought I'd come to the wrong place. The languid, casually dressed young men on the porch didn't look like businessmen, but one of them said, yes, this was Red Sea Trading, and sent me up to the second floor.

Dessu, a youthful man of 50 wearing blue jeans, handed me his business card. The company logo is the prow of a cargo boat inside the circle of the numeral 9. *"Bado Tshiate,"* Dessu said, pointing to the number. "It means Zero Nine. We will never lose the name."

Zero Nine (nine for the number of ethnic groups in Eritrea) was formed in 1974 as an EPLF hit squad, whose job was to do whatever it could to undermine Ethiopia's war effort. The squad's first victims were two Ethiopian colonels, shot in downtown Asmara. Of Zero Nine's 14 original members, four, including Dessu, survived the war.

As the war intensified, Dessu explained, and shortages of basics such as milk, grain, salt, and butter became acute, the squad turned to shopkeeping and trade, which also provided cover for military activities. "I had a small shop," he said. "I looked like any salesman, with cloth, tins of biscuits, and flour on my shelf." Soon they were importing scarce commodities from Yemen and Saudi Arabia; with the profits the squad members bought trucks and a boat.

From these beginnings emerged Eritrea's most powerful trading company. Today Red Sea Trading Corporation is Eritrea's largest exporter of sesame seed and gum arabic. Imports range from TV sets to cement. The company has 20 million dollars in the bank in a country whose entire economic output amounts to 300 million dollars a year. Dessu hopes to open offices in London and Washington, D.C. But profits are not everything, he said; freedom is not a license to exploit. In 1994, when sellers inflated the price of cement, Red Sea Trading reined them in by offering its cement at a markup of only 10 percent.

"Those merchants wanted a profit of 100,

200 percent, but 10 or 15 percent is fine," Dessu said. "We're not socialists, but our profit is to help the people. This is not government price setting. Of course, we are close to the government."

That a country with deep roots in the political left officially advocates free-market economics seems incongruous, but Eritreans are above all a practical people. "Inefficiency and bureaucracy are the problems of government-run companies," said Hagos Ghebrehiwet, who heads the economics division of the political party born of the EPLF. "We have to make things happen, make a difference and change lives."

IF ERITREANS are long on will, they remain short on expertise. There are, however, small signs of progress. At Winna Technical School in the highlands north of Nakfa, the machine shops that turned out bullets during the war are recycling brass and steel shell casings into rods to reinforce concrete. Winna's 120 students will graduate from the three-year program with the skills to run their own machine shops or garages, become carpenters, or teach in trade schools.

Meanwhile a million or so Eritreans exiled by the war, many of them highly educated and with diverse talents, are scattered across Europe, North America, and the Middle East. Few have come home.

"I came thinking of medicine," said Mekonnen Asmerom, an expatriate who returned in 1991, "but I saw that the real problem was housing. For the moment it's the biggest problem in Eritrea." Mekonnen, a 37-year-old whose family emigrated to Italy when he was 17, trained there as a doctor specializing in infectious and tropical diseases. He came back "because I wanted to do something that could really help the country."

I met Mekonnen by chance one afternoon as I drove past a tank graveyard on the western edge of Asmara. A sign caught my eye: SPACE 2001 ERITREA. A man operating a cement mixer ushered me to the boss's office, a modest building made of reddish adobe brick. Mekonnen, who founded and runs the homebuilding enterprise, has a 30 percent stake. The rest is owned by the city of Asmara, an Eritrean charity called the Children of Martyrs, and a Belgian company, all of which helped finance start-up of the business.

A two- or three-bedroom house with veranda, carport, and fenced yard sells for $10,000 to $15,000—a moderate price in Eritrea. Mekonnen has built 20 models, and demand has forced him to nearly double his original production goal of 300 houses a year. The design is especially popular among returning young professionals with families. "Look," Mekonnen said, "they can take lower salaries, but if they're used to suburbs in California, especially the children, they won't accept to squeeze into one room."

Last year Mekonnen hired a general manager, which means he can go back to being a doctor. When I next visit Eritrea, I'll look for him in downtown Asmara, in one of the smart new office buildings that seem to be sprouting all over the city.

AS THE NERVE CENTER of Ethiopian communications in Eritrea, Asmara came through the bombing almost unscathed. For their part the EPLF forces, which generally avoided attacks on urban areas and in any case did not want their future capital in ruins, limited their attacks on Asmara to sporadic ambushes.

Asmara impressed me as frozen in time, a blend of faded Italian flavors and traditional African life. Battered Fiat taxis and Vespa scooters share broad, palm-lined streets with donkey-drawn *arebias*—small carts used to haul wood, farm produce, or passengers. At 7,600 feet above the sea, the city is dry and cool, perfect for walking—and many do, window-shopping or browsing in the scores of boutiques that front the narrow streets. These streets are invariably tidy, and beggars are nowhere to be seen.

Eritreans themselves seem surprised by the changelessness of Asmara. "I never thought these same cafés would be here," said Mesfin Yoseph, raising his voice above the hiss of a cappuccino machine in the Bar Royal on Liberation Avenue. Home on a visit from Los Angeles, where he works for a real estate company, Mesfin is thinking about moving back to Eritrea after 26 years in the U.S.

That Eritrea is still something of a blank slate can be seen as an asset, says Sebhat Ephrem, formerly the field commander of the guerrilla forces, later administrator of Asmara Province, and now Eritrea's minister of defense. He believes Asmara has an advantage over African cities like Tanzania's Dar es Salaam, which have grown explosively in recent decades. "They are faced with the question of curing major problems. Here it's a question of preventing them."

Hard-schooled on the battlefield, wounded veterans now test themselves in a classroom at Denden Camp in Asmara. "They're treated like heroes," reports photographer Bob Caputo. "Villagers bring food and gifts. They realize the debt society owes the fighters." Outside Afabet, broken bones of tanks and trucks (bottom) memorialize the rebels' greatest victory. In this narrow ravine, fighters trapped and disabled an enemy convoy—and with seized weapons forced the Ethiopian Army into a decisive retreat.

Slowing the spread of AIDS is at the top of the list, "lest the liberation gained through sacrifice is aborted," Sebhat says. In 1994 it was estimated there were 60,000 carriers of the virus in Eritrea, most of them young adults, and of the 1,700 AIDS cases reported so far, 80 percent were in Asmara.

The city's population, now 400,000, is growing fast enough that containing urban growth—and the attendant ills of inferior housing, traffic congestion, crime, and pollution—is also becoming an issue. An uncounted number of Eritreans live in a slum called Abba Shawul near the *idaga*, the bustling market in the heart of Asmara. Yet even in Abba Shawul I felt none of the anger and alienation that

Desert Savvy Under a torrid, cloud-forsaken sky, Arabo Mohammed tends to his thirst, collecting cones full of palm sap, out of which he'll make a sweet wine. Migrating between water holes on the dry eastern panhandle, Arabo belongs to the Afar

tribe, an Islamic people of mostly semi-nomadic camel and goat herders and one of Eritrea's nine ethnic groups. To guard against the tribal divisions that lacerate most African states, Eritreans discourage political parties based on ethnic or religious affiliation.

The outer world scarcely exists for inhabitants of the mountaintop Bizen Monastery. Coptic monks live here in austere isolation, their days given to prayer, penance, and teaching acolytes to chant in the ancient liturgical language of Geez. The monks could not transcend the war though. Both armies used the cliff as an occasional lookout.

usually surround such places. If the wood seller who rents a room in a tiny crumbling house with a roof held down by rocks and branches is typical, most people see it as a way station. "This is not for always," he said. "Now we have opportunity."

Indeed Asmara is alive with entrepreneurial energy, as new money flows in and apartments, restaurants, and shops open. You can now test-drive a Mercedes-Benz at a local auto dealership. Initially foreign and domestic investment was expected to create 30,000 new jobs, thereby lowering the nation's high unemployment rate. Jobless Eritreans survive by virtue of a traditional safety net—the extended family system.

Danny Dafla, an ex-guerrilla who started a small graphics firm in a house near Asmara University, hopes the new consumerism will not erode Eritrean idealism. "The war was perfect," said Danny, who joined the EPLF at 14. ("My rifle was larger than me.") "You really wanted to give yourself for everyone. No exchange of anything except love."

The Ministry of Tourism recently commissioned Danny to design a promotional magazine. He is excited about the prospect of making some money but clings to the wartime ideal of self-sacrifice. "If we can hold enough of it," he said, "miracles can be done."

IN THE EPLF'S seemingly miraculous battle against the odds, women fought alongside men. In fact, by the end of the war women made up nearly a third of the entire fighting force. Now, by law, women in Eritrea have equal property rights—unusual in much of Africa today. They also have rights to their children in divorce, and forced marriages are banned.

Yet the clasp of tradition has only been loosened, as Abeba Habtom knows. Abeba, an official with the Ministry of Education in Asmara, still wears her hair in the closely cropped style of the EPLF guerrillas. "I'm 42 years old," she said. "My husband's relatives, and mine too, wouldn't mind if we got a divorce and he married a younger woman."

Abeba is childless in a society in which married women without children are considered failures. She attributes her inability to get pregnant to the lingering stress of combat. "I have been in the field all this time, and anyway there are children we can adopt. But they don't see it that way." The divorce rate among former guerrillas is reportedly high, but her husband has stood by her despite his family's disapproval. "He has understanding and depth," Abeba said.

Unlike Abeba, who is part of the urban elite, at least 80 percent of Eritrean women are

illiterate villagers. Tzighe Gebrekristos, whom I met in Embaderho north of Asmara, is 30 years old and tired. After a land mine killed her husband, her brother-in-law became the absentee owner of their plot, so she must now work the land as well as raise four young children, two boys and two girls.

The last thing Tzighe wants is for the boys to be farmers—in her mind that's condemning them to poverty. "I want them to be office men." And the girls? "I need them only to get married and give birth. That is our culture, so we cannot go out from our culture. Girls are born to marry."

"If you want real change," said Fozia Hashim, who is Eritrea's justice minister (one of two female ministers in the new government), "you can't say, 'here's a five-year plan.' You can have a plan for building houses and roads, but changing the mind of a person is not made by calculations like that."

In the calculus of change, fashioning a stable, secular democracy—an entirely new idea in Eritrea—requires drafting a constitution, formulating the legal basis of political parties, and holding elections. The goal is to do all this by 1997. Until then the EPLF will remain in power as the renamed People's Front for Democracy and Justice, or PFDJ.

"I'm for a bill of rights and checks and balances," said Bereket Habte Selassie, an Eritrean who was once Ethiopia's attorney general and now heads Eritrea's constitutional commission, a group of 50 people appointed

by the transitional government. "There are many questions. Do we want a parliamentary system like the British? Or a U.S. model? It will be controversial. One of the problems I see in African countries is they took so-called 'models' and used them without change."

The commission aims to draft a truly democratic constitution and is holding meetings in towns and villages throughout Eritrea, soliciting ideas directly from the people. It's a challenge: In the dirt-poor villages where most Eritreans live, the abiding worry is not the brightness of the political future but whether the clouds have rain in them.

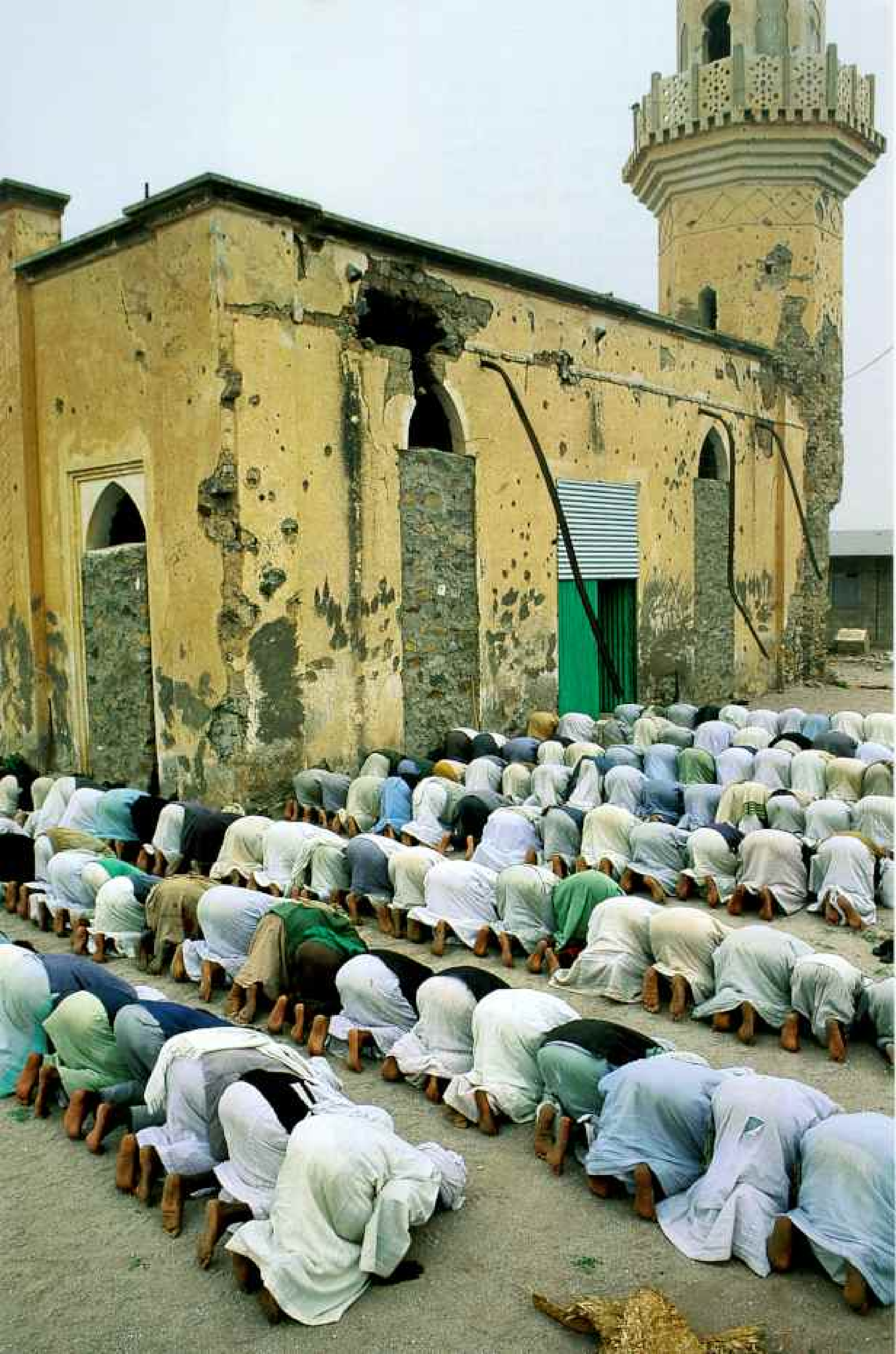
IF HARD WORK were the only requirement, Eritreans like Mikele Tasfaledet would be rich. The first time I visited Mikele, a well-muscled man of 61, he was laboring with two oxen to turn the sun-hardened earth outside Embaderho. "*Hone! Hone!*" he shouted, urging them forward. "*Haba!*" he yelled, leaning left or right to turn them in the direction he wanted. Behind the plow a young boy from the village scattered dried manure on the 30-by-50-foot plot. Mikele has three other plots of about the same size, which he plants with cabbages, potatoes, wheat, and millet. "We can grow to eat," he said, "but not to get the money we need. It's not enough."

Mikele, who has a family of five to feed, was better off before 1978, when the Ethiopian soldiers forced him to flee. Then he had four oxen and a truck, and he sold cloth and surplus grain from a shop in his house. "I'm starting all over," he said.

One morning nine months later, I visited Mikele again. Inside his *hudmo*, a rectangular house of fitted stones typical of the central highlands, the walls were bare, and the dirt floor was as hard as baked earth. A hole in the thatch roof served as a skylight. It let in so little light that the two wooden doors at the front of the house were kept open, allowing four cows and various chickens to join us as we perched on low wooden stools, talking and drinking rich cardamom-flavored coffee.

Mikele's 19-year-old daughter, Nazreth,

Ranks of the faithful pray at a battered mosque, the sole building left standing in the town of Nakfa at war's end. Ethiopian pilots used its minaret as a sighting point for bomb drops. The Muslim half of Eritrea's population lives mostly in the lowlands, many of them herders. The Christian half is concentrated on farms in the highlands, the site of such shrines as Mariam Darit (below), built into a baobab tree near Keren.



sat on a bed, a platform of dried mud, readying herself for the six-mile walk to school. Nazreth was a ninth grader. Her schooling, like that of so many Eritrean teenagers, had been held up by the war. Mikele's wife, Tukabu, was baking *taita*—a slightly sour, pancake-like bread—on a charcoal fire.

The crops are good this year, Mikele said. "We're going to collect enough grain to last us for at least half a year." The vegetables had done well too; he had been able to sell some beans and cabbages in Asmara. But one good season has not turned him into an optimist. "We're doubtful we'll have enough rain next year," he said. "We're always doubtful."

A HUNDRED MILES west of Embaderho, in Gash Barka, a low, dry region along the border with Sudan, Samir Gebreselassie beamed at me from a sea of cotton. This is Aligidir, a plantation established by the Italians in the 1920s, abandoned during the war, and now coming back to life. Samir is one of 2,300 former fighters and refugees who have taken up an offer from the Eritrean government: five acres of land, free and clear, to be planted with cotton, with two more acres for sorghum after a successful first year.

"I never expected to own land," she told me. "It feels very good. I was not expecting to be alive."

Each settler also receives $1,500 in start-up money as well as training programs and free use of tractors, excavators, and other heavy equipment. There are compelling reasons for this largesse. The textile factories in Asmara depend heavily on cotton from Aligidir, which is by far the largest domestic producer. And by promoting the tense border region as a land of opportunity, the government hopes to counter efforts by the Eritrean Islamic Jihad to subvert the area's mostly Muslim population. Allied with armed Islamic fundamentalists from other countries, Eritreans opposed to the nation's commitment to remain a secular state have been infiltrating from Sudan and attacking villages. A number of Eritreans have been killed.

Aligidir is divided into three 9,000-acre sections; less than half the available land has been taken. Lack of water is the big problem. The nearby Gash River runs through the plantation but is dry most of the year, and the area's sole reservoir holds only enough water to irrigate 11,000 acres.

Unveiled curiosity lights up the eyes of two Rashaida women, their fancy beadwork belying the drab duties of goatherding. New laws guaranteeing sexual equality—the right of women to divorce, to vote, and to acquire land—promise to shake up traditional culture. "In places it was once hard to see women," says a student returning from abroad. "They were restricted to the house. Now I see them building roads, talking in meetings. Amazing."

"I was not expecting to get something from this," Samir said, running her fingers through the dry, powdery soil. "There was a time I was afraid of this land." But the cotton has done so well that Samir must hire laborers to help her pick it all. "Now we are getting bigger and bigger," she said proudly, looking into the pouch of her apron, filled with fat puffs of cotton.

NOT FAR FROM ALIGIDIR, in the village of Tessenei, are two long sheds that serve as a reception center for refugees coming home from Sudan. Within 24 hours the Eritrean Relief and Refugee Commission whisks each family to its chosen destination.

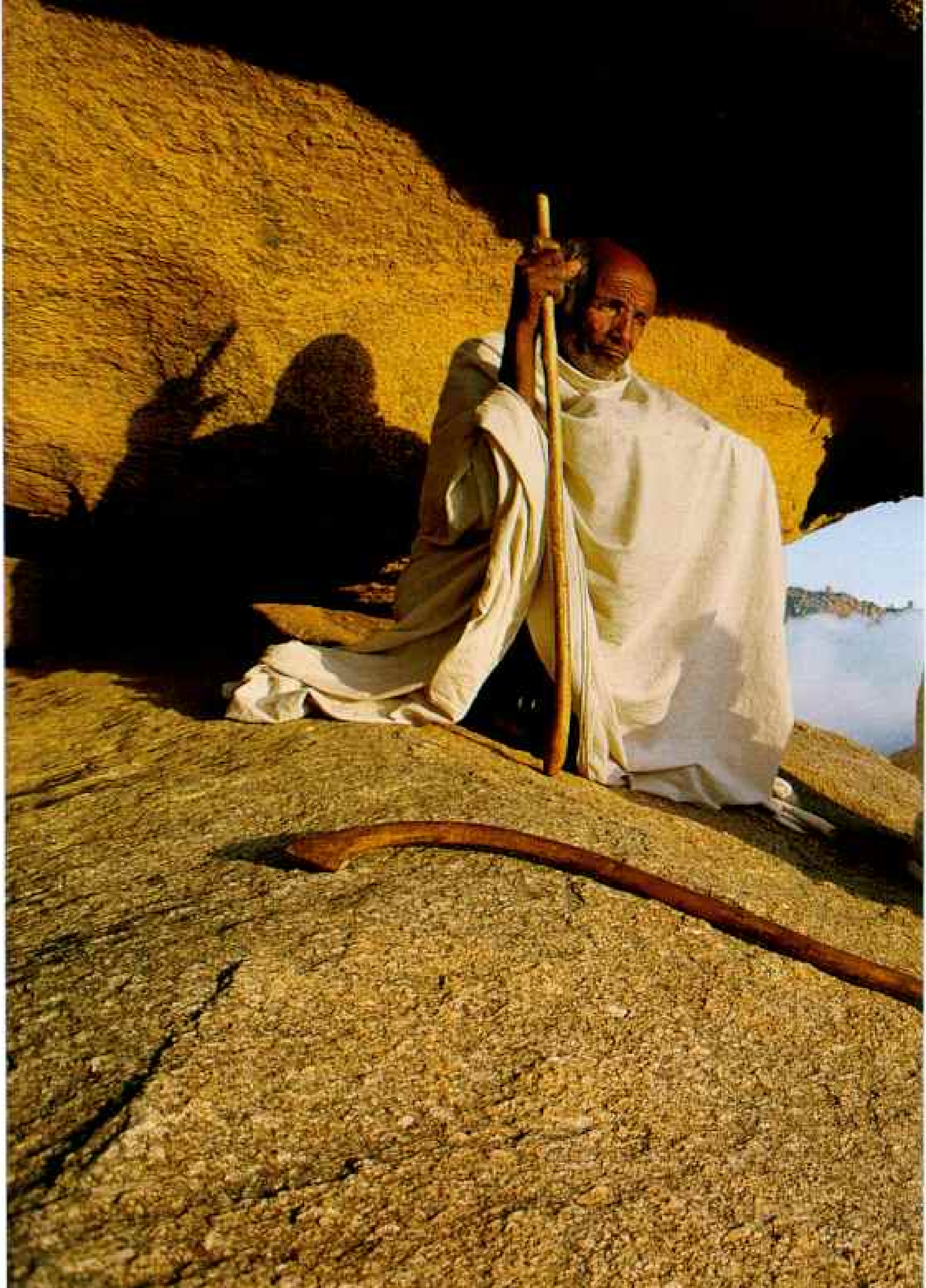
On a blistering day in December I climbed aboard one of the 12 UN trucks that were carrying some 200 families and their meager belongings. I squeezed into the space occupied by

Teklai Bokrezion, his wife, Akberet, and their three children. Dust swirling, the truck lurched eastward from the Sudanese border. On the short ride to the reception center the air was thick with anticipation, and hardly a word was spoken.

We gathered in the meal shed for a dinner of taita and vegetables prepared by volunteers, and I asked Teklai about his plans. He said he would not be going home to Himbirti, his village near Asmara, because he'd heard it had grown beyond recognition. His choice was a new village, Alebu, built by the Eritrean Relief group a few miles from Tessenei. "I don't know my home anymore," Teklai said. "Here I know there is land."

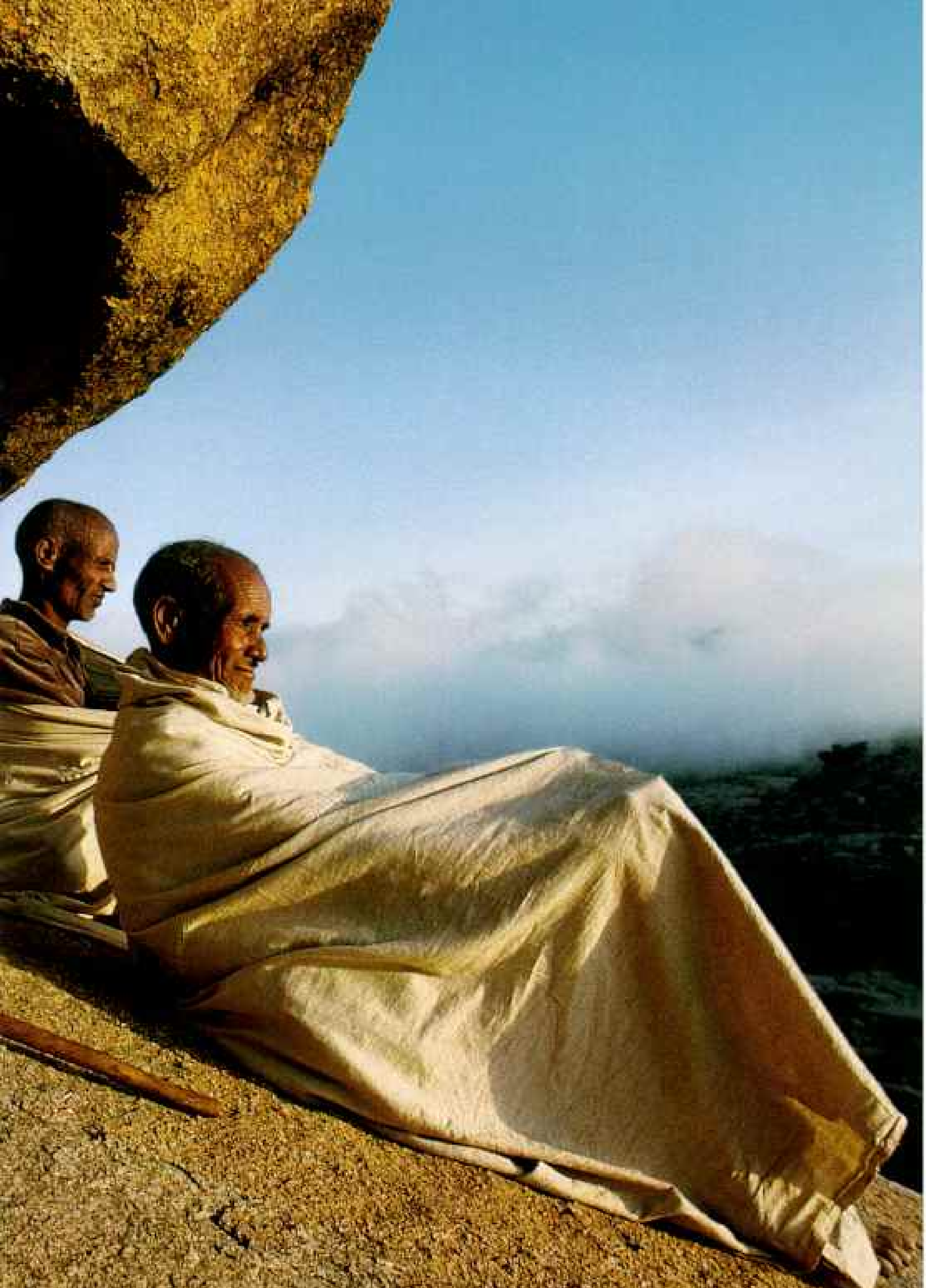
By nine the next morning we were in Alebu, not so much a village with a recognizable center as row after row of circular grass huts—500 in all. Less than a third of them had been taken. After much pacing, Teklai settled on a hut that appeared to my untrained eye indistinguishable from the others but that Teklai calculated had the most surrounding land, an irregular plot of no more than a third of an acre. Soon the hut's walls and ceiling would be braced with *werwer*, long tree branches he had carried with him from Sudan for the purpose.

Although the countryside had no irrigation yet, two hand pumps in the village suggested a reliable water supply. A large rectangular hut would serve as a clinic. A school was planned. Teklai reckoned he should be able to grow enough crops to sell the surplus. Eventually, if all went well, he would open a small general store. "Everything that is good requires that you build slowly," Akberet said. Teklai nodded in agreement. "If you work, you will get more," he said, and I heard Eritrea speaking.



Heightened Prospects

Meditating on the sunset from an outcrop above Debre Sina, village elders look across a land freed from the storms of war. With elections in view and an ambitious reconstruction plan in place, Eritrea hopes to play a calming role in the



tempestuous Horn of Africa region. "It will be a very hard road," says a foreign observer, noting that Eritrea remains one of the world's poorest nations. "But this is a country that won a war on its own, against all odds. Nothing is impossible." □

It could kill man-size prey in a single bite. *Carcharodontosaurus* —its 90-million-year-old skull reconstructed here—is the most remarkable of new finds excavated in the Sahara. Led by University of Chicago paleontologist Paul Sereno, below, a team has found compelling evidence that Africa's dinosaurs evolved along divergent paths from those elsewhere on earth.

AFRICA'S DINOSAUR CASTAWAYS

BY PAUL C. SERENO

PHOTOGRAPHS BY THE AUTHOR AND LOUIE PSIHOYOS

THE MORNING HEAT had soared to a hundred degrees, and the Atlas Mountains shimmered like a mirage in the distance. A hundred miles of tilted plateau, more than 500 feet high, stretched to either side. No living thing made a sound in this barren valley of the Moroccan Sahara, but the rocks were waiting to tell of dinosaurs that had lived here some 90 million years ago.

Glancing across the jagged valley floor, I spotted a reddish patch of rock high on a cliff. Perhaps this sandstone held a clue to the world of Africa's dinosaurs. I began climbing. Near the top I stopped short before a scattering of yellowish bone fragments. I picked up the largest piece, about the size of a grapefruit, and examined it closely. Recognizing a knob that protruded from the bone, I knew I was holding the back of a huge predatory dinosaur skull.

The fragment looked freshly broken, as if it had fallen from the sandstone above, so I scaled the sheer face toward the top of the plateau. I found nothing, but as I made my way back down, I looked up and saw a bone jutting from the stone, camouflaged 20 feet above my original find. The edges matched those of the skull fragment. The carnivore's skull disappeared into the cliff side. Several of its teeth, which were about five inches long, were exposed. Wide-eyed in wonder, I ran my fingers across the saber-shaped teeth of an animal I would later realize was perhaps the largest carnivore that ever walked the earth.

At five feet four inches long, the skull of this meat-eating theropod is a bit longer than the largest known skull of *Tyrannosaurus rex*, the massive 40-foot-long killer from North America. Such creatures would have most likely preyed on the long-necked plant-eating sauropods, which browsed on all fours and whose young made easy targets. The beast chased its prey by running on its powerful hind limbs, balanced by a muscular tail. It would have sliced into the thick skin of the plant-eaters with bladelike teeth. My colleagues and I identified this creature as *Carcharodontosaurus*, or "shark-toothed reptile." It is a well-deserved name.

A short distance from the skull, we discovered fossil crocodile teeth, turtle shells, and crayfish, and petrified wood—evidence that 90 million years ago today's scorched desert was a vast floodplain laced with rivers lined by coniferous trees. Crocodiles swam the rivers, and swift predatory dinosaurs like *Carcharodontosaurus* ran through the mud, leaving dozens of three-toed tracks now fossilized in the sediment.

The discovery of the enormous *Carcharodontosaurus* skull was the most dramatic find of two expeditions I have led to the Sahara in Morocco and Niger. No one knew much about the dinosaurs that roamed northern Africa toward the end of their reign when our small band of paleontologists and students started out three years ago. Of the hundreds of dinosaur species that have been identified throughout the world, few have

DINOSAUR DISCOVERIES

Articles in this series reveal the latest insights into the world of dinosaurs. Much of the research was supported by your Society.

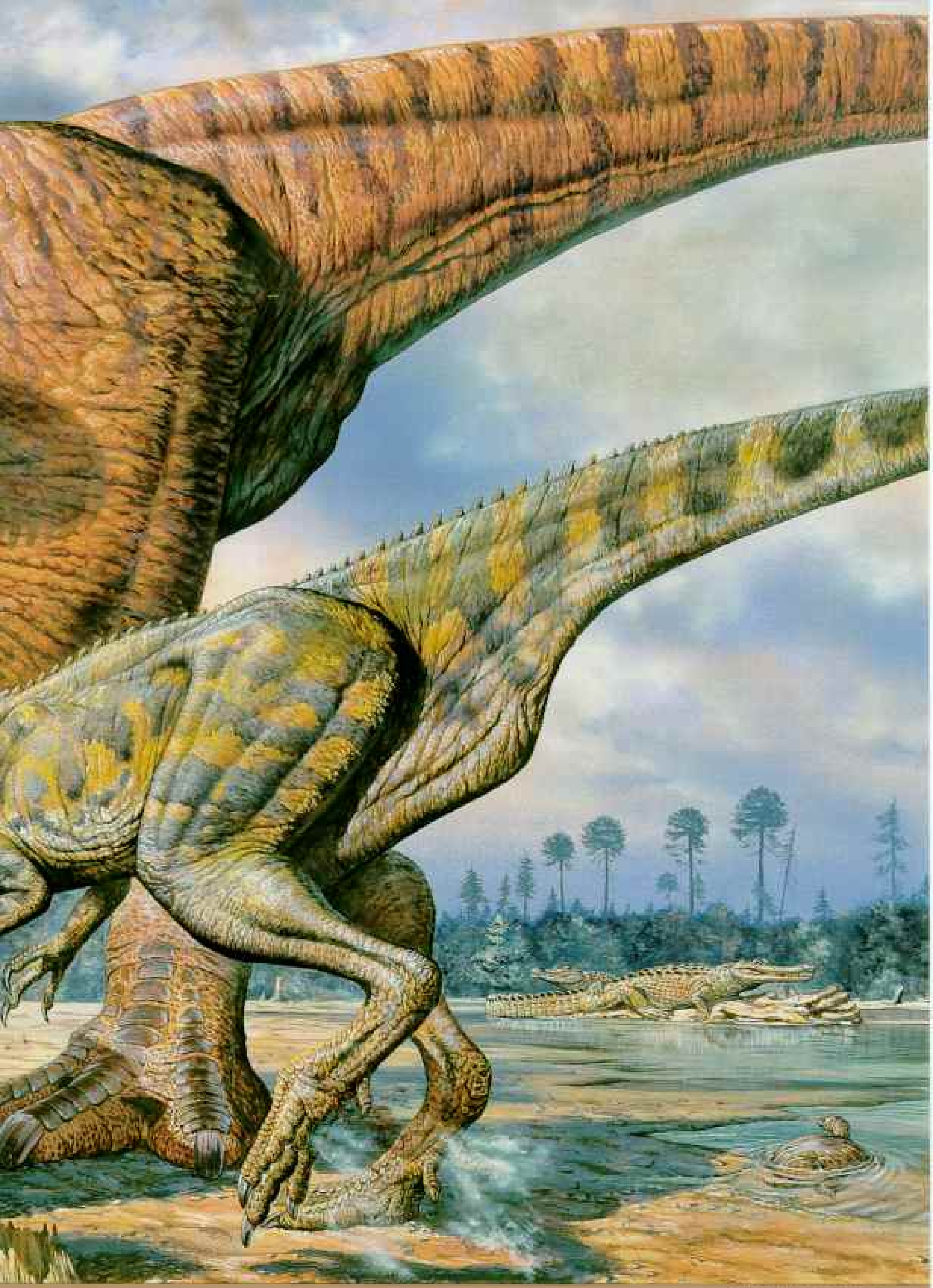
PAUL SERENO is an associate professor of paleontology and evolution at the University of Chicago. Photographs by LOUIE PSIHOYOS will illustrate a story on Mongolia's dinosaur fossils in next month's issue.

Braced on a sandstone cliff, the author uncovers teeth of *Carcharodontosaurus*. At five feet four inches, the skull measures a few inches longer than that of the largest *Tyrannosaurus rex*, putting *Carcharodontosaurus* in contention for the title of king of all land predators. Once it has been cleaned, a five-inch tooth (left) reveals a series of grooves—their purpose unknown.

The team scaled crumbling slopes in 120°F heat on the 1995 expedition to the site in the Kem Kem region of Morocco. Fieldwork in Niger two years earlier covered flatter terrain. To get to the Niger dig, the crew drove from Algiers more than 1,500 miles into the Sahara (map) to prospect among some of the world's least explored rock formations.

Africa's Dinosaur Castaways

Threats reverberate across a delta in what is now the Sahara as *Carcharodontosaurus* guards its kill against *Deltadromeus*. Unearthed from a slope in the Kem Kem, a skeleton of the smaller predator revealed a quick, two-legged creature measuring 25 feet long.



PAINTING BY MARK HALLETT

Nearby sediment gave up more evidence. Fossil remains of crocodiles, turtles, and crustaceans—as well as petrified wood—suggest the life and habitat that thrived in the region some 90 million years before humans walked the horizon.

"**He seems to know** every stone and bone in the desert," says Sereno of his turbaned Tuareg guide. During a 1990 exploratory expedition, the local chieftain led the author to the site of an ancient graveyard of plant-eating sauropods. Three years later the team found the spot again.

HANS LARSSON

been found in surroundings as remote or as hostile as the Sahara.

What little was known came from partial skeletons excavated years ago in Egypt, Morocco, and Niger. Those remains belonged to a strange two-legged predator called *Spinosaurus*, which had a large fin along its back, to a primitive duck-billed dinosaur, and to the huge, plant-eating sauropods.

WHEN dinosaurs emerged about 230 million years ago in the Triassic period, the world's continents were massed together into a supercontinent called Pangaea. Dinosaurs in every part of Pangaea looked remarkably alike. By the end of the Jurassic, 80 million years later, Pangaea had broken into two landmasses, a northern one, Laurasia, and a southern one known as Gondwana, which carried plants and animals with them. During the next great geologic period, the Cretaceous—from 146 million to 65 million years ago—the continents drifted apart and began to assume their modern positions.

By the time of *Carcharodontosaurus*'s appearance, some 90 million years ago, the world had become a patchwork of isolated island continents, each with unique dinosaur forms. Like all life-forms, dinosaur species slowly changed over generations. Predators like *Velociraptor*, a human-size killer with sickle-shaped claws, hunted in Mongolia. Rhino-like ceratopsians and herds of duck-billed dinosaurs browsed on ferns and flowering plants in North America.

But what about Africa's Cretaceous dinosaurs? What did they look like? And how did they fit in with those of the other continents? These were the questions that sent us to the Sahara.

For a long time scientists thought that dinosaurs evolved neatly into northern and southern subgroups after Laurasia and Gondwana split apart. This idea was based in part on the discovery of strange dinosaurs in South America, such as *Carnotaurus*, a predator with bony horns above its eyes, that looked nothing like their northern counterparts. It was assumed that African dinosaurs, having begun to evolve in the isolation of the great southern landmass, would be similar to those in South America.

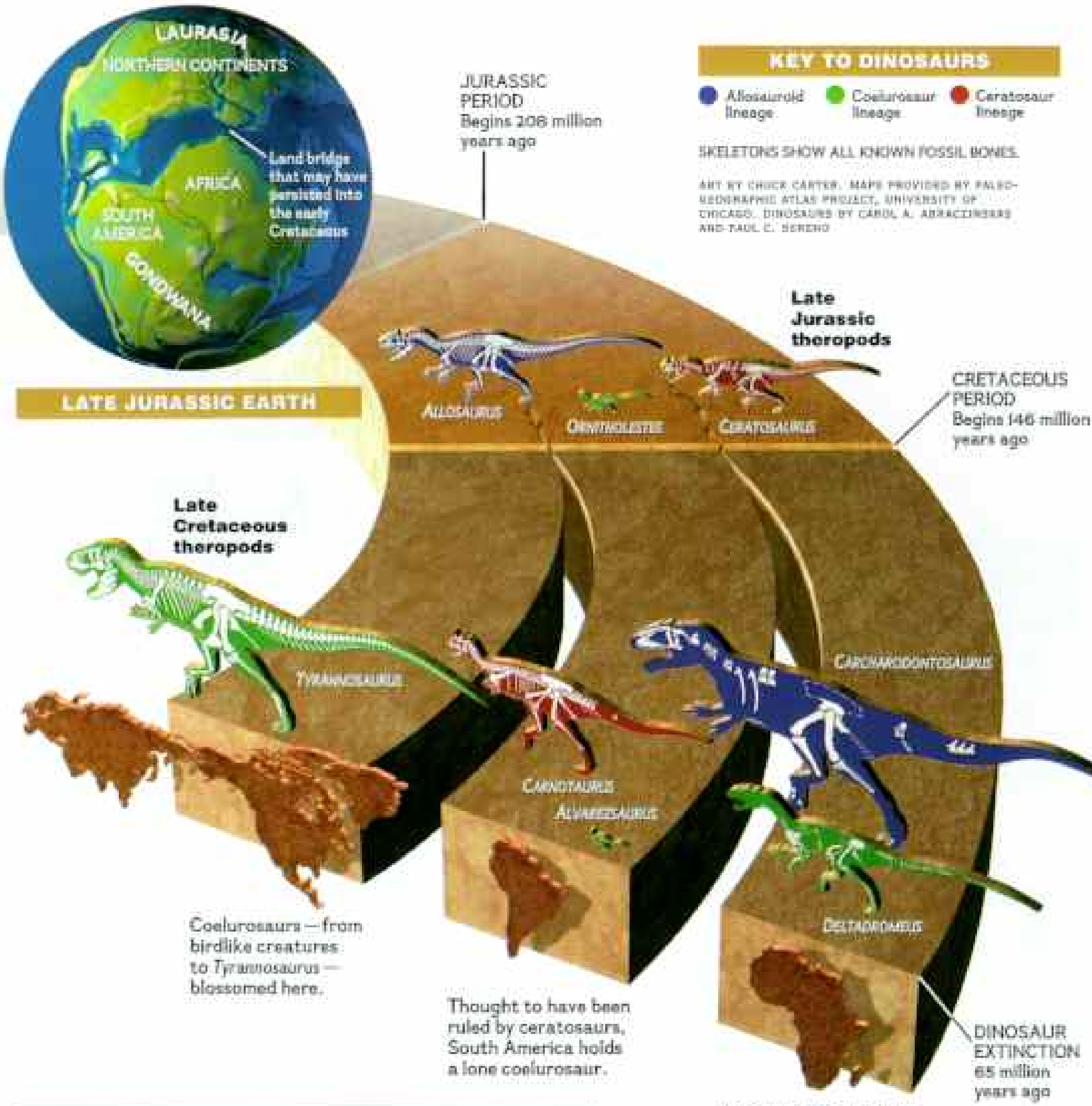
Our recent discoveries in Africa suggest that dinosaur evolution was much more involved than that. The dinosaur world may not have split neatly in two. *Carcharodontosaurus*, for example, seems to be most similar not to a South American carnivore but to *Acrocanthosaurus*, a huge allosauroid that thrived in North America during the early Cretaceous period.

Further evidence came last year, when our Morocco expedition was running out of time. Taouz, a town not far from the Algerian border, served as our base. From there we drove into the desert to a small oasis, where we slept and ate in the open beside a schoolhouse.

Fresh food was hard to come by and difficult to store, so we usually cooked the dehydrated food we'd brought with us. We hiked miles each day, climbing steep rubble-strewn inclines that tore up our shoes and wore out our knees. Soon we were patching the soles of our boots with strips of truck tires. The incessant heat took its toll too. Many of us lost more than 20 pounds in the first month.

Gabrielle Lyon, a writer and a former student at the University of Chicago, made the first major discovery, stumbling upon several beautifully preserved, six-inch-long dinosaur bones embedded in a rocky hillside. During the next two days we continued to dig bones from the hillside until the desks of the school were covered with them.

Late one night while the others



Dinosaurs adrift

Dispersed by earth's drifting continents, dinosaurs evolved into a spectacular array of species during their 165-million-year reign. When they first arose, most dry land was consolidated in a supercontinent called Pangaea, and animals migrated freely. By the end of the Jurassic period Pangaea had broken into a northern landmass—Laurasia—and a southern one—Gondwana (top globe). The author's study suggests that intermittent land bridges and shallow seas allowed common passage long after the breakup—in fact long after South America and Africa began to separate.

By the late Cretaceous, the continents had become isolated, each with unique dinosaur forms. Some lineages died out, while others flourished.

Oasis-hopping for fuel and water, the caravan nears the Algerian town of Taghit at the edge of a 400-mile-long sand sea. Later near In Gall, in Niger, the team found a sand-scoured fossil jutting from the ground, the forelimb (opposite, foreground) of a 60-foot-long, four-legged sauropod.

PAUL C. SERENO (ABOVE AND OPPOSITE)

slept, I tried to solve what looked like an enormous jigsaw puzzle. I picked up a piece we had thought was a tailbone of *Spinosaurus* and fit it onto another piece. I soon realized that I had the delicate shoulder blade and forelimb of a different sort of beast. My heart was pounding as the skeleton came into focus. The animal's spine was long and stiff, and its limbs were slender. It wasn't like any dinosaur I had seen before. I suspected we had a new species. With tears in my eyes, I woke Gabrielle to tell her of the 25-foot-long carnivore we had unearthed from an ancient riverbank. We named it *Deltadromeus*, the "delta runner."

This animal was much smaller than *Carcharodontosaurus* but probably no less aggressive. While we never found its skull, we can guess that it chased down its prey or scavenged the kills of other predators. *Deltadromeus*, most important, has skeletal similarities to coelurosaurs like *Ornitholestes*, an agile six-foot-long predator that lived in Laurasia and whose cousins had spread around the globe during the Jurassic.

MY INTEREST in the evolution of Africa's dinosaurs was sparked in 1990 when I joined a group of paleontologists from the British Museum who were hunting for fossil fish in Niger. We discovered a dinosaur graveyard the size of a basketball court with huge bones protruding from the sediment—one thighbone was six feet long. But with little time to excavate, I knew I would have to delay further work until I could organize a large-scale expedition.

After three years of planning I finally led a team of 21 scientists and students back to Niger in 1993. We crossed more than 1,500 miles of desert in six Land Rovers overflowing with supplies to spend two months searching for dinosaurs that lived some 130 million years ago, during the early Cretaceous.

But political turmoil stopped us. The site of the dinosaur graveyard, some 400 miles northeast of the capital of Niamey, was located within a military zone. Days turned into weeks as I tried to gain permission to explore the area. Meanwhile, my expedition crew languished in the oasis of Agadez, not far from the site. Isolation, fear, and illness eroded their confidence, and many decided to return home. With half our field season gone, I arrived in Agadez to call the expedition off.

But just as we prepared to leave, permission was finally granted. Many of the students decided to stay, and I and my streamlined crew of nine headed west and settled into a mud-brick compound in the oasis of In Gall. Relying on faded Polaroids, a rough topographic map, and a local guide, we soon relocated the graveyard.

As we brushed back the sediment, well-preserved white bones appeared. The skeletons, still arranged as they had been in life, looked as if they had been resting peacefully for millions of years. We guessed that the creatures had been buried in minutes, perhaps by a flash flood of an ancient river.

We began to dig around a forelimb of one of the plant-eaters. As the pit expanded, we slowly unearthed a hind limb, backbone, and tail of a 60-foot-long skeleton. It had much in common with a sauropod from North America, the 60-foot-long *Camarasaurus* that lived during the Jurassic. A jaw fragment had similar broad, spoon-shaped teeth and suggested the same rounded skull.

The next day several team members and I came upon a muddy plain strewn with weathered bone fragments. As we fanned out for the search, the curved edge and socket of a large bone caught my eye. I tiptoed closer, trying not to disturb the bones underfoot, and realized I was looking at the hipbone of a predatory dinosaur.

Then Jeff Wilson and Hans Larsson, graduate students from the University of Chicago, pulled a claw from the sediment. More bones of the beast lay just beneath the surface.

We named it *Afrovenator*, or "African hunter." It had jaws studded with two-inch, blade-shaped teeth, and powerful forelimbs armed with three curved claws. This 30-foot-long hunter closely resembled *Allosaurus*, a Jurassic predator from North America, and other predators of

Pieces of a puzzle slowly surface as Sereno and his team uncover bones of a predator, just five miles from the sauropod site near In Gall. They named the swift 30-foot-long carnivore *Afrovenator,* or "African hunter."

Driven by hunger 130 million years ago, two hunters emerge from the underbrush (right, at right) and strike quickly at a young sauropod. The scene is based partly on excavation of a herd of sauropods that died together, probably from a flash flood. Sediment found beneath the herbivores shows that a river system once flowed through the region.

PAUL C. SERENO; PAINTING BY MARK HALLETT

Poised to attack
Chicago, a long-silenced *Afrovenator* was reconstructed from a largely complete skeleton. Says Sereno: "We're just scratching the surface of a dinosaur world that's waiting to be unearthed."

similar age on both northern and southern continents.

What could explain these similarities between Africa's early Cretaceous dinosaurs and dinosaurs from northern continents? Perhaps land bridges or shallow seas remained between Laurasia and Gondwana after they had split apart. This would have allowed migrating dinosaurs—and evolutionary changes—to spread throughout both landmasses, keeping dinosaur forms more or less similar worldwide.

We do know that by 90 million years ago a broad waterway separated Africa and the northern continents, and a narrow Atlantic Ocean split Africa and South America. On each now isolated continent some dinosaurs

became extinct while others thrived. In North America, for instance, allosaurs died off, and tyrannosaurs emerged to take over the role of dominant large predator. Plant-eaters such as the once prolific sauropods were overtaken by armored, horned, and duck-billed ornithischians, a major group of dinosaurs that roamed the continent's western plains in huge herds like buffalo.

In Africa predatory dinosaurs evolved along other paths, with *Carcharodontosaurus* representing a triumph of the allosauroid lineage unseen elsewhere.

Our discoveries suggest that continental movements did affect the evolution of dinosaurs toward the end of their reign. Evolving in partial and—much later—complete isolation, dinosaurs in Africa adapted uniquely to their habitats, aided over the millennia by chance and invention, the results of which we are only now beginning to appreciate. In the next few years I hope to return to the Sahara and continue the search for clues. The story of Africa's dinosaurs has just begun. □

TOR

ONTO

Sweeping curves of City Hall's twin towers and the arches at Nathan Phillips Square run counter to Toronto's straight-arrow image. The Freedom Arches, so named in 1989, show support for the world's ongoing struggles for liberty—battles and upheavals that have brought to Toronto waves of immigration and dramatic ethnic metamorphosis. With its sizzling cultural mix and a stylish new personality, this once bland metropolis breaks into the urban major leagues.

BY
RICHARD CONNIFF

PHOTOGRAPHS BY
GERD LUDWIG

A movie set re-creating a Hong Kong street becomes a parade route during the Chinese New Year. From the earliest laborers to current expatriate millionaires, Chinese have adapted to a city renowned for its thank-God-it's-Monday industriousness.

"CHRIST WITH THE DONKEY?" cries a guy in a black leather jacket, hurrying like a hotel bellhop down a basement hallway at St. Francis of Assisi Church. "Christ with the donkey?"

"I just saw him," a woman answers. "He's over there." It's 3 p.m., one of the largest Good Friday processions in North America is about to begin, and everything is in chaos.

"Can you send Christ with the donkey up *right now?*" says a voice on the man's two-way radio. Upstairs, the congregation is already filing out of the church. They are mostly kerchiefed older women singing a recessional in Italian, but there's also a young black man in the middle, humming the tune, and a mother and son from China. A man dressed as Christ rushes out to join the marchers, whooshed along by the guy in the leather jacket.

"What's the hymn they're singing?" I ask. The jacket shrugs: "I have *no* idea. I'm Portuguese." Then he dives back downstairs to find Judas with the sack of silver coins.

The northern sun beams down through the bare tree branches and bursts around a statue of a heartbroken Blessed Virgin, which a group of men are carrying on their shoulders. Smoke coils around them from flaming urns borne on poles. A band, its tubas swaying mournfully in response to the high note of the clarinets, plays *"Tutti Dobbiam Morire"*—Everyone Must Die." In the crowd lining the curbs, an old woman ticks over her rosary beads, and a young girl clutches a pink stuffed Easter bunny. The church bell tolls.

The city is Toronto, and if you have been sleeping (which is what most Americans do when the subject is Canada), you may be under the impression that it is a white-bread kind of town, largely Anglo-Saxon and Protestant. Indeed, a lot of people in Toronto were under that impression until recently, and they are typically bemused and delighted by the miraculous ethnic transformation that has taken place in their city during the past 25 years.

"I grew up when you went to Sunday school and dropped your pennies in the box for the missionaries to convert the pagans and the heathens," one older Torontonian told me. That was back before World War II, when the biggest parade in Toronto was the Orange Order's July celebration of Protestant supremacy. Then, in that agreeably noncommittal tone Canadians have perfected, he said, "Now the pagans and the heathens have moved in

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RICHARD CONNIFF has been a contributor to NATIONAL GEOGRAPHIC since his May 1991 article, "Chicago: Welcome to the Neighborhood." GERD LUDWIG photographed pollution in the former U.S.S.R. and Chornobyl for the August 1994 issue.

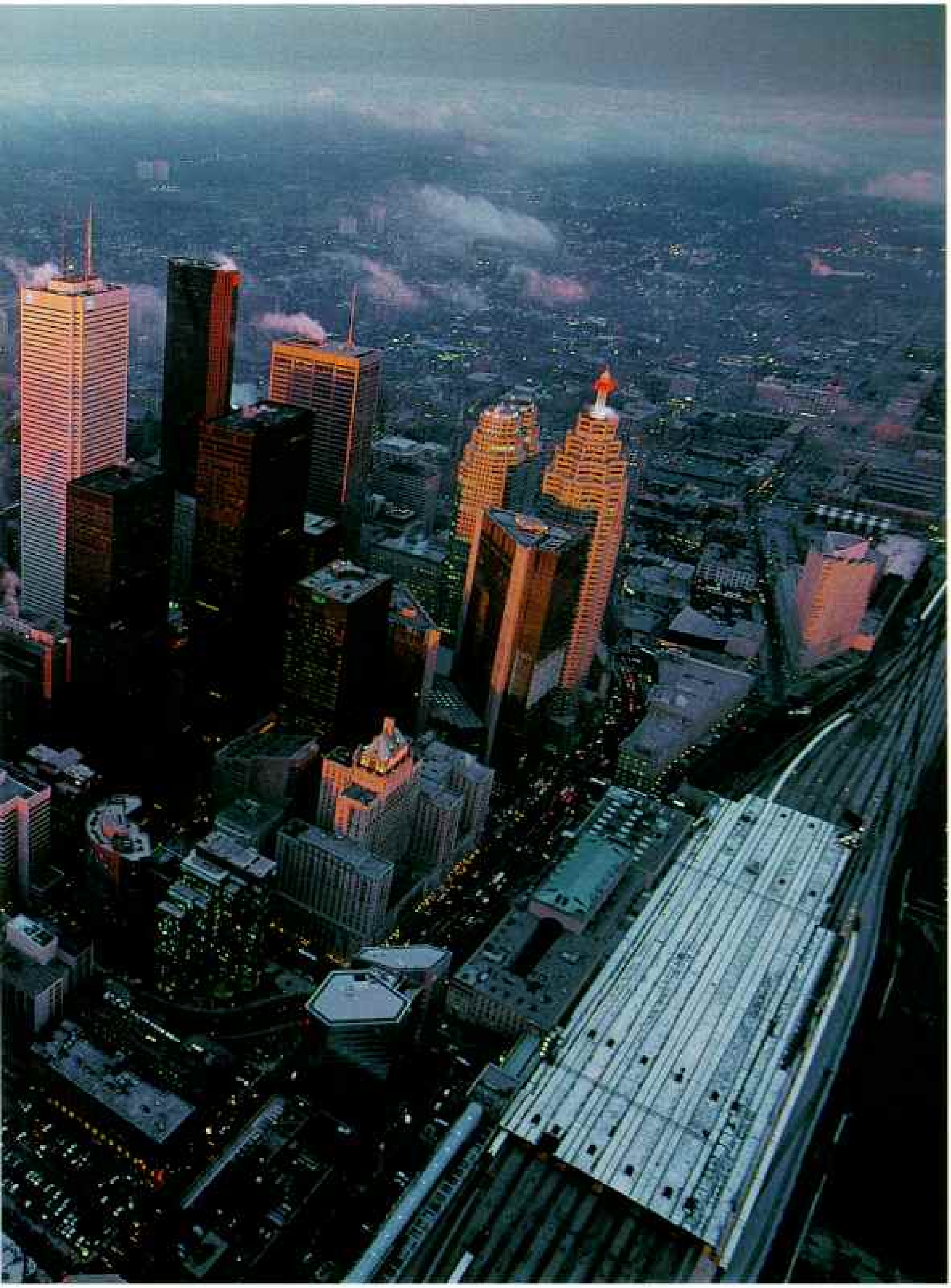
here, and they're quite nice people, eh?"

Not only have the Orangemen receded, but their children now boast that Toronto is the most ethnically and racially diverse city on earth. It has six Chinese newspapers. Its Caribbean community celebrates a huge two-week-long Mardi Gras-style festival (permanently scheduled in summer on account of weather). It has a radio station, CHIN, which broadcasts in 32 different languages. Asked which language is playing at the moment, the station's owner, Johnny Lombardi, looks at his watch: "It's 11:45 a.m. So . . . yeah, that's Croatian."

About a third of the 230,000 immigrants who arrive in Canada each year end up in the Toronto area. Refugees arrive in synchrony with the latest international nightmare—Tamils from Sri Lanka, Hutus from Rwanda, Chechens from the former Soviet Union. Not only have they turned out to be quite nice people, but they have also made Toronto an infinitely nicer city.

This is a miracle worth examining, particularly for U.S. cities, where being nice can pass for a character flaw and combativeness often prevails over ethnic accommodation. Like any city, Toronto has its problems. A lengthy recession has put new strains on the social fabric. Money for community programs has run short (which some citizens blame on the costs of settling new immigrants). There is tension

Touched by fading winter light, the towers of the financial district testify to Toronto's commercial dominance in Canada. Slowly recovering from an early 1990s recession, corporate Toronto may benefit as companies shy



away from separatist turmoil in rival Montreal. The 1989 Free Trade Agreement with the United States, while spurring exports, has sent some manufacturing jobs to Michigan, Illinois, and other states south of the border.

Laughs come easily at Ba-ba-lu's, a Latin tapas bar in the upscale Yorkville district. Such masters of antic humor as Dan Aykroyd and Jim Carrey polished their early routines in the city's club scene, and big punch lines are among Toronto's most visible—and risible—exports.

between downtown and the suburbs over how to share the tax burden fairly. But the streets are still clean, the subways punctual, and violent crime rare. (In 1995 Toronto had 2 murders per 100,000 people versus 65 for Washington, D.C.) Different ethnic groups and races mix congenially in a society structured on an old Anglo-Scottish ethos of order and propriety. The panhandlers, the strippers—and even the pale girl selling roses dipped in tar at a hip nightspot—are polite.

Toronto is a city striving to be simultaneously cosmopolitan and middlebrow, and it often succeeds. To promote a retirement fund, billboards in the bus stops and the shopping centers feature Oscar Wilde, looking urbane in his smoking jacket, beside what may be the least characteristic line he ever wrote: "It's better to have a permanent income than to be fascinating." Toronto tourism officials hand out a compendium of quotes about how boring their city used to be, including this assessment from a visitor in 1906: "Toronto makes a Sunday in a Scotch village seem like a hashish dream!" City residents are ostentatious about being dull, always confessing that they are a little too quiet, a shade too fussy, a bit too neat.

But Toronto also gets many of the flashier things right: Its baseball team, the Blue Jays, won the 1992 and 1993 World Series. Its theater community has developed into one of the liveliest in North America, and its television- and film-production capabilities, combined with the cheap Canadian dollar, have turned the city into Hollywood North. In Margaret Atwood, Michael Ondaatje, and the late Robertson Davies, Toronto has also produced some of the most powerful novelists in the English language. Former New Yorker Jane Jacobs, who wrote *The Death and Life of Great American Cities* and now lives in Toronto, once called it "the most hopeful and healthy city in North America."

For a typically quarrelsome American, all this is like having a happy family move in next door. It filled me with powerful admiration, a

From the boundaries of the city proper (beige), Toronto has spread into surrounding municipalities to become Canada's largest metropolitan area, population 4.5 million.

modicum of envy, and also a deep need to find out what this family's secret is.

WALKING DOWN QUEEN STREET one night, I caught a glimpse of the CN Tower, built by the Canadian National Railway in an un-Canadian fit of megalomania. I'd seen it by day; it is the tallest freestanding structure in the world—1,815 feet—and hard to miss. But its otherworldly appearance by night stopped me dead. It was veiled in rolling, diaphanous clouds, and its aircraft warning lights blinked in rhythmic alternation. Above the SkyPod, columns of light seemed to lift and fall through the clouds like water in a fountain. It was a vision out of a 1930s Buck Rogers comic book fantasy—a flying saucer speared on a minaret.

The tower was also wildly at odds with the low-key, commonsensical spirit of the city. Built ostensibly as a broadcast tower, its main function now is for tourism: The SkyPod is an excellent spot to see how down-to-earth the rest of the city has remained. Standing directly above the Lake Ontario shoreline, you can see 40 miles north to Lake Simcoe, and sometimes beyond that to Georgian Bay. Around the metropolitan area, where 4.5 million people live, high-rise towers sprout in unruly patches. It all comes together at the lakefront downtown in an architectural hodgepodge, one part redbrick Victorian, one part modernist office tower, one part science fiction fantasy. But the neighborhoods still predominate. All across the flat landscape, the streets are laid out like field crops, in long rows of tidy brick houses and tall shade trees.

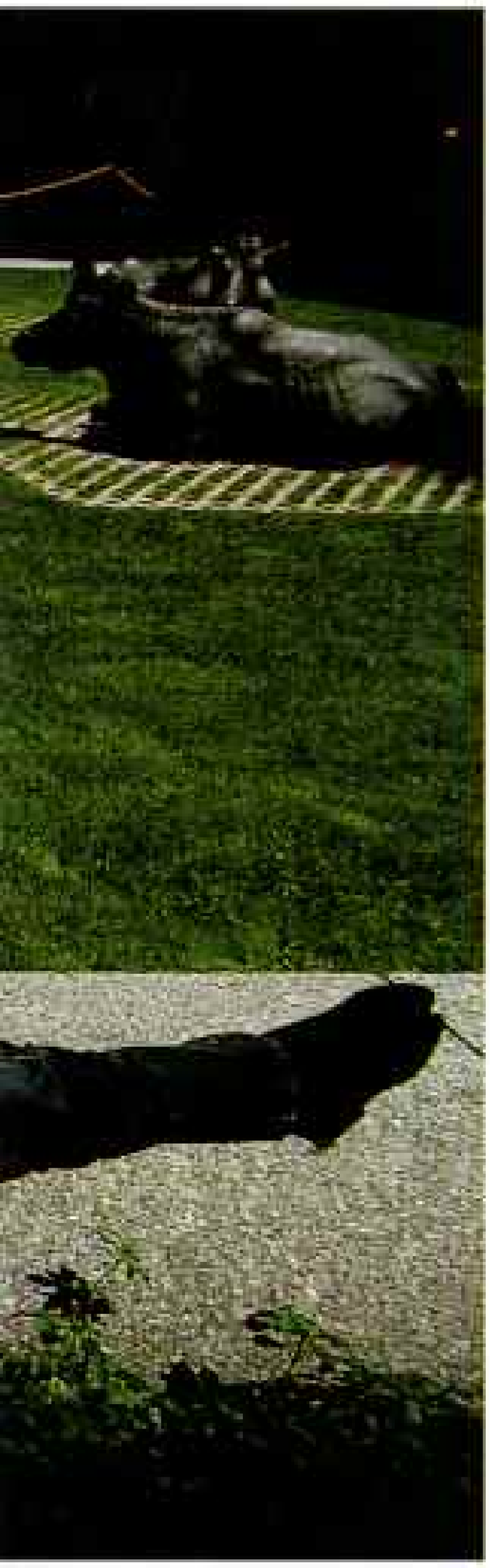
"It's quite an ugly city in its main thoroughfares," said John Fraser, a journalist who is now master at Massey College in the University of Toronto. The real charm of the city, he said, is that you can take a step or two off the raw thoroughfares, and instantly find yourself in comfortable little neighborhoods of neat houses huddled close together. We were driving through such a neighborhood, ferrying his

daughters in the family Volvo between skating rink and choir practice. At heart, he said, it is still a Presbyterian shopkeeper's city. "My mother used to say the houses were built so close together because everybody wants to keep an eye on everybody else." He pointed out a church, the Timothy Eaton Memorial, named not for a saint but for a local department store magnate. "The typical Canadian is self-deprecating," he said. "But actually we're quite smug about the place."

A RED-AND-WHITE STREETCAR sailed down Dundas Street with an almost stately grace: the dry steel-on-steel glide and rumble of the wheels, the pop of the air brakes, the ding-ding of the bell. Over the intersection, crisscrossing streetcar wires sliced the sky into neat diamonds.

On board, no particular color or ethnic group predominated, and something benign in the way people made eye contact gave me the feeling that no one would be so impolite as to impose their culture on anyone else. Since 1971 Canada has had a policy to encourage multiculturalism, and Canadians like to say their society is a mosaic, not a melting pot. The Italians got off the streetcar in one neighborhood, Vietnamese nearby, Chinese a few stops east. Each community is intact, a piece in the mosaic, each seeking a place in the national design. The perennial question in "polysyllabic, polymorphous, polymetropolitan" Toronto, as one resident calls it, is whether there is, in fact, any design.

I got off at the Dundas Street Chinatown stop, where the merchants sell shark cartilage, fresh taro root, and tall bundles of raw sugarcane on the sidewalks. Toronto's underlying orderliness was evident even here, amid the



Taking their ease with bronze bovines, sunbathers snooze near Bay Street, Toronto's counterpart to Wall Street.

Joe Fafard, creator of "The Pasture" and a self-styled populist sculptor, explains his work, installed in 1985: "Canada's wealth originates in the countryside," he says. "I wanted to remind stockbrokers what real stock is."

hectic buying and selling. The sidewalk stands all stay scrupulously within yellow painted lines marking the spaces where the shopkeepers are allowed to do business. (Even the musicians in the subway stations stay within yellow rectangles—and must audition to get a spot.)

David Ko, an entrepreneur who came here from Hong Kong in 1967, showed me the neighborhood. "Hong Kong is very busy," he said. "You have to walk very fast, talk very fast, work very fast, eat very fast, and time goes very fast. There's not much life in Toronto. People from Hong Kong don't like that. But they settle in Toronto because they want the better education, the low crime."

"Are you a Canadian?" I asked.

"I am a Canadian citizen," he replied.

"But in here?" I said, indicating his heart.

"My kids are Canadian. They eat at McDonald's. They like french fries, not rice."

"What does being Canadian mean to you?" I asked.

But the subject of being Canadian made Ko weave and dodge: He didn't know what it meant to be Canadian, except that it was like being American. Only safer.

"Great place! I love it," said Peter Tran, one of the Vietnamese boat people of the 1970s, a former professor of education who made a new life here as a busboy, then a restaurant owner, and now a counselor at a government facility called Ontario Welcome House, where he helps newcomers get settled. "Friendly. Prosperous. Democratic." Then he added, "And *safe!* Safe in many ways. No floods. No hurricanes. No crime. Well, there is crime, but not so serious."

It occurred to me that Toronto has remained law-abiding partly because so many newcomers, arriving from places like Vietnam in the 1970s and '80s, have seen how bad the world can get when order slips away into madness. Like Tran, they are also usually middle-class. Canadian immigration policy encourages what critics call designer immigrants.

Downstairs at Ontario Welcome House, an English teacher named Wayne Hayes was leading 30 or so newcomers through the intricacies of the conditional. On one chalkboard he wrote, "I will go to that expensive restaurant with you tomorrow." On the other, he added the crucial phrase, "if you pay." A student with a Tamil dictionary sat next to a classmate with a Serbian dictionary, who sat in turn beside Russian, French, and Cantonese classmates. Hayes moved on to the subtle differences among adjectives. "Your mother, of course, would be *supportive*. The clerk at Eaton's would be . . . what? Yes, *helpful*."

They were mostly in their 20s and 30s, educated, eager to learn. At home they had been doctors, engineers, lab technicians, teachers. Hayes asked them to describe their weekends.

"I went skating at Harbourfront," said one man.

"Did you fall down a few times? Do you remember the word 'embarrassed'?"

"I watched the hockey game on TV," said another. "I went to church with my wife." "I went to the park with my kids."

Afterward, Hayes and I talked about rules. "Canadians," he said, "appreciate order, and we are willing to sacrifice certain freedoms to have that order. So we don't carry handguns. We readily give this up. Canadians

believe in lining up. You wait your turn, whether it's for a movie or a bank teller."

The rules, particularly those governing admission to the professions, often frustrate his students. "I once had a dream that I was in my class," Hayes said, "and all the students around me were aging at an incredible rate. I was thinking of these doctors who dream of practicing medicine again, and they may never get to do that.

"It can be grim. But they have often come from places that are grimmer. You can see it in their faces sometimes. They get this glaze in their eyes, and you can tell they're remembering something you hope you never, never see."

I HAD AN IDEA—possibly brought on by thoughts of unimaginable violence—that hockey might be the unifying force drawing these ethnic groups together. Canadians like to think they invented the sport, and it figures prominently in the endless debate over Canada's national identity. I'd seen a film called *Masala*, by an Indian immigrant, in which Lord Krishna, "the most wily and mysterious of the gods," appears in the uniform of the Toronto Maple Leafs and performs miracles (winning the Stanley Cup not among them). To an outsider, hockey often seems to be the one place where Canadians unleash anarchic impulses, which might explain why they love it to such uncharacteristic excess.

In a cavernous skating rink in Scarborough, I found a hockey dad shivering in the stands. Carl Chan, a nuclear engineer, had come from China to go to school in Winnipeg. "Great place to be!" he said, raising his clenched fist in a mock hurrah for Winnipeg. "Minus 40. Fahrenheit or Celsius. Doesn't matter which." I asked if the game reinforced his 13-year-old son's sense of being Canadian. "I don't think he thinks about being Canadian," Chan said. "He's just having fun out there."

What the kids were mostly thinking about was the blue line. Then I got diverted by a stocky 15-year-old girl suited up in goalie gear. Her name was Reyelle McKeever, though the back of her shirt, inherited from a past player, said it was Penthouse. No one seemed to kid her about the name. She plays in both girls and boys leagues and told me the girls are rougher.

"I got suspended 11 games for beating up the referee," she said. "She put me in a choke hold. So I hit her in the face, mostly." She smiled, sweetly. "Off the ice, I'm really soft."

MAYBE IT DOESN'T REALLY MATTER whether the city has an identity a newcomer can put a finger on. The real miracle of Toronto might be that the "most hopeful and healthy city in North America" emerged almost by inadvertence, while people were looking elsewhere.

Its cultural roots are mainly in foreign soil, and not just the obvious new immigrant ties. Its theaters and hospitals bear the names of British royalty, and its deep colonial ties to the British Empire would be enough to weaken any city's sense of self. But Toronto has also been colonized by American pop culture.

I went to visit Ken Thomson, a Toronto man with feet in both foreign cultures. The Thomson Corporation owns more than a hundred newspapers in Canada and the United States, and a travel business in Great Britain. It is one of the largest media companies in the

Reality's on the right as a shopwindow duplicates Front Street, a boulevard that marked the shore of Lake Ontario until land reclamation put several blocks between them.

Only the chill is real (top) at one of the film industry's frequent on-location shoots. Long prized by Hollywood for its gift of urban mimicry—not to mention Canada's favorable exchange rate—the clean streets of Toronto regularly play the mean streets south of the border. Add a taxi and a swirl of potato flakes, and presto: Manhattan in winter.

Revelers await their moment to parade at the Caribana Festival, a Mardi Gras-like celebration held in warm midsummer rather than the cold pre-Lenten season. The city succumbs to rule-relaxing rhythms, exchanging winter gray for a sensuous splash of hot Caribbean colors.

world, and Lord Thomson of Fleet ranks among the world's richest individuals. He is also the world's least likely press baron.

Thomson's office occupies half the top floor of the office tower that bears his name. "It's a mess," he apologized, three times during the course of a half-hour talk. The mess was in fact an extraordinary collection of paintings, sculptures, miniatures, and ship models, filling three large rooms.

Thomson is a lean, handsome man in his early 70s, with steely gray hair, white sideburns, and arched brows over pouched blue eyes. Among other quirks, he is embarrassed to have his picture taken. "I wish I were sort of flippant and could relax. Usually I tighten up." He also prizes anonymity: He once told a photographer that he liked being able to pop over to the department store across the street, to buy socks when they were on sale. At the time, he happened to be the owner of the store.

In publishing Thomson has made a reputation for a relentless focus on the bottom line. In his personal life too, he said, spending for its own sake was "almost a sacrilege." But he will spend almost any amount on art. This passion has made him the guardian of Toronto's one homegrown mythology.

"I'll phone them and tell them you're coming so you don't have to pay two dollars to get in," Thomson said. Then he dialed the Thomson Gallery, across the street from his office, which features Toronto's most famous artists, the so-called Group of Seven, whose work shaped Canadian identity in the 1920s and '30s. "They painted scenes very broadly," Thomson said. "They went out into the wilderness and confronted nature directly."

Their canvases were, in truth, mythic: tumultuous, unpopulated northern landscapes. Light shone from the bare trunks of burned trees next to Georgian Bay. Unseen witches stirred clouds across the sky. But it struck me that the paintings almost never depicted Toronto, where most of the artists actually lived. The homegrown mythology, which

Under a hot August sun, Portuguese families reaffirm spiritual ties to their homeland at the feast of *Senhor da Pedra*, which honors the suffering Christ. Since the 1950s the Portuguese community has swelled to 141,000, one of the largest in North America.

remains close to the city's heart, is about going someplace else, escaping each summer to "cottage country" and the wild north.

"There's a perverse kind of refusal to accept the here and now in Canada," a 30-year-old filmmaker named Srinivas Krishna complained. "There's an allegiance to the elsewhere." Krishna's accent and attitude were thoroughly North American, though he was born in India to a wealthy family. Cultural confusion was the subject of his first feature, *Masala*, and also of the film he'd just finished shooting, about a Vietnamese counter girl at a Toronto department store. Canada did not tell its newcomers where they fit in or what they were to become, and this void made him scowl at his omelette and home fries. "There's no narrative to this country," he said.

But I was beginning to think that might just be the secret to Toronto's strength.

I went to visit 56-year-old Ernst Zundel, one of the leading neo-Nazi propagandists in the world. Zundel, an immigrant from Germany, lives in a gentrified Toronto neighborhood on a street with Caribbean, Mexican, Italian, Chinese, and Spanish restaurants. His house was crammed with too much narrative, in the form of the books and videotapes he sells, with titles like *Did Six Million Really Die?*

"Canadians deserve all the problems that are coming with immigration," he said. I asked him what problems, and he mentioned drive-by shootings, rapes, robberies. Which immigrants did he blame? "Blacks," he said. "I'm objecting to allowing hordes of racially unabsorbable populations to invade the living space of a specific race."

But if it was easy to dismiss Zundel, it was also easy to detect a developing racial tension beneath the city's genteel surface. Other Torontonians spoke euphemistically, but with unmistakable edginess, about how the population of 241,000 blacks, mainly Caribbean immigrants, is fitting in.

Many blacks told me that job discrimination and police harassment are routine. "You

hear the phrase 'Canadian experience,' " said Clifton Joseph, an Antigua-born performance poet. " 'Yes, yes, you're a doctor, but you don't have Canadian experience.' " Young males particularly have begun to reject Canada's orderly ethos, he said, because it is not working for them. The danger, he suggested, was that both whites and blacks are learning, by way of the nightly news, to fall into the racially polarized attitudes of the United States.

But I didn't believe Toronto would ever go to U.S. extremes. A newspaper columnist, trying to make sense of Canada for me, remarked, "Our goal is not life, liberty, and the pursuit of happiness; it's peace, order, and good government. Our history is a story of people trying to settle things in a nice way."

Echoes of a quiet past, the Bell Tower at Old City Hall and the angelic War Memorial (above) coexist with steel and glass. The Galleria at BCE Place (opposite) offers sleek weatherproofing in a downtown increasingly protected from the climate. Beneath the lighted walkway sprawls an underground city, six miles of tunnels connecting public transit, hotels, shopping, and restaurants.

"IT USED TO BE CALLED Toronto the Good," a community organizer told me. "I know that sounds boring." According to the latest research, its very name derives from a Mohawk word meaning "stick in the mud." (Well, OK, it's actually "poles in the water," a reference to an old fish weir in the vicinity.)

But there is much to be said for the city's mature point of view. Toronto concentrates its energy on getting the essentials right: good schools, safe neighborhoods, a strong network of social support programs for everybody. Then it leaves people alone to become what they wish.

"Choose your own definition," an urban planner in Toronto advised his colleagues at a conference. "A city is a place where you can encounter strangers with equanimity, enjoy perversion in anonymity, find community without claustrophobia, understand that eating, drinking, and talking well are the best revenge. Most of our recent immigrants know instinctively how to enjoy city life, and happily the vast liberal middle class still living in the central city has never forgotten."

It was an admirably tolerant outlook, and so I wandered around the city delighting, like all the other newcomers, in its variety. At the Ontario Science Centre, I watched an Orthodox Jew in his grizzled beard and black beaver hat clamber into the bobsled simulator with his daughter. In the SkyPod at the CN Tower a Sikh in a white turban sprawled out on the glass floor, to be photographed as if fluttering in midair above the city. In the day-care room at Ontario Welcome House, a girl babbled Russian to a boy who babbled back in Tamil. Then they both laughed.

Downtown, in the thriving shopping corridors underneath the financial district, I found a lunch place and sat down to read the newspapers. In one paper there were brokered marriage proposals: "Punjabi Khatri Hindu/Kayasta parents seek suitable match for their beautiful daughter, Canadian born . . . doing Master's in Education."

In the personal ads of another paper a woman sought a husband in verse: "I'm physically active and told I'm attractive. My blue eyes and brown hair are pretty. Financially free,

Kids scoot across the glass observation deck at the CN Tower, tallest freestanding structure in the world, oblivious to the major-league Blue Jays turning double plays on the SkyDome infield 1,122 feet below.

"The glass floor will support 14 hippopotamuses," guide Rochelle Strauss assures children—a sum fainthearted parents may well judge to be a few hippos short of a sure thing.

Viewed from the parkland of the Toronto Islands, the city's skyline, with its soaring CN Tower, seems a model of urban vision. Toronto is trying to learn—not without struggle—to live its own dream of vibrant cultures without violent clash.

I'm BA, LLB and practicing law in the city."

The here and now that city residents choose is typically a private one. The narrative is all about families, neighborhoods, and ethnic groups. Toronto accommodates all of it unflappably, content to get on with its business and let other people get on with theirs. A businessman told me a story about Toronto's knack for adapting, even in the face of an intruder as outlandish as the CN Tower: When the tower was first opened, crews were removing plywood from the observation deck, and one sheet broke loose. As they watched, horrified, it tumbled down toward the busy streets. In any U.S. city innocent pedestrians would be flattened, passersby would succumb to a deadly vapor cloud of spruce shards and resins, and lawyers would sort the whole thing out in court over the next millennium. All good narrative for the evening news. But this was Toronto. "The plywood came down right in the middle of King Street, in front of the theater. A station wagon was coming along. The guy stopped, got out, put the plywood in the back of his car, and drove off with it. We never found out who he was."

I'D HEARD that the Toronto Islands are the spiritual heart of the city, so I went out near the end of my stay for a visit. An archipelago a mile or so off the downtown waterfront, the islands are home to about 700 residents, a congenial crowd of artists, schoolteachers, and aging social activists. They live in modest little cottages close together, which have evolved from the summer tents and bungalows of early vacationers. There are no private cars and few shops on the islands.

I was visiting a plumbing contractor and gas fitter named Bruce Smith, formerly a geologist, now a part-time artist. Smith piled one of his steel sculptures, a flying toad, onto a wagon, along with wrenches and a tank of propane gas, then threw himself into a harness to haul it through the snow down to the beach of Ward's Island. Small toads, he said, overrun the islands each spring, and monarch butterflies sometimes descend in clouds in the course of their migration. The flying toad was a combination of the two, and a symbol of the island community's irrepressible nature.

The Toronto Islands are mostly public parkland, and in 1956 civic authorities decided to evict the human population, which had grown up on short-term leases. Bulldozers flattened 600 buildings. But when the sheriff came to evict the last enclave, the residents sounded the World War II siren atop the clubhouse and rushed out en masse to block him, herding their children in front. For many people in Toronto, their successful resistance became a primer on how neighborhoods can stand up against bigness, authority, and

conventional urban planning. "Even though you are outnumbered," said one island resident, "the good little things can survive in the big bad city."

It was late afternoon when Smith planted his flying toad at the water's edge. At the horizon the colorless, end-of-day winter sky blended seamlessly into the lake. He lit a kerosene-soaked rag at the end of a stick and held it up to the sculpture, which had begun to hiss with propane. Jets of blue heat burst from the toad's eyes, and an arabesque of gentle yellow flames danced across the wings. Smith stood close, and the soft glow spread across his face and out into the shallows of the lake.

Back in the heart of the island, children were playing street hockey in the dark. Smith's son René slapped a shot at the goalie, who made a diving save, skidding on his pads across the sidewalk.

The night sky was split in half, dark as ink on the lake side, and on the city side a luminous skyscraper green. Toronto is vague like that—a city dreaming of the unsettled north yet as urban as Manhattan, never entirely one thing or the other, always a good place to call home.

Icicles hung from the eaves of the roofs and magnified the warm yellow light emanating from each house, where a parent or two was getting supper started in the kitchen. I listened to the children playing and felt any moment now someone would call us in to dinner. □

FLASHBACK

HANS HILDENBRAND

AIPS NEWS

■ FROM THE GEOGRAPHIC ARCHIVES

Bosnia's Lost Bridge

This fairy-tale view of Mostar (above) ended in nightmare. Stari Most bridge, spanning the Neretva River and linking the city's ethnic quarters, was built in 1566 by Süleyman the Magnificent. The bridge also joined Muslims, Croats, and Serbs in a centuries-old diving competition, a local rite of passage. The stone structure withstood earthquakes, floods, and warfare—until November 1993, when Croatian shelling destroyed it. Muslim divers reclaimed the ruins (left) in July 1994 during a cease-fire. But authorities, fearing Serb attack, banned the contest in 1995. This Autochrome was made for, but not published in, our January 1928 article on Yugoslavia's Dalmatian coast.

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to its comfortable ride, to its powerful line of Magnum® engines.

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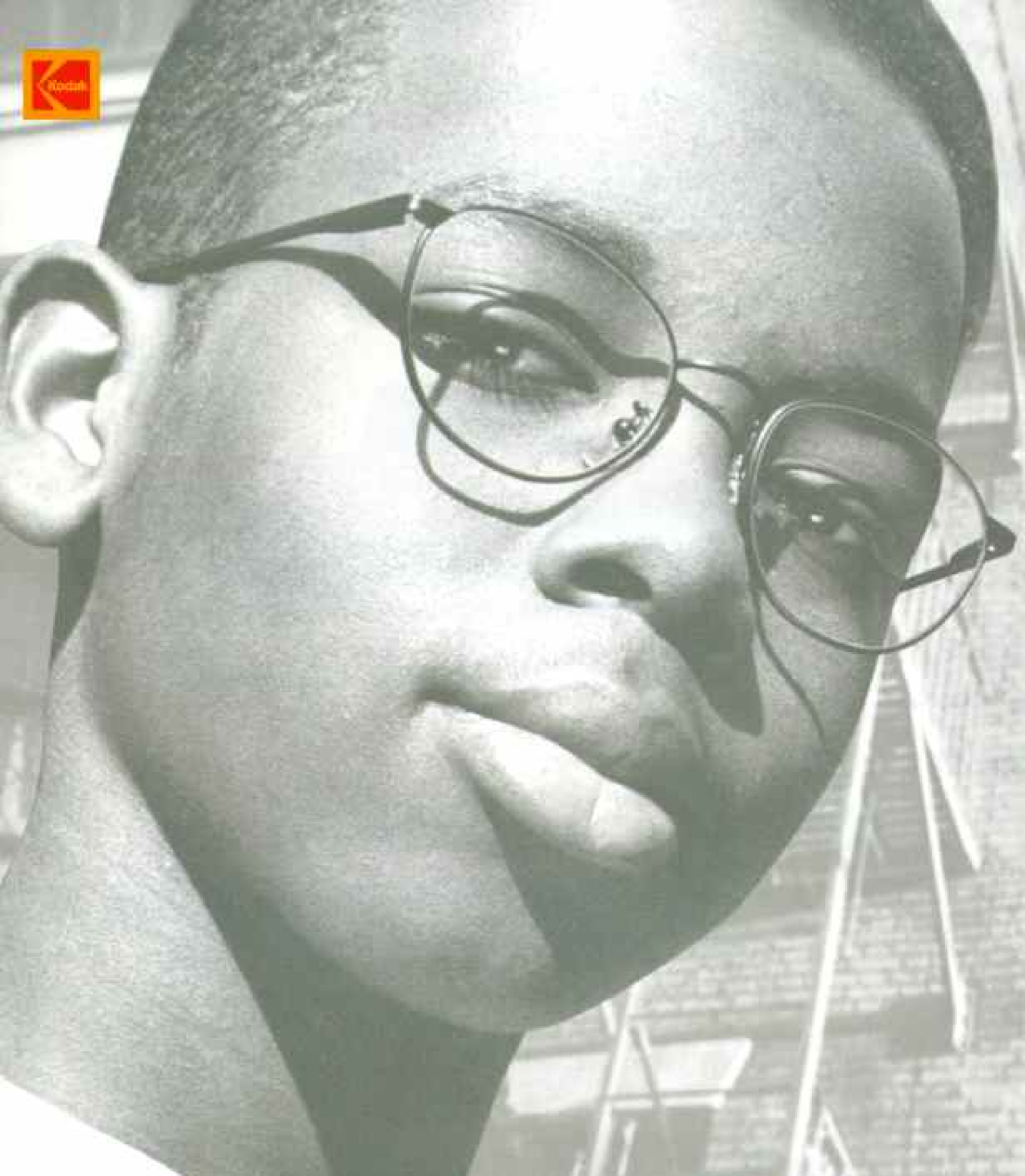

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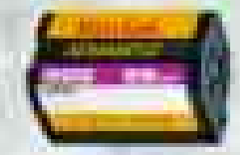
A new kind of film  for a new kind of camera 

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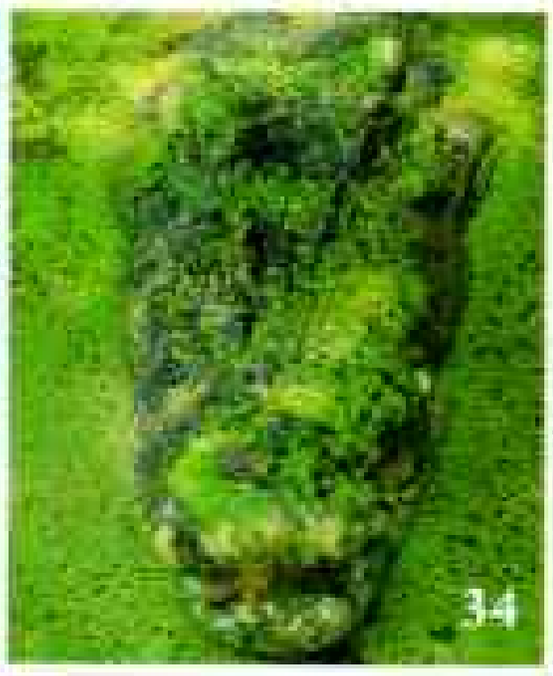
NATIONAL GEOGRAPHIC

JUNE 1996



The Cover

Veiled by mud and mystery, an Aboriginal youth escapes the tropical heat of Australia's Cape York Peninsula. Photograph by Sam Abell

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Behind the Scenes

C. BRUCE FORSTER

Dinosaurs in the Dark

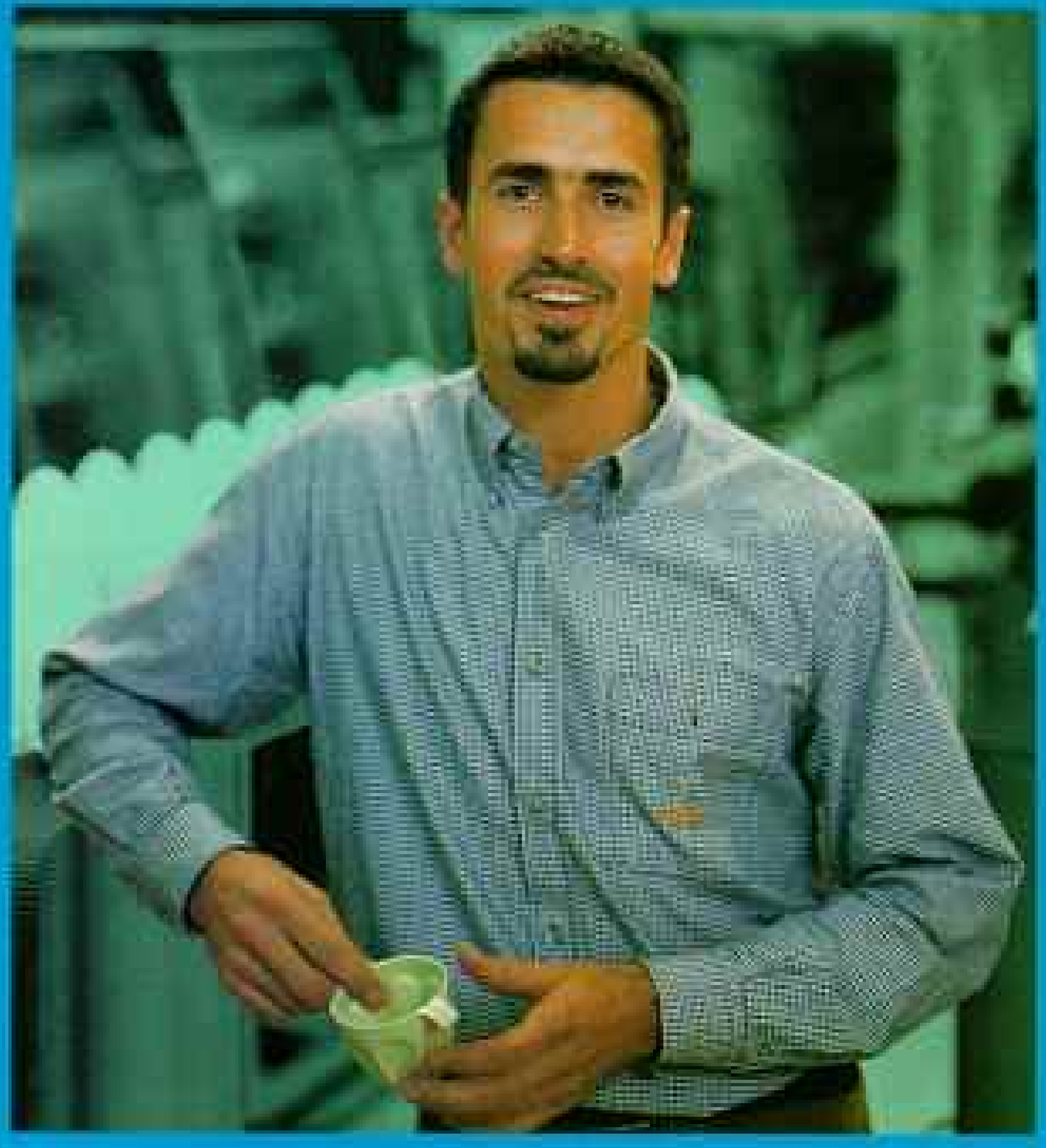
WHEN 75-MILE-AN-HOUR winds ripped through Salem, Oregon, last December, they toppled a tree over artist Mark Hallett's barn, smashed debris into his nearby studio, and caused a three-day power outage. But Mark had two paintings to finish for the African dinosaurs story, and losing electricity wouldn't stop him.

"Coleman lanterns lent a nice glow," he says of his emergency lighting, "but it was hard gauging colors at night." The paintings arrived on schedule.

Hail to the NGS Chief

AFTER 42 YEARS at the Society—the past 16 as President—Gilbert M. Grosvenor, at left, retired last month. He looks forward to sailing and woodworking, he says, though he will remain Chairman of the Board of Trustees and the Education Foundation. Succeeding Gil is Executive Vice President Reg Murphy, who came to the Society in 1993. Former publisher of the Baltimore *Sun* and the *San Francisco Examiner*, Georgia-born Reg also recently served as president of the U.S. Golf Association. "I didn't have anything to do with making this Society great," says Reg, "but I have everything to do with keeping it that way."

Good engineering should advertise itself with good design.



Let's make things better.

Elmar Zankl, Work-preparer, Plastic-techno Domestic Appliances Plant Klagenfurt, Austria.

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My name is Elmar Zankl, a work-preparer in the Domestic Appliances Plant, Klagenfurt.

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Our design now is to surpass them.

PHILIPS

MAGIC GRIFFITHS BELT

■ FAVORITE PLACES

Baja California

"BAJA IS AS GOOD as it gets," says Assistant Editor Don Belt. When he and his new wife, photographer Annie Griffiths Belt, were gathering material for their December 1989 article, she recorded him helping a local family cart firewood. "The peninsula is mostly wilderness: no motels, no restaurants, no people," he says. "We camped in our truck. It was bliss."

Yesterday's News

THE BURGESS SHALE quarry in British Columbia yielded unexpected finds for Society grantee Desmond Collins. Excavating for fossils, the Royal Ontario Museum paleontologist found a frozen layer of debris including tin cans, miners' tools, and newspapers (right) featuring exploits of Teddy Roosevelt and Pancho Villa. The items were left during earlier excavations by Charles D. Walcott, then head of the Smithsonian Institution. "We brought the newspapers back to the Royal Ontario," says Desmond—as fossils of a different sort.

BRIAN BOYLE

Hop to It

THESE ORPHANED WALLABIES have no trouble living out of a suitcase. Senior writer Cathy Newman gave this souvenir tote bag to Martin Coetzee and Julia Young, a couple she visited in the northern Australia town of Aurukun while working on this issue's Cape York Peninsula story. When staff photographer Sam Abell passed through a few months later, he found that the wallabies—rescued by Martin after their mothers were taken for food by Aborigines—had found the canvas "pouch" to their liking. Martin and Julia plan to bottle-feed six-week-old Kali and ten-week-old Pookie until they are a year old. Then they will be released into the wild.

—MAGGIE ZACKOWITZ

SAM ABELL, NGS

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In This Class, History Isn't Measured In Years, But In Volumes.

Not content to have her students read about history, Penny Ferguson set about showing her students how to write it. Over a three-year period, her 11th-grade English classes researched, located old photos for, wrote, and published a three-volume history of their county. The students sold the books throughout the community to commemorate the bicentennial of their state.

Perhaps the most rewarding aspect of the project was the interaction that took place between the students and local history experts with whom they consulted.

"Many of these experts were over the age of seventy," remembers Ferguson, "and what great respect and awe they generated from the students with the wisdom and the knowledge they had to share."

For teaching how an appreciation for history and the written word can unite generations, State Farm is pleased to present the Good Neighbor Award to Dr. Penny Ferguson, along with $5,000 in her name to Maryville High School in Maryville, Tennessee.

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Forum

Irian Jaya

As I read the February 1996 articles on this province of Indonesia, I was happy to think that there was still some place so remote and untouched that the people lived in trees and rarely came into contact with the "outside." Any illusions I had quickly dissolved when I reached the picture of the Freeport-McMoRan geologists descending from a helicopter to conduct surveys. Perhaps the world isn't such a big place after all.

MATTHEW BEEKHUIZEN
Miami, Florida

Living in the central highlands with two tribal groups, the Ngalum and the Dani, from 1962 to 1975, my missionary family and I were, as your article mentions, interested in "saving souls." However, we also built the largest hospital in the interior (Mulia) and operated successful animal husbandry, agricultural, literacy, translation, and school programs, which benefited the tribal groups. Most of the foreign missionaries are gone today, but the work they did from the mid-1950s onward will live on in hospitals, clinics, schools, translations, churches, and educated nationals.

WILLIAM R. CARNE
Sun City, California

When will Westerners ever cease to condemn indigenous peoples with the cliché that they are "emerging from the Stone Age"? It's time we abandon the notion of an evolutionary hierarchy with Western industrial civilization deemed to be in an advanced state while tribal peoples are somehow lacking. The Dani and Asmat, like the Yupik in Alaska, possess highly sophisticated cultures. It doesn't require any extra intelligence to adopt Western tools. The Yupik are still hunters and gatherers, but they roam their domain on Ski-Doo and Arctic Cat instead of dogsled. I doubt that the indigenous Irianese are any more or less timeless.

ANTHONY CAOLE
Quinhagak, Alaska

I congratulate Thomas O'Neill on his excellent portrayal of the Irian Jaya people. It was a fresh reminder of the struggles some people go through every day to keep their traditions alive while fighting off modernization.

BRUNO GALLANT
Moncton, New Brunswick

While I was in Papua New Guinea in fall 1995, I learned that Papuans are convinced that the Indonesian government intends to strip the western half of the island of resources and that the indigenous peoples and cultures will be drowned beneath a tidal wave of imported Javanese. Their helplessness in the face of world indifference to this situation mirrors that of the East Timorese.

ALAN DEAN FOSTER
Prescott, Arizona

Indonesia Map

I know of the extreme care you take in examining each issue for errors. In portraying East Timor [as part of Indonesia], I believe you committed an error. This territory was once a Portuguese colony. In 1975, during decolonization, it was invaded by Indonesian forces, and it remains an occupied territory today. Culturally, the Roman Catholic Maubere people do not fit in with the rest of Indonesia. Furthermore, the United Nations does not recognize East Timor as Indonesian territory. You usually add a map note, generally in red, when there is a geopolitical conflict. You did just that on this map concerning the Spratly Islands. Why not a similar comment about East Timor? It is still an open conflict; nothing has yet been decided.

SERGIO CARDOSO
Almada, Portugal

Indonesia annexed the area in 1976; in keeping with our cartographic policy the map reflects the de facto political situation.

Tex-Mex Border

Congratulations to Richard Conniff for capturing the socioeconomic crisis of clashing cultures. Not many commentaries about the NAFTA agreement even attempt to point out the ambiguities of an "agreement" that largely remains silent about the lack of a social contract for the Mexican worker.

MIGUEL PARMANTIE
Madrid, Spain

The article does not mention the people who lost jobs to the *maquiladoras*. I worked for a German-owned factory in Niagara Falls 12 years ago; it employed U.S. workers, many of whom were one paycheck from being on welfare. Two years ago, shortly after NAFTA was signed, my former employer got its last tax abatement from New York State, packed up, and moved its last product line to Reynosa, Mexico. It gives the Mexican girls two hot meals a day, free bus transportation, and $30 a week. If they make their assembly quota, they are given candy bars.

SUSAN R. WILKE
North Tonawanda, New York

I live in the lower Rio Grande Valley—the last 150 miles before the river empties into the Gulf. It is nice to see an article that balances the bad about the area with the abundant good here. I would add that the area was sparsely settled ranchland until the possibilities of irrigated agriculture brought farmers, many from the Midwest, early in this century. The influx of new energy and ideas makes the area extremely dynamic. By the way, the cotton grown here is not pima but short-fiber upland cotton.

SARAH LINGLE
McAllen, Texas

I want my own place...
a place where I can't be reached.
I want to be "Off Duty."
I want to call a "Time Out."
I want a mute button... for reality.
I want to put the world on hold and tell it...
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The middle and higher classes who live south of the border bring millions of dollars to their bank accounts in Laredo, McAllen, Del Rio, and Brownsville. This is a big problem for Mexico. I live now in Germany, but I miss Monterrey and McAllen. And I just learned a new Spanish verb: *macallear*, which means to go shopping in McAllen, a hobby for all of us south of the border.

PATRICIA HERRMANNSDÖRFER
Bamberg, Germany

Our Polluted Runoff

As a family member of property owners at Torch Lake, featured in your article, I have witnessed the demise of this once pristine lake. The problem of polluted runoff is compounded by the effects of polluted "run in." On any summer weekend hundreds of powerboats enter the lake via public access ramps. There are no readily accessible toilet facilities. I have seen dirty diapers floating in the popular sandbar area. If residents continue to stick their heads in the sand regarding water quality, that sand will be murky gray and slippery. What a waste.

CELESTE A. POLLEY
West Simsbury, Connecticut

I want to inform you of the 232 new homes being planned for the Mitchell Creek watershed (pages 112-13). If efforts to protect rivers and streams were sincere, Garfield and East Bay Townships would not be allowed to let development occur in our wetlands.

NANCY G. FRYE
Traverse City, Michigan

Your article was very informative except for the drawing of a timber-harvested watershed with eroded soil that implied this scene was common. In fact, where soil is disturbed by logging, most areas revegetate rapidly through natural seeding or are planted back in trees. Most states have laws to deal with excessive sedimentation. Voluntary compliance with "best management practices" by private landowners in my state exceeds 90 percent.

JOHN R. HELMS
Columbia, South Carolina

We hope that the article will expedite the interest of our local governments and development groups in controlling the poorly managed growth here and throughout the country. The article paints a grand picture of an ugly situation; the picture should be titled "The Wake-up Call."

DAN and TINA LANTIS
Fife Lake, Michigan

Thailand

You mention Thailand's logging ban, enacted in 1989. Instead of serving tourists (pages 102-103), many elephant keepers have commenced logging in neighboring countries. Deforestation rates have increased in nations bordering Thailand as a result of its ban. Perhaps Thailand will have a domino effect in spreading logging bans to all the world's rain forest countries.

MIKE LAPETINA
Menands, New York

National Geographic, June 1996

Palila (*Loxioides bailleui*) **Size:** Length 15 cm **Weight:** Approx. 37 g **Habitat:** Subalpine mamane and mamane-naio woodland on Mauna Kea, Hawaii, USA **Surviving number:** Estimated at 2,500 Photographed by Jack Jeffrey

WILDLIFE AS CANON SEES IT

A palila grasps a green seed pod, snipped with its finch-like bill from clusters hanging on a mamane tree. This Hawaiian honeycreeper occupies a specialized ecological niche on the upper slopes of Mauna Kea, where it fully relies on the dry, open mamane woodland for its staple food as well as favored nest sites. In 1892 the palila was described as being numerous within the mamane region, but today, due to habitat loss from introduced livestock, less than 10% of its former range remains. With the palila's biology so closely linked to the mamane ecosystem, habitat protection is a key factor for ensuring this species' survival. As a global corporation committed to social and environmental concerns, we join in worldwide efforts to promote greater awareness of endangered species for the benefit of future generations.

Times, politics, and technologies may change but not traffic jams. The photograph of Bangkok's "clotted horror" (page 92) sent me through 23 years of back issues to a remarkably similar photograph of the city with the caption "Traffic without end" (July 1973, page 103).

WARREN H. FRISKE
Canoga Park, California

Into the Heart of Glaciers

Your article was fascinating and educational. It taught me, a sixth grader, many things I didn't know about caves and glaciers, such as how stalactites form. Articles like these get kids interested in the world around them.

JENNA CLEGG
Gentry, Arizona

In Focus: Caucasus

You refer to Armenians in Nagorno-Karabakh (NK) as "rebels." But under the Soviets NK was an autonomous oblast within Azerbaijan, which gave it certain rights, including some self-rule. In February 1988 the people of NK voted to remove themselves from Azerbaijani administration and place themselves under the administration of Armenia. The Azerbaijani response was vicious, and 500,000 Armenians were forced to leave Azerbaijan. Azerbaijan attacked NK, beginning a seven-year war still unresolved but into its 20th month of a cease-fire. On June 1, 1991, NK declared itself independent. There was little choice.

WILLIAM MESROBIAN
Natick, Massachusetts

Armenians still use the name Stepanakert for the capital of the territory of Nagorno-Karabakh, not Xankandi as indicated on your maps. In recent years Azerbaijan has been renaming Armenian places in the territory in an effort to deny the Armenian identity of Karabakh.

ALEX ZEYTOUNIAN
South Croydon, Surrey, England

Author Mike Edwards suggests that the ethnic conflicts make it difficult for Russia to control the region, but my Georgian friends there tell me the ethnic conflicts are precisely Russia's means of controlling the region. They insist there would be no armed conflict without Russian intervention.

GLENN KNICKERBOCKER
Marlboro, New York

Only by understanding the complexities of religion, language, and topography can we understand the problems of Bosnia or Kashmir or Rwanda. Please continue these short and informative articles as often as possible.

DAVID TOWNSEND
Victoria, British Columbia

Letters for FORUM *should be sent to National Geographic Magazine, Box 37448, Washington, D.C. 20013-7448, or by fax to 202-828-5460, or via the Internet to ngsforum@nationalgeographic.com. Include name, address, and daytime telephone. Letters may be edited for clarity and space.*

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Table 1. Adverse Experiences Reported in Placebo-Controlled United States ZYRTEC Trials (Maximum Dose of 10 mg) at Rates of 2% or Greater (Percent Incidence)

Adverse Experience	ZYRTEC (N=2034)	Placebo (N=1612)
Somnolence	13.7	6.3
Fatigue	5.9	2.6
Dry Mouth	5.0	2.3
Pharyngitis	2.0	1.9
Dizziness	2.0	1.2

Due caution should be exercised when driving a car or operating potentially dangerous machinery.

In addition, headache and nausea occurred in more than 2% of the patients, but were more common in placebo patients. The following events were observed infrequently (less than 2%) in 3982 patients who received ZYRTEC in U.S. trials, including an open study of six months duration; a causal relationship with ZYRTEC administration has not been established. **Autonomic Nervous System:** anorexia, urinary retention, flushing, increased salivation. **Cardiovascular:** palpitation, tachycardia, hypertension, cardiac failure. **Central and Peripheral Nervous Systems:** paresthesia, confusion, hyperkinesia, hypertonia, migraine, tremor, vertigo, leg cramps, ataxia, dysphonia, abnormal coordination, hyperesthesia, hypoesthesia, myelitis, paralysis, ptosis, twitching, visual field defect. **Gastrointestinal:** increased appetite, dyspepsia, abdominal pain, diarrhea, flatulence, constipation, vomiting, ulcerative stomatitis, aggravated tooth caries, stomatitis, tongue discoloration, tongue edema, gastritis, rectal hemorrhage, hemorrhoids, melena, abnormal hepatic function. **Genitourinary:** polyuria, urinary tract infection, cystitis, dysuria, hematuria. **Hearing and Vestibular:** earache, tinnitus, deafness, ototoxicity. **Metabolic/Nutritional:** thirst, dehydration, diabetes mellitus. **Musculoskeletal:** myalgia, arthralgia, arthrosis, arthritis, muscle weakness. **Psychiatric:** insomnia, nervousness, depression, emotional lability, impaired concentration, anxiety, depersonalization, paroniria, abnormal thinking, agitation, amnesia, decreased libido, euphoria. **Respiratory System:** epistaxis, rhinitis, coughing, bronchospasm, dyspnea, upper respiratory tract infection, hyperventilation, sinusitis, increased sputum, bronchitis, pneumonia. **Reproductive:** dysmenorrhea, female breast pain, intermenstrual bleeding, leukorrhea, menorrhagia, vaginitis. **Reticuloendothelial:** lymphadenopathy. **Skin:** pruritus, rash, dry skin, urticaria, acne, dermatitis, erythematous rash, increased sweating, alopecia, angioedema, furunculosis, bullous eruption, eczema, hyperkeratosis, hypertrichosis, photosensitivity reaction, photosensitivity toxic reaction, maculopapular rash, seborrhea, purpura. **Special Senses:** taste perversion, taste loss, parosmia. **Vision:** blindness, loss of accommodation, eye pain, conjunctivitis, xerophthalmia, glaucoma, ocular hemorrhage. **Body as a Whole:** increased weight, back pain, malaise, fever, asthenia, generalized edema, periorbital edema, peripheral edema, rigors, leg edema, face edema, hot flashes, enlarged abdomen, nasal polyp. Occasional instances of transient, reversible hepatic transaminase elevations have occurred during cetirizine therapy. A single case of possible drug-induced hepatitis with significant transaminase elevation (500 to 1000 IU/L) and elevated bilirubin has been reported. In foreign marketing experience the following additional rare, but potential severe adverse events have been reported: hemolytic anemia, thrombocytopenia, orofacial dyskinesia, severe hypotension, anaphylaxis, hepatitis, glomerulonephritis, stillbirth, and cholestasis. **DRUG ABUSE AND DEPENDENCE** There is no information to indicate that abuse or dependency occurs with ZYRTEC. **OVERDOSAGE** Overdosage has been reported with ZYRTEC. In one patient who took 150 mg of ZYRTEC, the patient was somnolent but did not display any other clinical signs or abnormal blood chemistry or hematology results. Should overdose occur, treatment should be symptomatic or supportive, taking into account any concomitantly ingested medications. There is no known specific antidote to ZYRTEC. ZYRTEC is not effectively removed by dialysis, and dialysis will be ineffective unless a dialyzable agent has been concomitantly ingested. The minimal lethal oral dose in rodents is approximately 100 times the maximum recommended clinical dose on a mg/m² basis and the liver is the target organ of toxicity. **DOSAGE AND ADMINISTRATION** The recommended initial dose of ZYRTEC is 5 or 10 mg per day in adults and children 12 years and older, depending on symptom severity. Most patients in clinical trials started at 10 mg. ZYRTEC is given as a single daily dose, with or without food. The time of administration may be varied to suit individual patient needs. In patients with decreased renal function (creatinine clearance 11-31 mL/min), patients on hemodialysis (creatinine clearance less than 7 mL/min), and in hepatically impaired patients, a dose of 5 mg once daily is recommended. Cetirizine is licensed from UCB Pharma, Inc.

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NY, NY 10017
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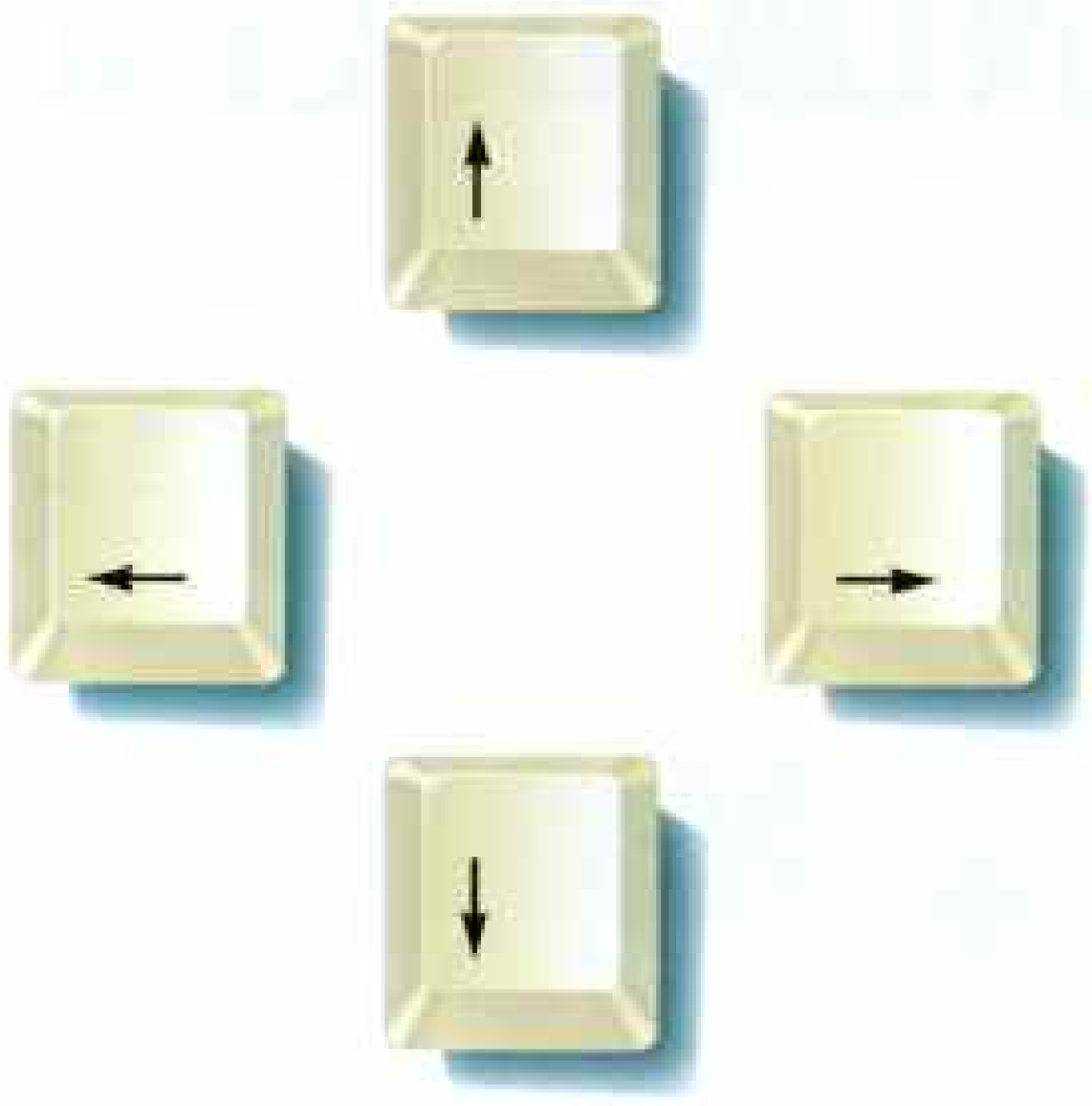

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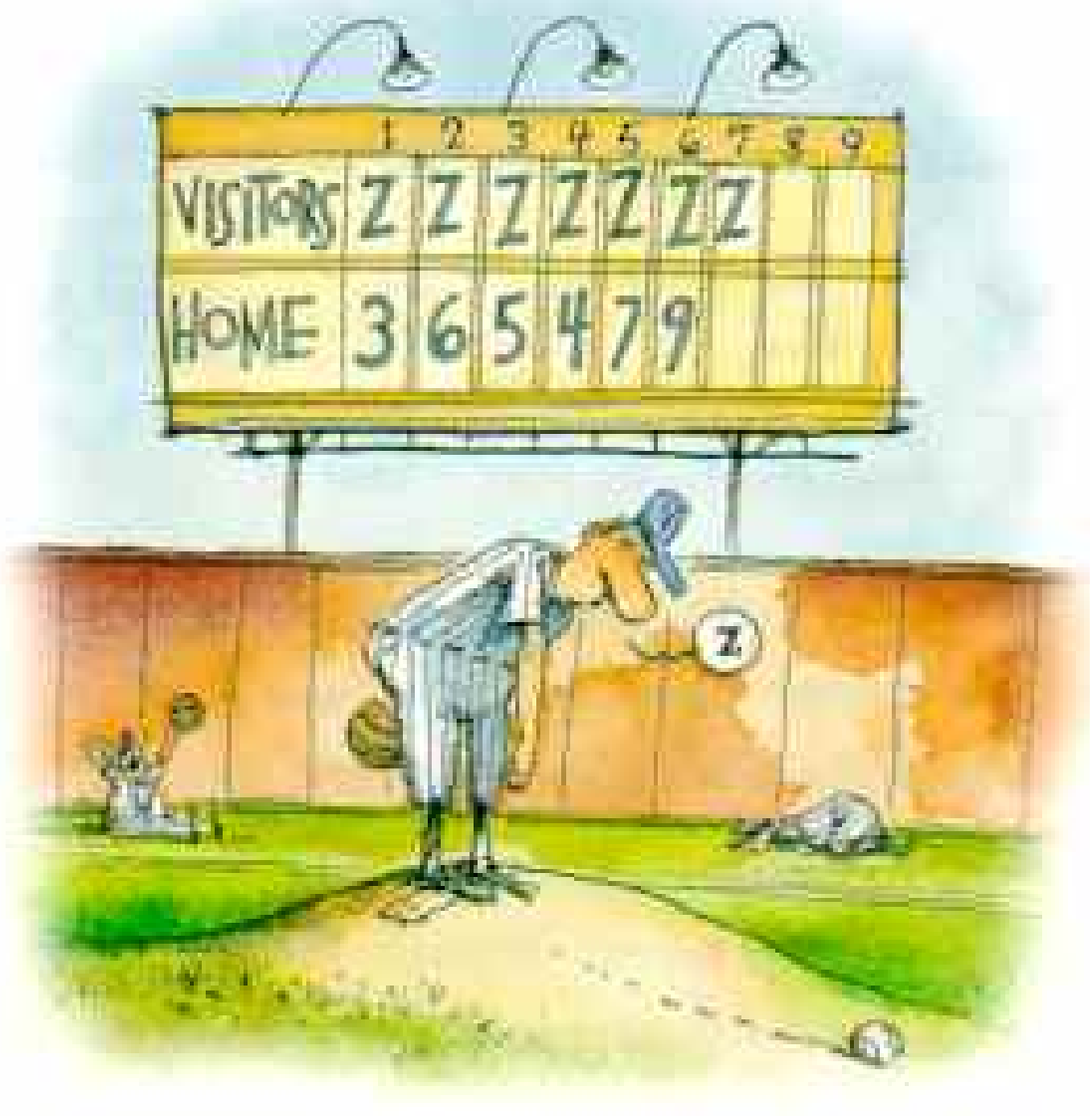
Test-Tube Baby: A First for Gorillas

BILL LUSTER

TWO MONTHS PREMATURE and weighing only three pounds, Timu was welcomed with cheers at the Cincinnati Zoo last October: The lowland gorilla is the world's first test-tube great ape. Parents Rosie in Cincinnati, Ohio, and Mosuba in Omaha, Nebraska, mated by mail.

Early last year zoologists gave Rosie hormones to induce production of multiple eggs. Twelve were collected and fertilized with Mosuba's sperm. Eight embryos survived and three were inserted in Rosie's womb, the rest frozen. Ultrasound scanning revealed a developing fetus. Since birth Timu has faced problems similar to those of human preemies, but overall she's doing fine.

Primatologists have long tried in vitro fertilization to broaden the gene pool of captive apes without the hazards of moving them from zoo to zoo. It is illegal to import gorillas from the wild, and the U.S. zoo population numbers only about 335. Cincinnati Zoo director Edward Maruska says the procedure could one day be used with wild gorillas.



RICHARD THOMPSON

Jet Lag Wallops West-to-East Nines

TALK ABOUT a home-field edge! Major-league baseball teams from the West Coast lose unusually often after nonstop trips to the East, says a preliminary study of the win-loss record of 19 teams. This adds to jet-lag research (GEOGRAPHIC, December 1987).

"We were looking for the effects of jet lag on skilled professionals," says Lawrence D. Recht, a University of Massachusetts neurologist, who co-authored the study with William J. Schwartz. "We found them—but only in one direction."

In the 1991-93 seasons, home teams won 54 percent of their games if the visitors had not traveled cross-country within the preceding two days. If they had endured such travel, home teams in the West were helped only slightly, raising their win record to 56 percent. Home teams in the East, however, won a significantly higher 63 percent.

Cross-country travel cost western teams 1.25 runs per game, enough to lose a close pennant race.

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Livestock's New Wave: The Emu Takes Off

COMING SOON to restaurants and supermarkets near you: ground emu, emu steaks, emu roasts. Late last year for the first time the U.S. Department of Agriculture approved meat inspection of all ratites—flightless birds, including the ostrich, kiwi, rhea, and cassowary. The federal stamp of approval should help persuade consumers to try the unusual bird products.

Emu ranching, big in Australia, is taking wing in the U.S., which now has perhaps a million and a half birds, says Tom Murphy, a North Dakota grower and president of the 5,500-member American Emu Association. A grocery chain in Texas sells emu steak for eight dollars a pound; more than 30 restaurants from Oregon to Florida feature emu.

Ed Hill, a Dickson, Tennessee, breeder (above right), hails low-fat, low-cholesterol emu: "Broiled, it tastes like choice rib-eye beef." He also touts the high quality of emu leather for handbags and emu oil for body lotion and face cream.

MICHAEL A. SCHWARZ

PIER PAOLO CITO

From the Paleolithic, a Family Affair?

WHEN THE MOTHER-TO-BE died, her companions gently laid her to rest in a grave within a large cave. There the 20-year-old lay for more than 24,000 years until Italian scholars excavating Santa Maria di Agnano cave near Ostuni in the heel of Italy found her remains, and more.

Hundreds of perforated shells in a red ocher paste covered her head. Her left arm was flexed with her hand near her face. Her right arm lay across her stomach. And beneath her right hand researchers were amazed to find tiny bones of a fetus. Another skeleton, probably male, lay beside her, back to back. About 35 years old, he was similarly adorned with shells but sported a deer-tooth necklace.

"We don't know what they died of; we find no evidence of trauma," says Donato Coppola of the University of Rome Tor Vergata, who is continuing the search for answers.

A Rooster to Crow Through Eternity

THE TOMB OF JING DI, fifth ruler of China's Han dynasty, became famous after its 1990 discovery near Xian (GEOGRAPHIC, August 1992); its army of two-foot-tall warriors numbers about 3,000. But excavations also yielded more humble objects, like this exquisite

R. LOUIS MAZZATENTA

rooster, its paint still intact after 2,100 years.

The rooster turned up in a pit with figures of six other domestic animals, gold chips, coins, lacquerware, measuring instruments, and wooden objects. "We believe this was a storage house to supply the emperor through eternity," says Wang Bao Ping of the Shaanxi Archaeology Institute.

—BORIS WEINTRAUB

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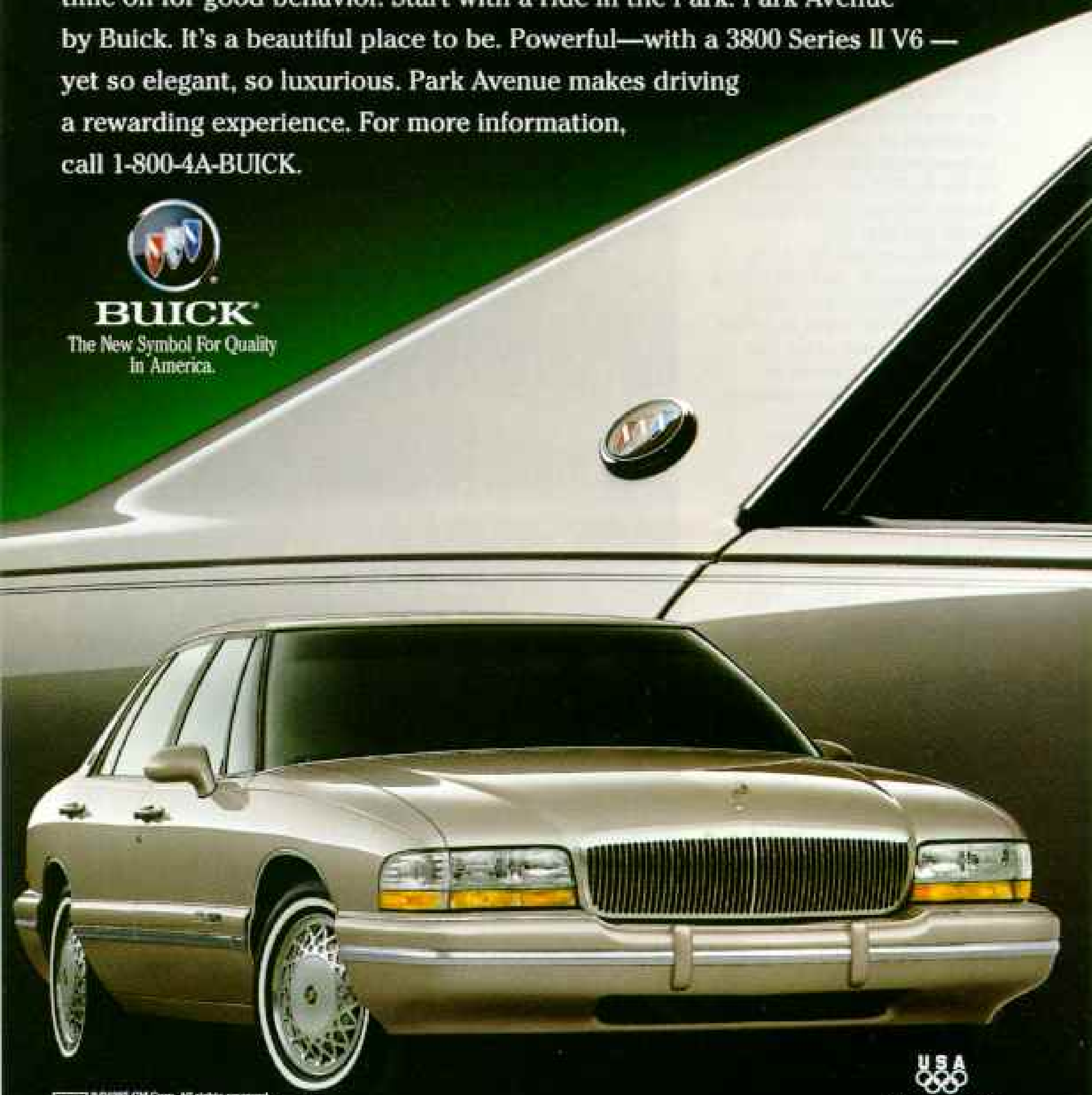

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NATIONAL GEOGRAPHIC

On Television

■ EXPLORER, JUNE 23, 9 P.M. ET

Mummies: Heralds From the Distant Past

EMISSARY TO THE GODS, the Inca girl gave her life 500 years ago. Her frozen body (right), exposed by snowmelt, was discovered by high-altitude archaeologist Johan Reinhard on the 20,700-foot summit of Mount Ampato in the Peruvian Andes (see page 62).

Within a month Reinhard, accompanied by an EXPLORER film crew, mounted a second expedition that found two more burials. "Mystery of the Inca Mummy" premieres on an EXPLORER evening dedicated to *The Mummy Hunters*.

In a segment called "Mr. Mummy," professor Bob Brier, an expert in mummification, recaptures the lost art of the Egyptian mummy makers, practicing what he has learned from ancient texts on a modern cadaver.

"Ice Tombs of Siberia" follows archaeologist Natalya Polosmak as she excavates the wooden burial chamber of a high-ranking woman of the Pazyryk people, who disappeared from southern Siberia some 2,100 years ago.

Whether mummified by nature or by man, these preserved bodies—rich with biological, religious, and cultural information—are escorts to the past.

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NATIONAL GEOGRAPHIC

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Do Harried Hares See Spots Every Ten Years?

BOOM AND BUST: Snowshoe hares go through a decade-long cycle. They can number hundreds per square mile, then nearly vanish, baffling scientists.

The hares' cycle roughly parallels the 11-year peak-and-ebb cycle of sunspots (indicated by white X-ray emissions, above right), says Anthony Sinclair of the University of British Columbia. Sinclair's team has tracked this correlation in North America back to 1751 in tree rings. Hares browse on young spruce, leaving a dark mark in the rings. The number of marks revealed hare density, which researchers matched with sunspot cycles.

Sinclair says that sunspots don't directly drive the hares' pattern but may affect weather and food supply. Another angle: Sinclair's colleague Charles Krebs says predators play a key role. When hares are plentiful, lynx, owls, and coyotes increase. As hare numbers are gradually reduced, predators find less to eat; when their own numbers dwindle, hares bounce back.

New Hope for New Zealand's Rare Reptile

IT LOOKS LIKE A LIZARD, but the tuatara has occupied its own branch of the reptilian family tree for 225 million years. Tuataras ranged throughout New Zealand until humans brought rats and dogs that all but wiped out the lethargic burrowers.

Now tuataras are staging a comeback in a recovery program run by Charles Daugherty at Victoria University of Wellington. The rarer of the two tuatara species, *Sphenodon guntheri* (below left)—perhaps 400 strong—lives on ten-acre North Brother Island. Females lay eggs only every four or five years, and they take 12 to 15 months to hatch. Daugherty's team collected some 200 eggs and learned to incubate them. The surrogate mothers raised 140 tuataras in their laboratory. Last November 68 tuataras from the lab and from North Brother were released on a 75-acre island where rats had been eradicated. The new colony seems to be thriving. Says Daugherty: "All we can say is, so far so good."

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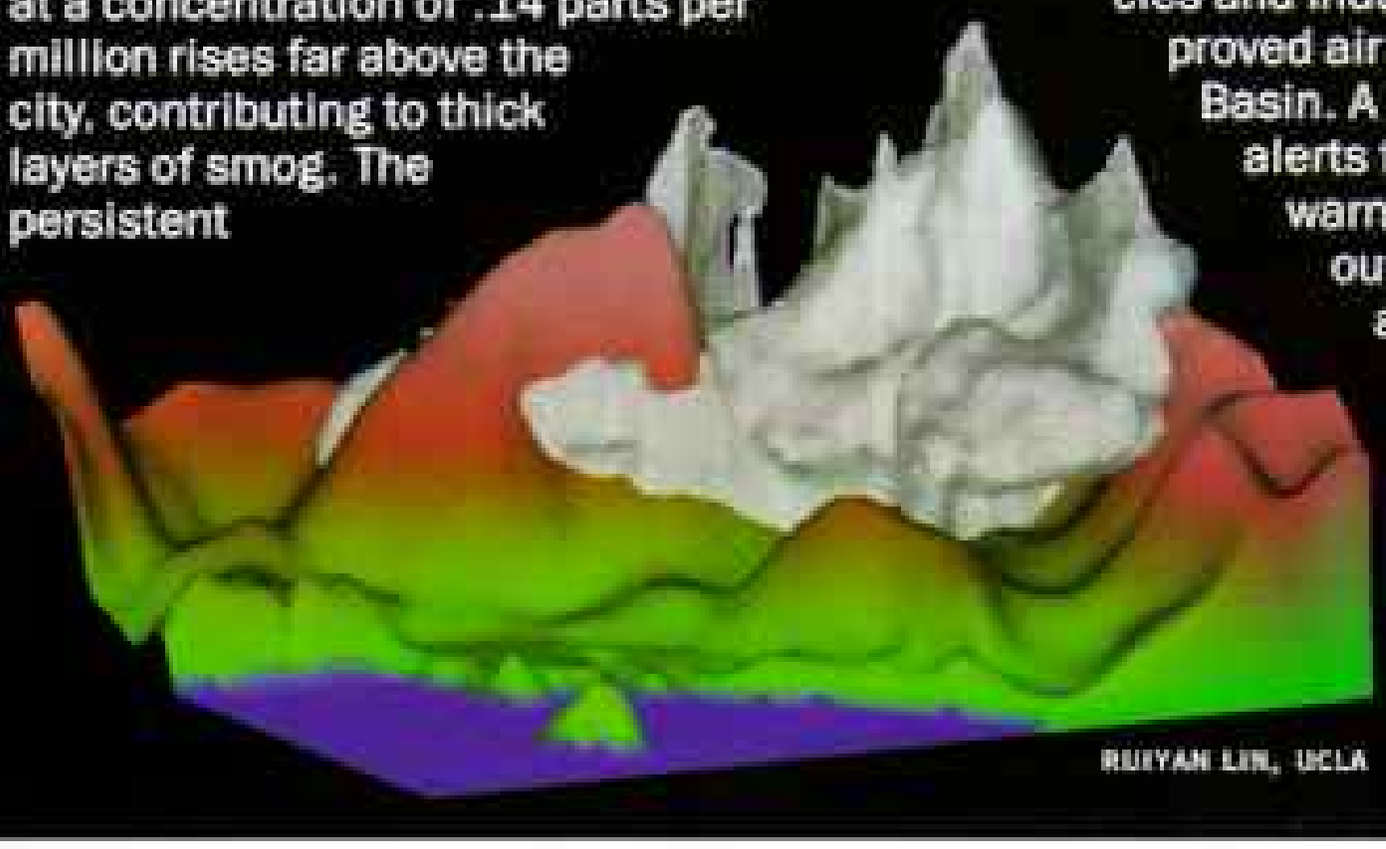
Anatomy of L.A. Smog—a Vastly Improved Picture

AUGUST 27, 1987, was not a great day to be breathing in Los Angeles. This is how the atmosphere looked in a UCLA computer simulation. Like whipped cream, ozone at a concentration of .14 parts per million rises far above the city, contributing to thick layers of smog. The persistent pollution is trapped by surrounding mountains, shown in red. Lowlands are green, and the Pacific is purple.



RUIYAN LIN, UCLA

Since then, reduced emissions from vehicles and industry have dramatically improved air quality in the Los Angeles Basin. A decade ago 83 stage-one alerts for ozone—when people are warned to avoid strenuous activity outdoors—were issued for the area. In 1994 the alerts dropped to 23. Last year only 13 were declared. None came in central L.A., which had two health advisories for less severe pollution. But officials caution that the area still suffers from the worst air pollution in the nation.

Noisy Mouths Scare Fin Whales' Prey to Death

WITH STUNNING EFFICIENCY, fin whales, like this one off California, keep their mouths full by blasting the prey inside with sound. They take in massive amounts of water to strain krill and tiny fish with their baleen. Opening their mouths for as long as five seconds, they seem to allow plenty of time for the fast-swimming prey to escape. Yet it doesn't. Why not?

Because the fin whale makes a racket when feeding, according to scientist Paul Brodie of Nova Scotia's Dalhousie University. When its mouth opens wide, a joint at the tip of the lower jaw cracks like a huge knuckle. "It's very powerful, probably the loudest crack of any joint anywhere," says Brodie.

Vibrations are strongest at the front of the jaw and reverberate along the sides. Churning within the maelstrom, startled prey congregates in the middle of the mouth—a haven of doom that leads straight down the hatch.

FLIP NICKLIN, MINDEN PICTURES

No Philandering Among Faithful Dik-Diks

TINY, DELICATE ANTELOPES, dik-diks share a trait possessed by only 5 percent of all mammals: monogamy, says zoologist Petr E. Komers. He studied them in Kenya's Tsavo East National Park, supported in part by Cambridge University and a Geographic research grant.

CHRISTOPH BÜRKI

Male dik-diks stake out half-acre territories by dropping piles of dung. Within, they zealously guard their mates. To mask the female's scent from rivals, the male covers her dung with his own. If his mate roams outside, he pushes her with his horns and brings her home.

Fear—or prudence—reinforces dik-dik monogamy. "Everything with teeth or claws eats them—jackals, hyenas, cheetahs, wild dogs, and birds of prey," says Komers. "It is too dangerous for them to explore new land for other partners."

—JOHN L. ELIOT

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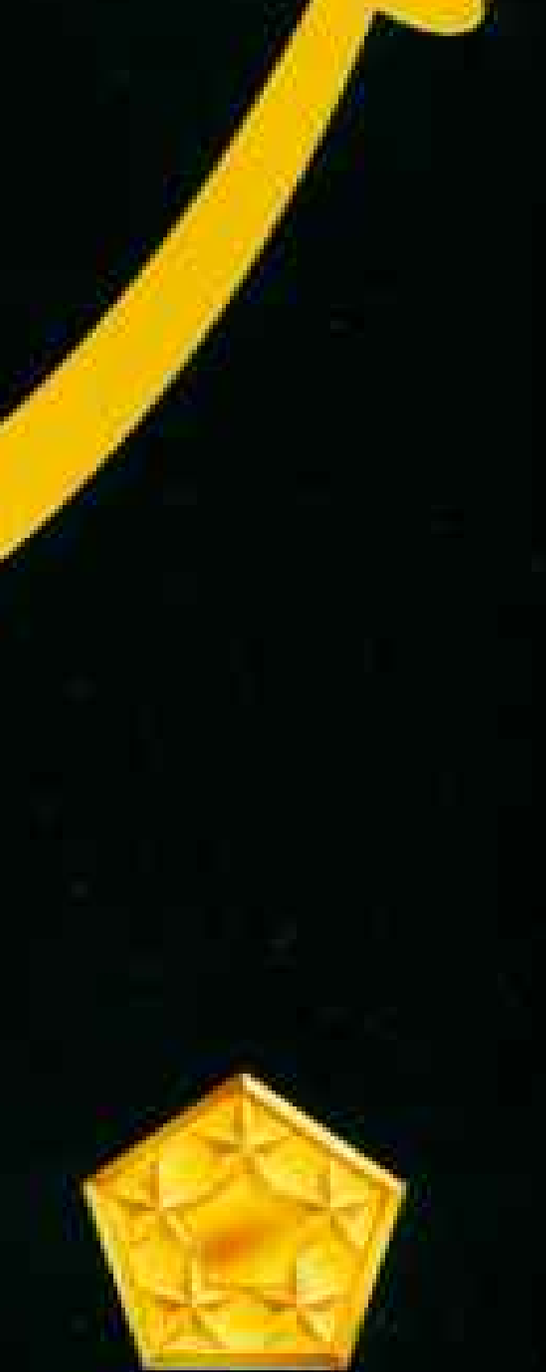

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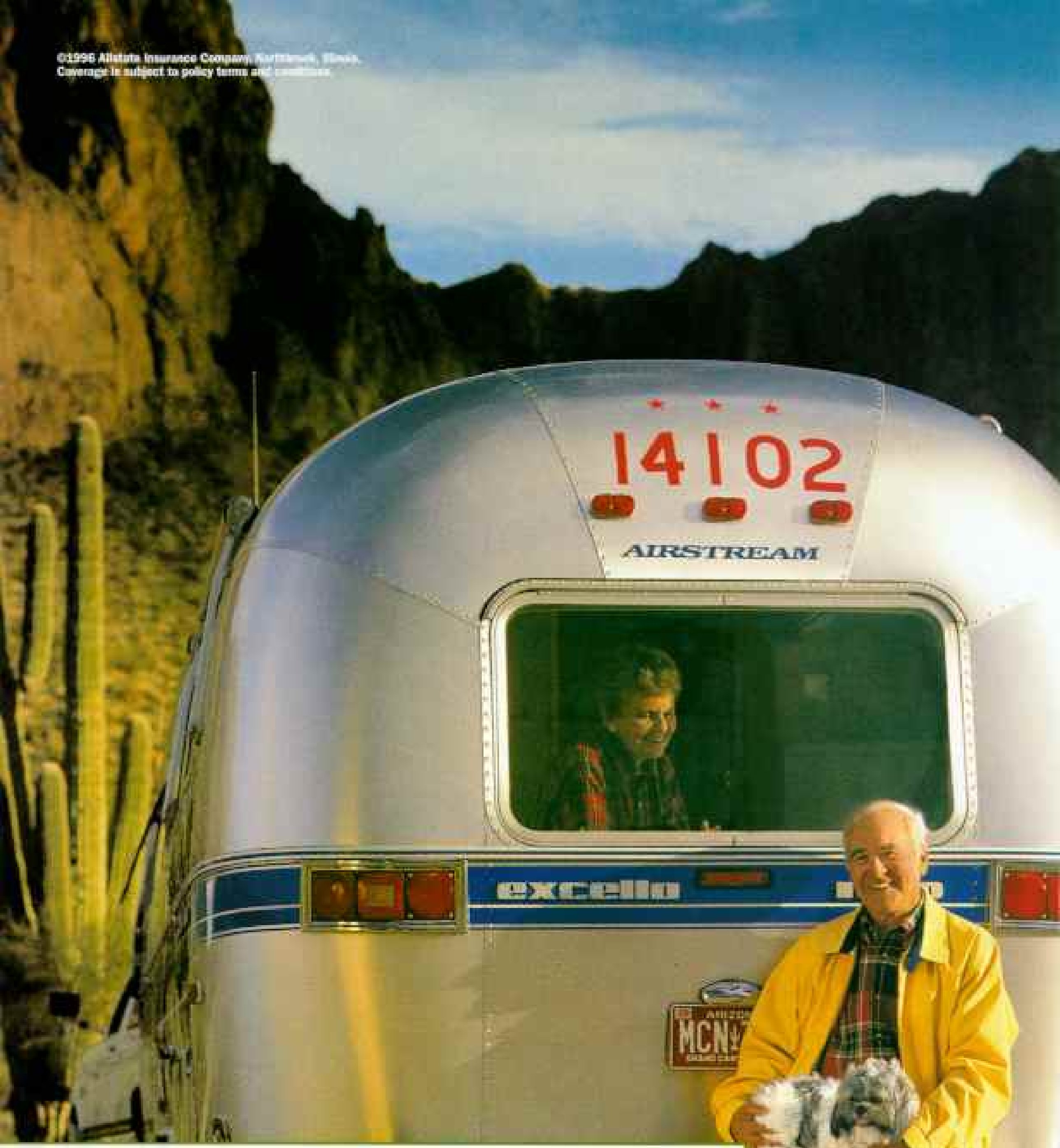

Benji's the only one who saw exactly how it happened, and he ain't talkin'.

Roy Verret looked out the right window of his pickup and suddenly he realized the trailer passing him by was his own vintage Airstream. 2,600 miles from home, with his vehicles totalled, Roy looked up a local Allstate Agent in the phone book, who got Claims Rep J.R. Martel on the case. J.R. met the Verrets at the body shop, cut them a check to replace their Airstream and the pickup and got them back on the long road home. **For Roy, Jenny and Benji—Being in good hands is the only place to be.**™

Claims Rep J.R. Martel of Bedford, NH, followed up with the Verret's local agent Joe Bland to make sure they got back home safe and sound to Mesa, AZ.

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On Assignment

DAVID DOUBILET

■ SALTWATER CROCODILES

Snapping Back at Crocodiles

"I LOOKED AT THINGS only a veterinary dentist ought to," recalls contract photographer DAVID DOUBILET of shooting saltwater crocodiles in Australia. "My first instinct, upon seeing those dinosaur teeth, was to flinch." Overcoming that urge in Airlie Beach, Queensland, Dave (above, at right) captures croc handler Rob Bredl—as Rob's 13-foot ward captures lunch.

"To get some of the shots I wanted, I had to get so close that, for a time, the camera was sitting where the croc's food should have been. At the last possible minute, I'd yank the camera out of there. I guess that's the real meaning of 'bait and switch,'" Dave says.

This story marks Dave's 41st GEOGRAPHIC assignment since 1972. He and his wife, Anne, live in New York City with their 12-year-old daughter, Emily.

■ CAPE YORK PENINSULA

Tow for Two

SHE WAS SO NEW to camping that Miami Beach native CATHY NEWMAN was offered lessons in lacing her hiking boots by her Australian guide, but the senior writer is a veteran of three collaborations with staff photographer SAM ABELL, at right. "He has a poetic sensibility," she says, "and such a wonderful sense of humor. That really comes in handy in the middle of nowhere, when your truck is hopelessly stuck in the mud and your fourth tow chain has just snapped."

KERRY TRAPNELL

NATIONAL GEOGRAPHIC (ISSN 0027-9358) IS PUBLISHED MONTHLY BY THE NATIONAL GEOGRAPHIC SOCIETY, 1145 17TH ST. N.W., WASHINGTON, D.C. 20036-4688. $25.00 A YEAR, $3.00 A COPY. SECOND-CLASS POSTAGE PAID AT WASHINGTON, D.C., AND ELSEWHERE. POSTMASTER: SEND ADDRESS CHANGES TO NATIONAL GEOGRAPHIC, P.O. BOX 2174, WASHINGTON, D.C. 20013.

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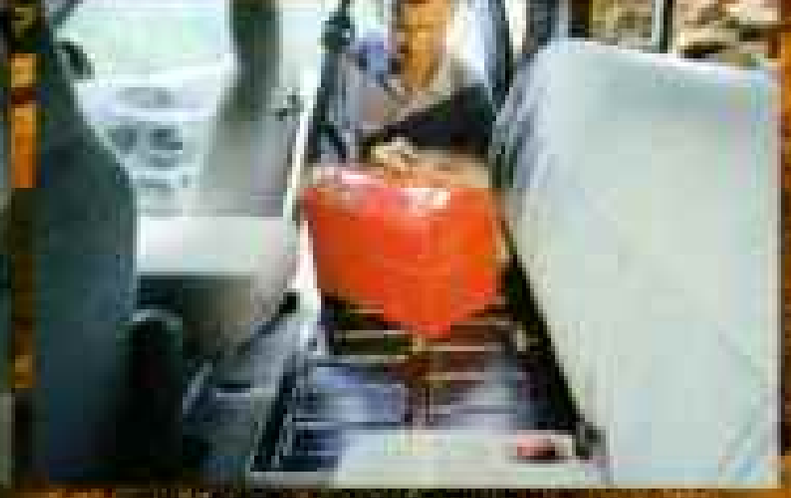

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