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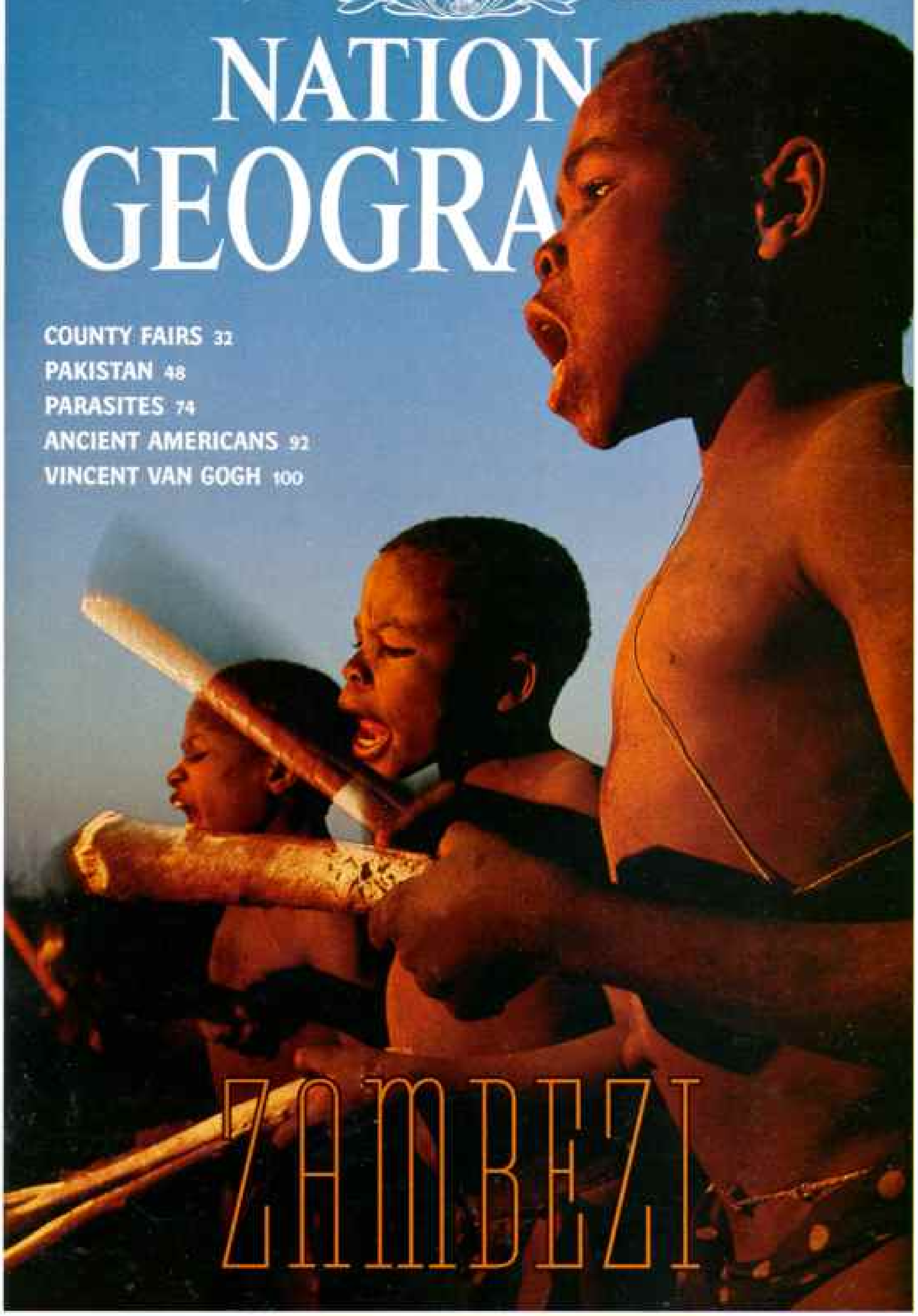

ZAMBEZI

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NATIONAL GEOGRAPHIC

From the Editor

JAMES L. STANFIELD

ALAN MARRIOTT, NGS

W. ROBERT MOORE

HIS NAME MEANT "power of the trinity." He was called the Lion of Judah. And one of the things Haile Selassie wanted when he was crowned emperor of Ethiopia in 1930 was to have his picture taken for NATIONAL GEOGRAPHIC.

Photographer W. Robert Moore had waited for days in Addis Ababa for his sitting with the new emperor, a member of the Society. Finally, as Moore was preparing to leave the country, he was summoned. The primitive color plates of the day required exposures of several seconds, and the evening light was already weak. Framing the splendidly robed ruler in his viewfinder, Moore barked the words that were at the time a mantra for all photographers: "Hold still!"

"Few people in those days would dare tell the Lion of Judah to hold still, or to do anything," recalls retired staffer Luis Marden, a colleague of Moore's. "With a twitch of his tail, you'd have lost your head!"

But Moore had an advantage: He represented NATIONAL GEOGRAPHIC magazine, which has always enjoyed unparalleled access to people, places, and events. Photographer Jim Stanfield has maneuvered his way into intimate sessions with Pope John Paul II and the shah of Iran. Dave Harvey (above, middle) made the first photograph of Andrew Wyeth and his model Helga to be published in any magazine. For this month's issue, writer Joel Swerdlow managed to arrange a night in the hotel room closed to guests since Vincent van Gogh died there more than a century ago.

These open doors stand as a tribute to the accumulated goodwill the GEOGRAPHIC has earned in 109 years. Patient, respectful of the cultures they cover, possessing a keen eye for the unexpected, the writers and photographers of NATIONAL GEOGRAPHIC may not always come back with the story their hosts would have preferred. But they always tell it with compassion, fairness, and professionalism.

Bill Allen

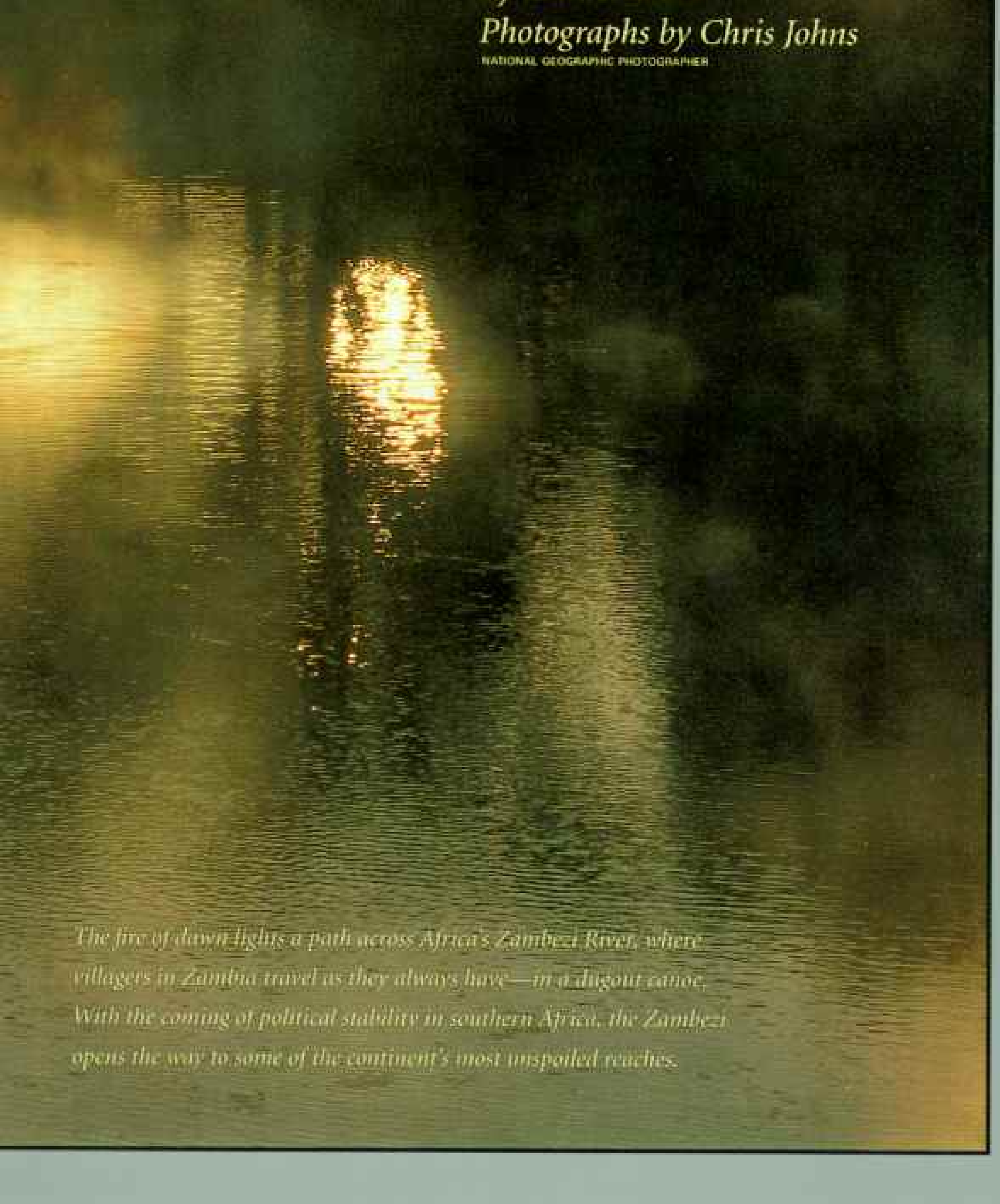
DOWN THE

ZAMBEZI

By Paul Theroux

Photographs by Chris Johns

NATIONAL GEOGRAPHIC PHOTOGRAPHER



The fire of dawn lights a path across Africa's Zambezi River, where villagers in Zambia travel as they always have—in a dugout canoe. With the coming of political stability in southern Africa, the Zambezi opens the way to some of the continent's most unspoiled reaches.

Fearsome makishi *dancers, believed to represent spirits from the grave, dance madly under a full moon as part of a ritual to distract boys from the pain of the previous night's circumcisions. Members of the Luvale,*

a people who live along the remote upper reaches of the Zambezi in western Zambia, the youngsters go into seclusion for a month as elders prepare them for manhood and a life of fishing and farming.

Elephant-size fury erupts on the banks of the Chobe River, a tributary of the Zambezi, when the herd matriarch, ears flared, drives off an intruder. The giants dashed in Botswana's Chobe National Park, one of a chain of

parks and game preserves along the middle Zambezi, which together present some of the most spectacular wildlife viewing in Africa. Sadly, poachers far outnumber rangers and game wardens.

IN THE EXTRAVAGANT AFRICAN SUNSET the Zambezi River was deep red, reflecting the crimson sky, and it shimmered in oxbows across the dusk black landscape of the floodplain like a vessel thick with blood.

That vivid arterial image seemed appropriate to the Zambezi, which is teeming with life throughout its 1,600-mile length. "This magnificent stream," David Livingstone exclaimed when he first traveled the river in 1853. More tellingly he called it "God's highway," an access route for the Christianity and commerce Livingstone imagined the river would bring to the interior of Africa.

But from the sky over the upper Zambezi in western Zambia, I saw a place little changed since Livingstone's day—clusters of mud huts and fishermen in dugout canoes. What could have been clumps of boulders scattered all over the river were pods of hippos, preparing to scramble up the banks for their nighttime grazing. And the small villages of thatched-roof huts glowed by the light of cooking fires and candles.

It was old eternal Africa, the one Livingstone knew when he traveled hopefully, charting the river. His gifts were his linguistic skill and his ability to get on with Africans who, having seen so many instances of enslavement, were understandably hostile toward outsiders. During 30 years of travel Livingstone charmed the African chiefs up and down the river, putting suspicions to rest.

A ready smile is still a great asset on the Zambezi, though it has no discernible effect on the hippos or crocodiles.

The landing strip looked like a small bandage on the great flank of the floodplain in the twilight. We descended through the smoky air of the dry-season bush fires and rolled to a halt on this grassy plot.

In the morning I could see that the banks of the river were lush. No matter how starved the rest of the land, the banks of the Zambezi are green from end to end.

I had woken to the sounds of the busy birdlife of the river, the kingfishers, the bee-eaters, the herons and egrets and fish eagles. From time to time I could hear the warning sound of hippos, which is misleadingly comical, like a tuba played underwater. Now and then there was a sudden splash—a big tiger fish, startled by a blowing hippo.

"We're off the map here," said Bernie Esterhuyse, and indeed I never found this site on the Zambezi—Ngulwana—on any map. Like many other South Africans, Bernie and Adrienne Esterhuyse had migrated north to the Zambezi Valley to start a tourist business. They have a tent camp for fishermen who come here to battle the tiger fish, which can grow to 34 pounds.

"The Litunga gave us permission to build here," Adrienne said, referring to the king of the Lozi people, the dominant tribe in this corner of Zambia. "Most of this land is his."

We were driving through deep sand, toward the market town of Lukulu, two hours away.

"Where's the road?"

For PAUL THEROUX, one of the pleasures of writing about the *Zambezi River* was spending time in places he had visited 33 years before as a Peace Corps volunteer. From Africa he flew to Hong Kong, the setting for his latest novel, *Kowloon Tong*.

Newly circumcised boys greet the dawn with traditional song and drumming in Lukulu, Zambia. Unless they work in a town downriver, the boys will probably go through life seeing few outsiders other than missionaries and the odd sportfisherman.

Strictly speaking there was no road, just a sandy floodplain stretching for miles along the river, like a beach that had become detached from an ocean.

At a cluster of huts under some deep-green mango trees I saw a group of women pounding corn in a mortar—taking turns with the loglike pestle. Like many other riverside villages, it was orderly and well stocked. "We know we are lucky," one of the women said, acknowledging that they owed their lives to the river.

I wondered whether in leaner times anyone ate the rats we had seen running across the floodplain. The word for rat is *khaswe* in Chichewa, which I had learned as a Peace Corps volunteer in Malawi. "*Kodi ichi amadya?*" I asked. "Are they edible?"

"We Lozi don't eat them," another woman boasted. She understood me: Because of the wide dispersal of Malawians, Chichewa is understood for almost the entire length of the Zambezi. "But the Luvale and Lunda people like them."

The Luvale and Lunda are the far-flung minority tribes of this immense area of the upper Zambezi, the Western Province of Zambia, once known as Barotseland, the kingdom of the Lozi, who are still loyal to their king, the Litunga.

I could see the king's people out on the great river, men in dugouts, big and small, paddling slowly upriver. I called out to the paddlers, asking them where they were going.

"To market!" The market at Lukulu was a day's paddle upriver.

All the way to Lukulu we saw people in the distance crossing the sandy floodplain using ox-drawn sleighs, with heavy wooden wishbone-shaped runners plowing the sand. And sometimes—speaking of appropriate technology—a dugout canoe was pulled across the sand by a pair of oxen.

"Angels in their flight" would have paused to marvel at Victoria Falls, wrote missionary and explorer David Livingstone, who in 1855 became the first European to see the mile-wide cataract on the Zambezi. Today ultralights provide a heavenly view.

Some of these conveyances were piled high with vegetables or firewood to sell at the market, but several held very solemn people.

"*Akudwala,*" an ox driver said to me of his passenger. "He's sick."

They were on their way to see the only doctor for many miles around, Peter Clabbers, who runs Lukulu Hospital. I made a point of seeing him myself when I got to the town sprawling over a bluff on the river: a Catholic mission, several schools, a busy market, and an even busier hospital.

"I see one new HIV patient almost every day," Dr. Clabbers told me as we walked through the clean but spartan wards of the hospital. Dr. Clabbers, from the Netherlands, has been at the hospital for three years. He told me that AIDS and HIV cases were continuing to climb and that malaria, TB, and meningitis patients were also numerous. There were some violent injuries too.

"I once saw a young boy who'd blown his hand off after finding a grenade and playing with it," Dr. Clabbers said. The border of Angola is about a hundred miles away, and for almost 20 years the UNITA forces of Jonas Savimbi had waged a guerrilla war against the Angolan government. Upriver, where the Zambezi loops through Angola from its boggy origin in Zambia, life is still disrupted by the effects of this guerrilla war.

Like many riverside markets on this part of the Zambezi, the one in Lukulu bustled with swarms of people picking through baskets of fish and used clothes lying in enormous piles or draped on racks or else flapping like pennants on long lines.

Julius Nkwita was selling small piles of dried fish, about 60 cents for a handful. But sometimes he swapped his fish for cups of flour or an item of clothing. Julius had five children, ranging in age from three to fourteen. His wife and four of his children were in his home village, some distance from the river, while he stayed in his seasonal fishing camp—just a reed hut—with his son, fishing intensively.

"I camp on the riverbank," he said. "I catch fish, dry it at my camp, and when I have enough I come here by the river to sell it."

I was curious to know whether he had made his own dugout canoe. No, he said, he had bought it "for two cows." A 12-man canoe, a 17-footer, might cost three cows, a bride even more.

Fishing remains the primary occupation for the men on the upper Zambezi. Julius sold bottlenose fish and large bream, tiger fish and the catfish known as barbel, smoke-dried like kippers.

"We have many hippos," Julius told me. He said that hippos gobbled the garden, and out canoeing he was occasionally attacked.

"What do you do if a hippo goes after you?"

"Swim away from the canoe," he said, and explained that the hippo concentrates on the canoe rather than the people in it. The animal single-mindedly tips over the boat when its territory is threatened.

"MY MOTHER was from Malawi," said Petrus Ziwa, explaining why he, a Zambian, spoke Chichewa so well. We set off in a four-wheel-drive vehicle through the Luena Flats, where the upper Zambezi drops south through Zambia. At 62, Petrus had far exceeded the average life span of a Zambian male, which some sources say is a mere 36. A Jehovah's Witness, he was hoping for my eventual conversion, which he tried to accelerate by quoting Scripture.

Flowing more than 1,600 miles from Zambian wetlands to the Indian Ocean, the Zambezi is Africa's fourth longest river, after the Nile, Congo, and Niger. Dr. David Livingstone envisioned it as a highway to central Africa, but the impassable Cahora Bassa Rapids in Mozambique dashed the dream.

Built of moonglow and water spray, a bridge of colored light arches over the chasm at Victoria Falls. Besides moonbows, special effects at the falls include a roar so loud it once broke windows six miles away and spray so

thick that at times the falls vanish from sight. Fever-racked, Livingstone grossly underestimated the extent of the falls. For the record, they're more than 5,500 feet wide and 355 feet high, almost twice the size of Niagara.

"Tourists overboard!" One of the ferocious Class V rapids below Victoria Falls flips a raft; passengers are assured beforehand that hippos and crocodiles usually steer clear of fast water. A proposed dam would drown 15 miles of rapids.

He also told me he was afraid of snakes.

"What kind of snakes?"

"Egyptian cobras and black mambas."

These are among the most poisonous in Africa, and I said frankly that I did not blame him.

"They are strong, Daddy."

This "Daddy" was interesting. The term of respect in Chichewa is *Bambo*—Father—but Petrus always translated this "Daddy," as in "The battery is dead, Daddy" or "It is too hot, Daddy."

The floodplain was very hot, but it was beautiful—at this season a broad expanse of sand scattered with clumps of fine golden grass. We headed south, through the sand, using a compass. Our destination was Mongu, a short distance from Lealui, where the Litunga had his royal compound. I wanted to meet this British-educated king, who rules a third of the river.

We drove downstream, bumping along the riverbank for hours in the sun, pausing in the middle of the plain at a place called Mbanga, just a small collection of buildings and mango trees. I asked a man, how far to Mongu?

"By foot it is ten hours," he said. "By vehicle I don't know."

Up on the Zambezi everything was measured differently, in the currency of cows or the distance of foot-hours. The separate notion of time and distance was pleasant, and its simplicity was strangely relaxing, modifying my sense of urgency. Here, among people for whom not much has changed since Livingstone's day, the local expectations were modest. I began to shift gears, happiest taking one day at a time, as they did, and feeling lucky to be so near the life-giving river, a source of food and water.

"A roller, Daddy." Petrus was pointing upward.

It was a racquet-tailed roller, tumbling through the sky toward the floodplain to impress a possible mate as we traveled slowly through the deep sand, in places higher than our hubcaps. Other birds with bright plumage, bee-eaters, flew past us. The day grew hotter. Hawks and vultures hovered above us. We seemed to be the only thing moving across the sand.

"THIS IS ALL the Litunga's land," said a herdsman named Vincent Libanga I met along the way. Vincent said he walked 16 miles to the river to buy bream or dried *ndombi*—barbel.

Vincent spoke of his king with great respect, yet he had never seen the Litunga. The Litunga kept to himself in his compound at Lealui, which I could see across five miles of marsh.

"How will we get down that terrible road?" I asked Petrus, looking ahead at the viaduct of crumbly mud.

"We will go through the marsh, Daddy."

It was stickier, and it was slow, but this route worked. Lealui was a peaceful, shady settlement of twittering birds on a low-level plain criss-crossed by canals. The royal compound, dating from the 1860s, was near the river, which plays a central role in the Litunga's rule and his rituals, the most elaborate being the annual royal progress, called the Kuomboka, from his summer to his winter quarters. At the end of the rains, when the river is in flood, the royal barge and the attendant canoes are paddled with great ceremony from one palace to the other, Lealui to Limulunga, through the system of canals.

The gateway to the king's palace was surrounded by a tall reed enclosure with pointed stakes, like a stockade. Out of respect, no one ventured near the Litunga's compound, but his subjects and petitioners dozed under the trees, behind the royal storehouses and the council house. Some people had obviously been there for quite a while and had set up makeshift camps, where they were cooking and tending goats and looking after children.

A dust storm of migrating wildebeests pounds through Zambia's Liuwa Plain National Park. Photographer Chris Johns calls the little-visited park a "rival of the Serengeti." On Lake Kariba, a 14-foot croc is a fisherman's nightmare.

Virtually all of Western Province, an area nearly the size of New York State, once belonged to the Litunga. To his half million or so subjects today, it still does. As a consequence, this province of the Republic of Zambia pays for its monarchist sentiments by being neglected. The Litunga's roads are poor or nonexistent, the schools are substandard, and many of the hospitals are run by foreign doctors. It looked and felt to me precisely like the rural Africa I had first seen over 30 years ago—independent, self-sufficient, and, of course, underdeveloped.

A helpful young man showed me to a small compound where a tall man emerged from a mud hut with religious mottoes tacked to the wall. He introduced himself. "I am Maxwell Mututwa, the Litunga's prime minister." His title, Ngambela, translates as "the king's chief counselor," and it was his task to determine whether I had a worthy motive in visiting the king. The chief counselor was fleshy and heavy faced, with the easy manner and the soulfulness of a blues singer.

"I am the Litunga's spokesman," the Ngambela said. "He is like a baby that needs protection. I have to speak for him." He lamented the opportunism of elected politicians and assured me that a monarchy with a chiefly system is the ideal form of government.

"A monarchy is a family, you see," he said. "People love their chiefs more than they do their president. Because it is in their blood—the same blood. We are all related. We are one people. A chief is controlled by the people."

"Give me an example," I said.

"Chiefs have to listen. If a chief makes a mistake, he will be told by the people." He gestured to the door of his hut. "Look out there in my compound."

I looked out the door and saw 50 people.

"All of them want to speak to me," he laughed. "They want to see the Litunga. They need help, they need advice. I am their prisoner!"

The Ngambela approved my visit but said that I also had to be presented to the Kuta, which was the council of chiefs.

"If this is going to take time," I said, "I will have to make camp."

"You must ask the Kuta for permission to camp here."

It was late in the afternoon before I was granted an audience with the Kuta. This council was nine elderly men, the sentries of a threadbare monarchy, sitting on old, creaking chairs propped on ceremonial straw mats in an unswept stone building, the council house. I sat some distance away on a low chair and thanked them for their attention.

"What is your mission?"

I explained that I wished to see His Royal Highness, to discuss the Zambezi River.

For a long time the chiefs debated my request, each chief and minister in turn, speaking at length, while roosters crowed outside. A skittering and squealing above the thin board of the ceiling was almost certainly a family of rats.

I sat, baffled by the progress of the debate, making notes to pass the time. After two hours my petition to camp in the royal village was

granted, and so was my request to visit the Litunga in the royal compound. "Maybe tomorrow." It was sadly clear to me from his tone that "tomorrow" was a metaphor for "fairly soon."

But I had permission to stay, and so I pitched my tent near the Ngambela's compound and, after dinner, turned in. Through my mosquito net I could see only candle flames and lamplight. The laughter of children, the muttering of adults, even the barking dogs went silent soon after nine, and then there was darkness that was unrelieved by a small scrap of moon like an orange rind.

The royal drums sounded at 9:30 p.m. and midnight and 4 a.m., sometimes with chanting and the tripping notes of a marimba. At dawn, as the sun rose over the 50 or so thatched roofs, there were cockcrows and the lowing of cattle and the children laughing again.

"We cannot find the king," one of the chiefs said to me. "We have looked everywhere."

Still no Litunga two days later. I spent the time bird-watching, writing my notes, and making inquiries. On the third day, seeing that the number of people waiting for an audience with the king had swelled, I made my excuses to the Ngambela and left. My not meeting the king was part of an old tradition. Travelers in Africa arrived at a remote royal compound, asked for an audience, and waited for months. "One cannot get away quickly from these chiefs," Livingstone wrote in similar circumstances.

Ordered to shoot poachers on sight, a game warden at Zimbabwe's Matusadona National Park guards a young black rhinoceros, one of perhaps 30 left in an area where once there were thousands. A rhino horn ground up for medicine can bring $50,000 in Asia.

FOLLOWING THE ZAMBEZI on a parallel road, Petrus and I drove southeast for the only ferry that was operating on the upper Zambezi that month, at Sitoti, south of Senanga.

"Usually we have no trouble with hippos, but one man was killed last month. He was cut in the stomach by a hippo," the ferryman, Ivan Mbandwe, told me, as he steered us across the river, near a pod of watching hippos.

Near the ferry landing a pinkish, buttocky hippo with a cavernous mouth and peglike teeth and tiny ears, blowing sour notes through the grommets of its nostrils, only looked goofy and lovable. But it could turn swift and deadly, a big bossy brute.

"A hippo can hold its breath and stay submerged for seven minutes," Petrus told me.

I kept the figure in mind. Not long after, while paddling an open canoe on the river, I saw some hippos ahead and, of course, gave them a wide berth. They snorted, they complained, they disappeared. I waited for seven minutes and then moved on through the smooth water.

Suddenly, very near to my boat, just feet away, I saw a mottled pinkish head emerging through swirling water. I dug my paddle into the water and thrust it, hearing the flap and blow of the hippo fussing astern. I kept going until I was well downstream.

"That was a mock charge," I was told later, by a river guide.

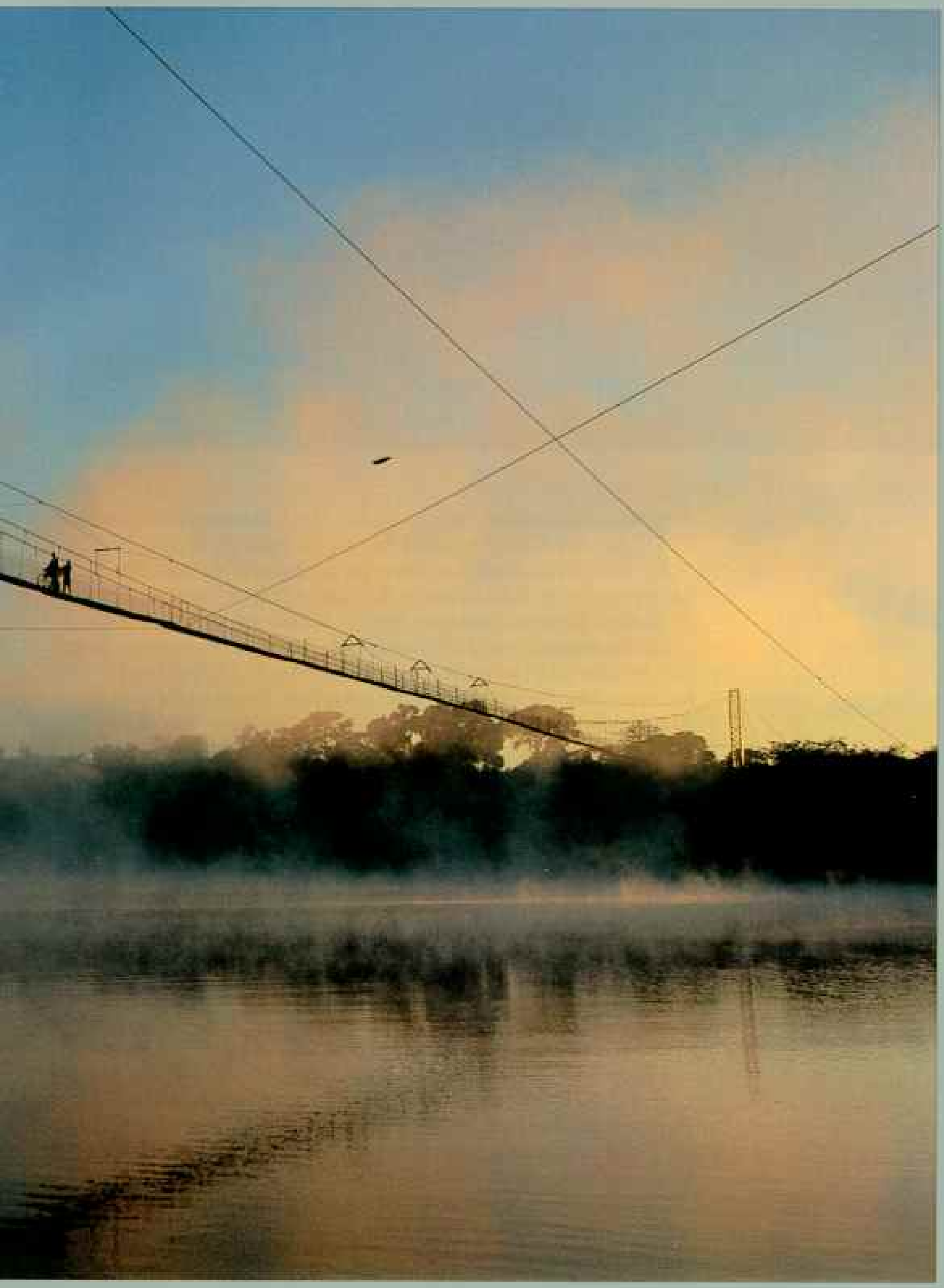
"How do you know?"

"Because he didn't get you."

Petrus and I followed the south bank of the Zambezi out of Zambia and into Namibia, where it flowed muddily past Katima Mulilo and Schuckmannsburg. Soon we were back in Zambia, and Petrus was saying good-bye and "Travel well," in his own language. I reminded him of the Chichewa saying, "To travel is to dance."

On a black night in 1971, a boat overturned while crossing the Zambezi at Chinyingi, drowning a Roman Catholic priest and nun and three local Zambians. Brother Crispin, a priest at a nearby mission, vowed to end

such accidents. Collecting cable and pipes from copper mines and reading engineering texts, he designed and helped build a 700-foot-long foot-bridge, an incredible amateur feat and one of the river's few bridges.



THE MANY STAMPS in my passport—I got one every time I crossed the river—were the proof that the Zambezi is a frontier. The river flows through or forms the border with six countries. We had traveled from Zambia, across the Caprivi Strip in Namibia, farther on through Botswana, and back again to Zambia through Zimbabwe.

The Zimbabwean town of Victoria Falls was visibly more prosperous than its sister city, Livingstone, across the bridge in Zambia. But I found an older, mellower Africa in Livingstone. Its Maramba market attracts people from miles around—Africans buying clothes and getting haircuts and stocking up on provisions, and occasionally tourists from over the border in search of bargains before heading off for white-water rafting or bungee jumping on the river.

This most touristy reach of the river had once been the front line in the bush war that was waged by the soldiers of the Zimbabwean political parties ZANU and ZAPU.

"This Zambia riverbank was all ZAPU freedom fighters in the 1970s," Colin Lowe told me.

Born in Southern Rhodesia, this former farmer was now a tour operator, guiding groups down the Zambezi.

He gestured to the Zambian side and added, "There were quite a few guerrillas dug in on the bank. The Rhodesian security forces were on the other side—over there. They would shoot and shoot, and when fire was returned, they would pinpoint it and let fly."

On the Zambian bank where the guerrillas had hunkered planning their invasion, there are now farms and lodges, and on the Zimbabwean bank where the security forces had been dug in, there are again tourists in Victoria Falls National Park.

Threading our way through the pods of hippos, Colin guided me by canoe downriver. At the Zambian bank that was nearest to Livingstone

Stopping traffic with their flamboyant costumes, makishi dancers liven up market day in Lukulu. For that slicker, urban look a barber in the Maramba market in Livingstone, one of the few cities on the river, recommends the "table" or "potato" cut.

Island, I was taken by a narrow boat—known on the Zambezi as a banana boat—to the island itself.

As the boat neared the island, low murmuring grew to a mighty roar and at last an industrial bellow and odd grinding sound that was unceasing—an ear-shattering engine of collapsing water with a rainbow suspended above it.

That night I camped midstream, as near to Victoria Falls as it was possible to be, on Livingstone Island. The explorer stayed on this small mound of rock and palm he called Garden Island in November 1855, and afterward he wrote: "No one can imagine the beauty of the view from anything witnessed in England."

On the island I heard only the sound of falling water, though it was pierced briefly by the whistle of the train on its way across the other end of the gorge. I got near enough the next day to feel the spray from Victoria Falls on my face and to get a vertiginous view into the greeny depths of the gorge. The river's shadows and froth give it the look of marble, like the floor of a palace corridor.

Tourists who come to see the falls stay at sumptuous riverside safari lodges. They sip drinks under the trees and watch wildlife, as I did one sundown. Just across the river from the veranda of our lodge, a crowd of about 30 chacma baboons were doing the same, crouched at the river's edge, sipping and barking companionably.

Some carmine bee-eaters began to gather on a branch near the lodge. They roosted side by side, their number growing—now there were nine of them. People were counting excitedly. Now there were eleven.

"The record is twelve," the resident bird-watcher said.

And then I sneezed, and a cry of disappointment went up.

I resumed paddling downriver at Kariba, a relatively new town in

Zimbabwe, on Lake Kariba. Until the 1950s this lake had been a deep gorge, where the Tonga people thrived. But a dam, finished in 1960, turned Kariba Gorge into a lake, with houseboats and ferries bobbing on its surface, and crocodiles—a notoriously dangerous number of them—gliding just beneath.

Downstream from the dam, which generates power for much of Zimbabwe and Zambia, I glided in my canoe for a whole glorious day, accompanied by flights of birds—reed cormorants, darters, oxpeckers. The hippos in the channel snuffled and blew; some tiger fish jumped completely clear of the river. Baboons gathered in the limbs of the tamarind trees to eat the seeds they particularly like.

At dusk at a small sandy island, I drew my canoe out of the water and pitched my tent. In the morning the river level had dropped so much that my canoe was now 30 feet from the water's edge. The dam had decreased its power output during the night, and the reduced flow revealed mudbanks where there had been water the day before.

I paddled on, intrigued by commotion in the middle of the river—many heads and flapping ears. When the elephants came to a sandbar and clambered out and crossed it, I was able to count 40 of them. They were big and small, swimming from Zambia to Zimbabwe, enormous bulls up ahead and cows behind nudging the babies. The current was swift, and the babies needed encouragement.

The elephants were panting from the effort as they swam, taking little notice of me because they had a larger obstacle ahead, a steep muddy bank rising from deep water. It meant they had to climb and maintain their balance as they crowded near the bank to struggle free of the river.

The Zambezi made the elephants more elephantine—blacker, bigger, the water streaming from their flanks making their hides shine,

and their tusks were washed a brilliant white in the river. It was a procession of gleaming black hides and bone white ivory, and something about their heavy breathing and the way they were winded from this crossing made them seem hardworking and vulnerable.

Not long after, I discovered just how vulnerable elephants can be.

"This is like a tour of carcasses," Mark Evans told me as he drove me in his Land Rover a quarter of a mile from a side channel of the river where a large elephant lay dead, its tusks hacked off. Mark had been a bush guide and ranger in Zambia's game parks for most of his adult life. Even so he was shocked. "Three killings in the past three days."

At first light we had heard 36 shots from poachers using what Mark guessed was an AK-47. By the time the rangers showed up, the poachers had killed an elephant, hacked one tusk away, cut off its head, and rolled it over to get at the second tusk. The corpse was covered with vultures, and for the next five days and nights it attracted hyenas and lions, and even crocs had gotten wind of it.

For over 500 years the river's elephants have been plundered. Muslim traders—Swahili from Zanzibar—were well established here by the end of the 15th century, trading cloth and other goods for ivory. One tusk produced three billiard balls, two tusks a piano. "Every keyboard entailed one elephant killed and at least two slaves to carry the tusks," wrote Timothy Holmes in *Journey to Livingstone*.

Although poaching has diminished as a result of the international ban on ivory since 1989, elephants still suffer from a loss of habitat caused by an irregular and smaller flow of the river here. Since Kariba Dam was built, the vast area below Chirundu no longer floods and renews the soil. The land is less fertile and supports fewer animals.

"There were once rhinos here," Mark said. "There are now virtually none. The world demand is great. The Chinese grind the horn and sell it as medicine. The Omanis use rhino horns for dagger handles."

He then added a sentiment that I heard often on the Zambezi: "Tourism discourages poaching. Rhinos feel safer near the camps and lodges where the poachers don't dare to go."

Lions padded to the river in the evening to drink and digest after feeding on the carcass of the elephant we had seen. From my boat I saw the cats licking their chops and looking sated. I drank the river too. Though I was hesitant at first about drinking the Zambezi, only wetting my lips or sipping it, I eventually developed a taste for it on my long trip. On the hottest days I dipped my cup into the river and guzzled it, without ill effects.

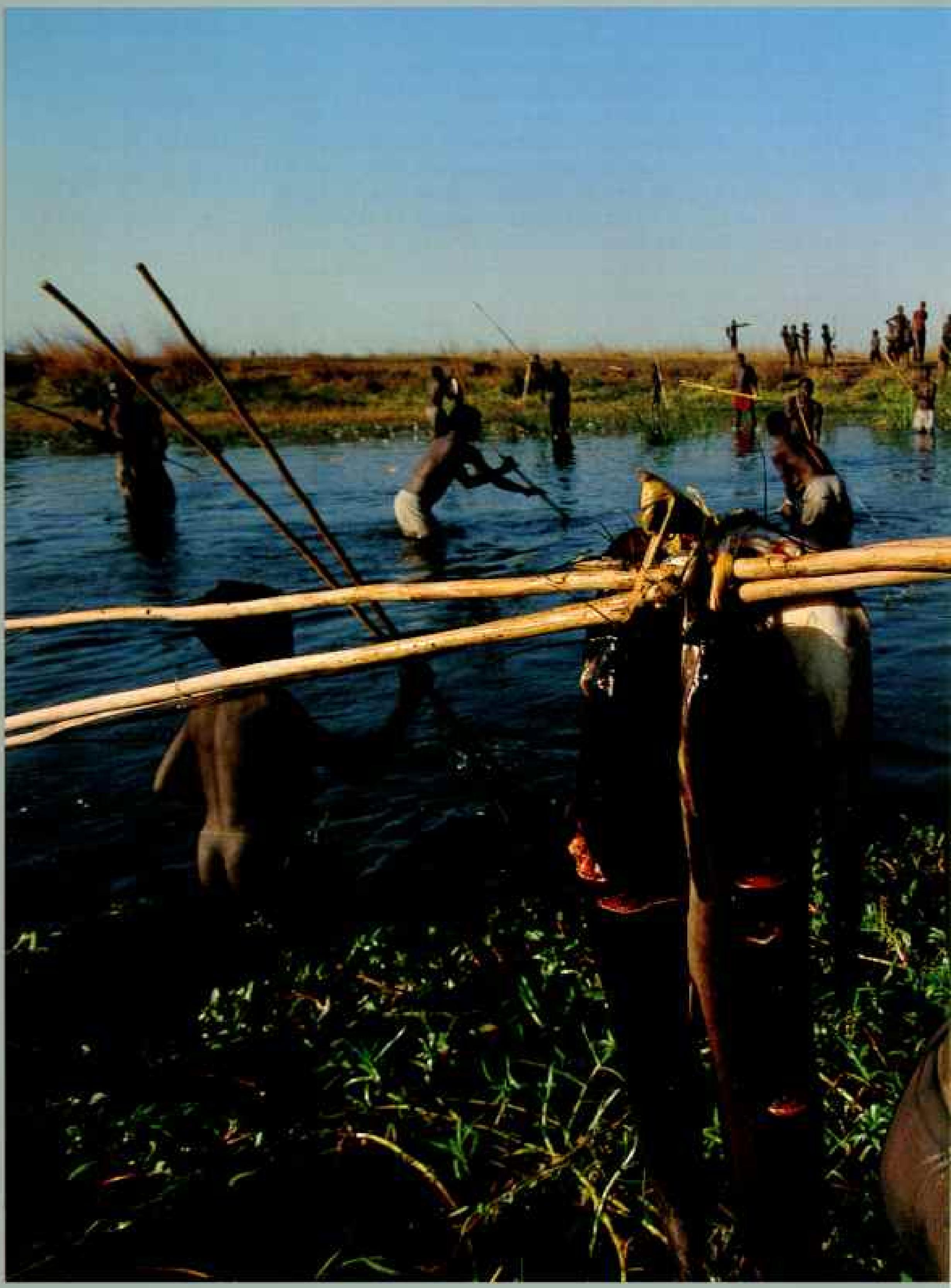
Movable feast: A teenager hustles a live pig home from the market in Chavuma, Zambia. The bike and the cargo signal that he comes from a relatively prosperous household. When he marries, his family must part with cows and cash for a bride.

THE ZAMBEZI has a different character and personality every ten miles or so: The placid upper river becomes the tumbling river of falls and gorges, swells into Lake Kariba, and widens again above Chirundu.

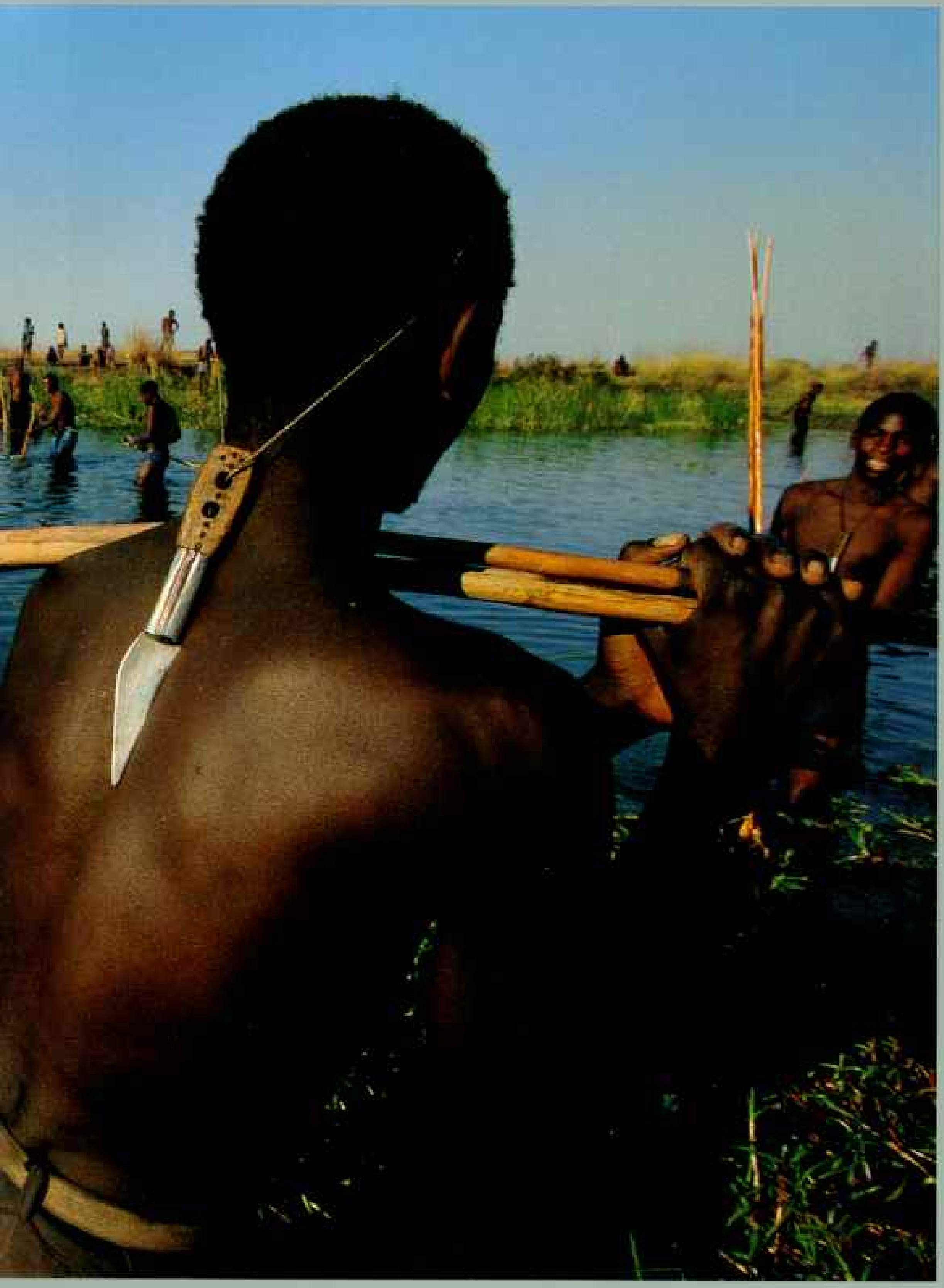
Two more days of paddling past Chirundu brought me to Mana Pools on the Zimbabwean side. This 850-square-mile national park, closed during the war of Zimbabwean independence, is full of wild game. In the dry season, when the pans in the bush have evaporated, the larger animals make for the river to drink.

Alastair Macdonald, a Zimbabwean guide who knows the river well, joined me to explore this section of the Zambezi. We pulled our canoes into a wooded shore of Mana Pools and walked about half a mile into

Warrior of the fishing hole, a Lozi tribesman rests after spearing a clutch of catfish on the vast upper Zambezi floodplain. Easy pickings, fish collect in pools during the dry season between May and October, when the river



withdraws to its main channels. After the floods return, the Lozi gather in a boisterous flotilla for the festival of Kuomboka. Their canoes follow the Lozi king as he and his family move by barge to a home on higher ground.



the bush. Then we sat behind a downed tree and watched. Four elephants plodded past us. We followed them back to a boggy area adjacent to the river. Gathered near the bog were more elephants, some waterbuck and eland, three zebras, some Cape buffalo, as well as baboons and herons and wild dogs—all sharing one source of water.

One day, paddling near the middle of a broad stretch of water below Mana Pools, we saw an enormous black mountain of seamless storm clouds advancing and made for the closest bank. The wind whipping against the current created a short breaking chop that began to slop into our boats. Within minutes we were swamped, our canoes still afloat but brimming like bathtubs. Instead of trying to bail, which would have been useless, we kept ourselves upright by bracing with our paddles as we stroked. Dangling arms and legs could attract crocodiles.

"Crocodiles are opportunists," Alastair said, as we draped our gear over hot rocks to dry it in the blazing sunshine that followed the storm. "I saw a croc bite someone's paddle a month ago. Must have thought it was edible."

The days passed slowly, with sun and storms and heat, and nights with streaks of lightning and bright stars. Gradually the stream narrowed toward Mpata Gorge, so narrow in places you can throw a stone from one side to the other.

On the Zambian side I saw small clusters of mud huts and some good-size villages—men in dugouts fishing with nets, women working in gardens, growing corn, children lugging buckets from the river to water the crops. I drifted along with the clusters of floating hyacinths—some like tiny islands—under the high Zambezi Escarpment. This ridge diminishes from a great green fortress-like wall to an assortment of low hills farther downstream. On my last day of paddling I reached Kanyemba, the place where three countries meet: Zambia, Zimbabwe,

and Mozambique. I could see a hill just past the point where the river twisted into Mozambique, the last country it touches.

THE ZAMBEZI flows for 630 miles in Mozambique, though for upwards of 30 years three guerrilla wars closed this hinterland. Millions of people were either killed or displaced, bridges blown up, communications shattered, roads closed, towns and villages depopulated by massacres. Because of this civil war the Mozambique Zambezi, from Zumbo to the delta in the Indian Ocean, and the main tributary, the Shire River, were inaccessible. Throughout the war the interior of Mozambique was a heart of darkness.

That was a great shame, for this part of the Zambezi is so important historically. Livingstone sailed a paddle steamer upriver from the delta to Tete and also up the Shire, the first Westerner to do so, raising his hopes that the whole river could be navigated.

The Zambezi and the Shire had allowed Livingstone to penetrate the African interior with all its marvels—Lakes Chilwa and Malawi, the country now called Malawi, the Shire's labyrinthine marsh with its abundant elephants, and the mountain Morrumbala, or "lofty watch-tower," a solitary 4,000-foot-high sentry post in this riverine fastness.

In the dry season last year one of the first descents in a motorboat down the Shire and into the Zambezi was made by a Malawian-British expedition co-led by Capt. Chris Marrow. Marrow is an Englishman who supervises Mariners, an aid agency reestablishing ferry and barge services, virtual lifelines, along the Zambezi in Mozambique.

Two months after Marrow's expedition Alastair and I paddled down the Shire from Nsanje in Malawi through the confusing web of marshes and into the Zambezi. We were able to accomplish this only with the help of two Malawian paddlers, Karsten Nyachikadza and Domingo Mon, who guided in their dugout canoe.

"Don't walk far," Domingo said, when he saw me heading into the bush to relieve myself. "There are bombs all over."

He meant land mines. The peace agreement had been signed in 1992, but thousands of land mines remained. Every bridge I saw in rural Mozambique had been blown up—some had been replaced with flimsier spans, others not at all. The entire north-south railway network that had crossed the Zambezi was a rusty ruin. I saw the roofless houses, the old scorched and windowless villas, the deserted farmhouses, the tipped over locomotives. But the waterways were open.

"We go to the Zambezi all the time," Karsten Nyachikadza told me.

"What are the problems we'll have on the river?" I had asked. "What about hippos?"

He laughed. There weren't many hippos, he said. The people had eaten most of them during the war. The crocs would not bother us. I was touched when he said, "The people are good."

"No problems, then?"

"The wind," he said. "Just the wind."

The wind came up each afternoon—the same prevailing easterly I had cursed upriver, and this head wind slowed Karsten and Domingo's big dugout and turned my kayak into a clumsy weather vane at times.

We camped at the edge of riverside villages—always asking permission—woke each morning at 4:30, folded the tents and packed the boats. We pushed off before five, at first light, paddling and drinking

Protein for the people, sardines head for drying racks, part of a nightly catch from dam-impounded Lake Kariba. Industry is scarce on the Zambezi. Diseases such as malaria have kept its banks better suited for wildlife than for dense human habitation.

Adrift in thought, Beauty Nalumeno Musiyalike nurses her baby before church. "People believe in God, but they believe more in witchcraft," says a priest about unchanging ways on the river. "Ki mo ku inezi," locals explain: "That's life."

river water and peeling the small mangoes that were just being harvested. We had lunch in the boats too, and pushed on until the wind came up. Then we looked for a likely village, introduced ourselves from our boats, and were welcomed ashore by the locals who waved us in.

We pitched our tents and broke out our food boxes and built a cooking fire and had a proper meal—a pot of the plain, starchy corn flour mixture, called *nsima* here, which we ate with fish or vegetables. As soon as the sun set and the mosquitoes descended, I crawled into my tent and listened to my shortwave radio and fell asleep by eight o'clock, dead from the day's strenuous paddling.

We threaded through the Ndindi Marsh, heading toward the Zambezi on waterways as narrow as creeks, with tall grass brushing us from both sides. The "vast herds" of elephants that Livingstone saw no longer existed—indeed we saw few large animals along the Shire, except for a few hippos and many crocodiles. The others have been killed or displaced.

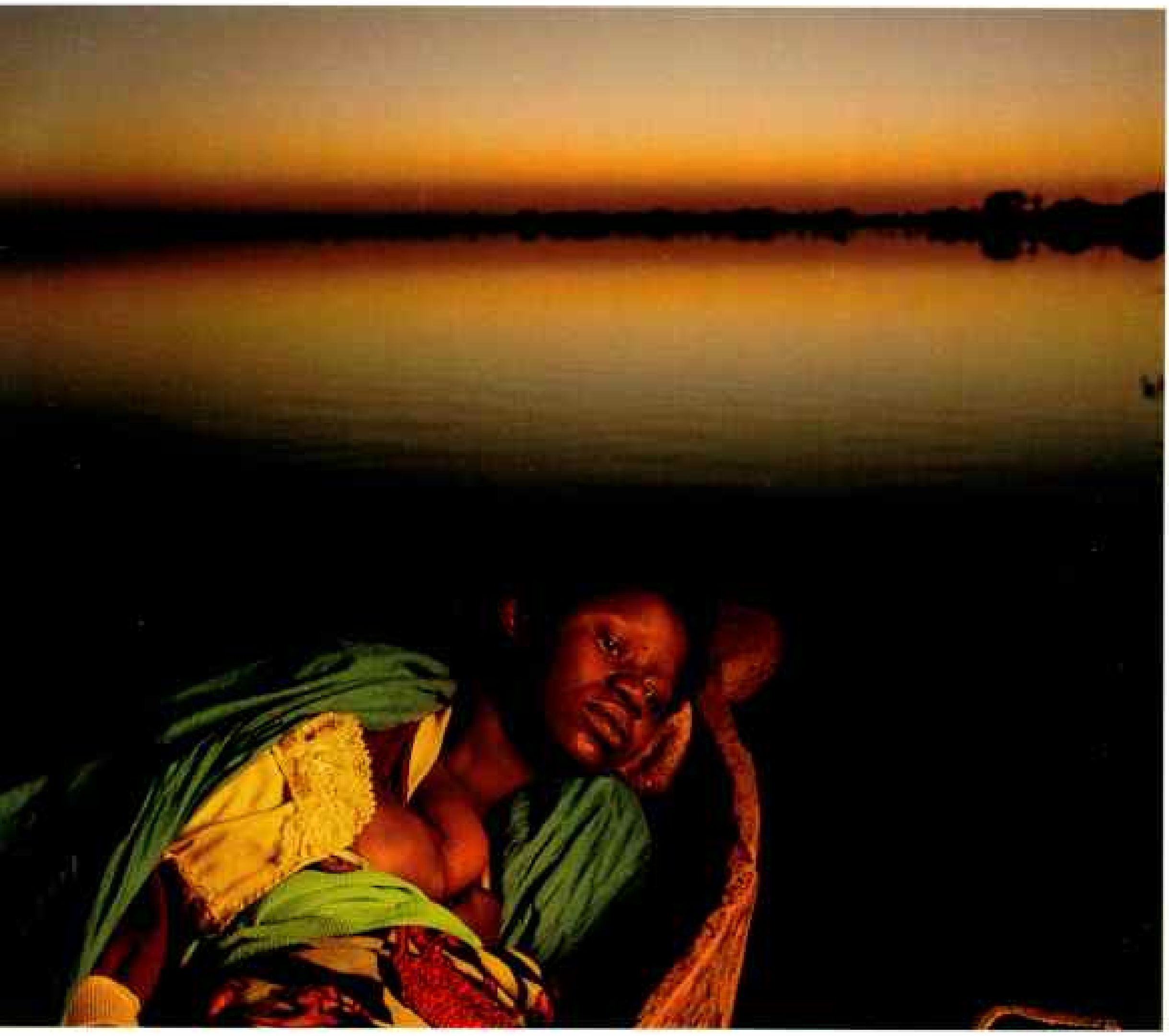
"We're going to the Zambezi!" Karsten called out confidently to the people on shore or in dugouts, as he shoveled at the river with his lollipop-shaped paddle.

The people greeting us were a community of marsh-dwelling Africans, perhaps 2,000 of them, the sprawling Sena nation, whose precarious settlements were not on any map. No road, no school, no church betrayed the Sena's existence. When they wanted to sell fish or buy nets or cooking pots, they paddled upriver to the markets in Malawi; when they bartered their fish for bags of sugar, they loaded their flotilla of dugouts and rode down to Mozambique, sometimes to the Zambezi.

"We don't need passports, Father," Karsten told me, explaining how the locals pay little attention to borders.

They come and go, from country to country, without passports—without even saying where they are going. But I was more conspicuous. At the international border, the tiny riverside depot of Megaza with its mud huts and abandoned collection of ruined riverboats and clouds of mosquitoes, I had to go through the strict formality of Mozambique customs and immigration. This was in the open air, under a mango tree. There was a commotion in the tree—ripe fruit dropped onto the official table. A rat in the branches, nibbling fruit, kept interrupting the proceedings.

Back on the Shire, for many miles we could see Morrumbala, which is more a plateau than a mountain. Livingstone called it "salubrious," and there used to be farms and fruit orchards at the top. How had the



Portuguese gotten up and down the mountain, I wondered?

"They were carried by Africans," the villagers said.

REMNANTS of the Portuguese colonial presence, abandoned houses and plantations, straggled on the banks. We camped in villages of the Sena people that seem as remote today as they were in the time of Livingstone. Lives follow the traditional pattern, the men fishing in the river to the cries of birds and the women and girls grinding corn: That rhythmic thud of the pestle and mortar is like a heartbeat on the river, the same here as on the upper river.

After five days of heat and mosquitoes on the muddy, slow-moving Shire, I looked up one noon and saw the river turning a corner, entering the Zambezi—clearly the Zambezi, for it was half a mile wide and tumbling down from Tete on its way to the sea.

Livingstone believed that the whole Zambezi was navigable. He was mistaken. He would be surprised that no ships ply the river; he would be startled by the hydroelectric schemes at Kariba and Cahora Bassa and by the towns on either side of the falls. But much of the river would be instantly familiar, for so little has changed. □

AMERICANA

COUNTY FAIRS

BY JOHN MCCARRY

PHOTOGRAPHS BY RANDY OLSON

ON A BRILLIANTLY SUNNY DAY in August several dozen Future Farmers of America and 4-H'ers struggled, one by one, to get their lambs and steers and hogs to walk in a circle at the swine barn of the Kitsap County Fair in Bremerton, Washington. An auctioneer perched atop a platform made from bales of hay was selling off the animals by the pound.

A hog had just sold for top dollar to Safeway when Matt Muzzy, a skinny 12-year-old with cropped blond hair, yanked his lamb, Butthead, into the arena.

"Now, who's going to help this young man out?" the auctioneer asked from his lofty perch. "He needs the money so he can go to the National Boy Scout Jamboree in Virginia next summer and get a badge."

And the auction began. Speaking at 78 rpm, the auctioneer launched into an alliterative litany of numbers. His voice grew tenser, his breath shorter as the numbers pushed upward. And then his voice hesitated, briefly, at $6.50 per pound. The auctioneer scanned the group of people crowded around until, finally, from the corner of his eye he saw a hand furtively rise from the back of some rickety bleachers. "Sold!" the auctioneer cried.

I caught up with Matt outside the sheep barn. He was breathless; his cheeks were flush. The throaty protests of the animals were joined by the crowd noises drifting over from the midway. The breeze rolling in off Puget Sound carried the edgy sweet smell of fair food all jumbled up with the rich odors of the barnyard.

I asked Matt if he was happy the way things had turned out. He smiled, a glinting semicircle of orthodontia.

"You bet!" he said. "Last year I only got $3.11 a pound."

But wasn't he going to be a little sad to see his lamb go? Matt rolled his eyes. "It's hard to get attached to a lamb called Butthead," he said and, giving me an "Are you done?" look, sprinted off toward the lights and music of the midway.

Fair time: That moment between summer and fall when young 4-H'ers sell off their lambs, when proud farmers bring in their fattest pumpkins or prettiest ears of corn and let them be judged against the efforts of their neighbors, when kids across the country lose themselves in the fantasy world of the carnival.

America's first county fair was organized in Pittsfield, Massachusetts, in 1811 by a gentleman farmer named Elkanah Watson. Concerned that Americans were falling behind Europeans in farming and

A century ago a parading brass band and 83 yoke of oxen opened the Tunbridge World's Fair. These days stock showing, pony pulling, midway glitter, and big-name grandstand acts fill this quiet Vermont valley with bumper-to-bumper crowds. Blending community traditions with entertainment spectacles, county fairs thrive across the United States.

A glittering slide and whirling "Skydiver" lure attention from the business of poultry and sweet potatoes as Alabama moonrise transforms the Cullman County fairgrounds. "Folks come 44 miles up from Birmingham," says fair manager Odie Johnson, "just for the rides."

animal husbandry, Watson invited local farmers to compete for best livestock. Two years later, he encouraged women to contend in homespun in an effort to lessen their dependence on European products. While Watson was essentially concerned with the sober issue of agricultural edification, he also encouraged an air of festivity, organizing parades and, eventually, pastoral balls. As county fairs sprang up across the United States, these annual events became larger, more entertainment oriented—and the social event of the rural year.

Today less than 3 percent of Americans are directly engaged in farming. Yet county fairs endure as an occasion to celebrate our agrarian traditions, to honor family, inventiveness, and hard work. More important, perhaps, they allow us, as communities, to come together and get to know one another.

County fairs also give us a chance to glimpse the American past. Yet they have lasted not by being annual historical reenactments but by evolving as American society evolves and becomes more urban.

In the summer and fall of 1996 I visited four county fairs scattered across the U.S.—in the Northwest, New England, the Midwest, and California. Whether in farm country or areas with more diverse economies, most of these fairs thrived as local people got together to reward one another for their small accomplishments, to celebrate their subtle regional differences, to compete gently. If a fair had momentarily faltered, it was perhaps because it was struggling to understand what kind of community it had found itself in.

I SPENT THE LATTER PART of my childhood in Northampton, Massachusetts, a city of 30,000 people in the western part of the state. My three brothers and I would eagerly await fair time—my eldest brother so he could show his Morgan horses, the rest of us just to spend the five bucks our parents gave each of us for the event. What I remember most was the elusive promise of winning the big stuffed Tweety Bird from the carny who kept urging, "Just give her one more try, kid; you'll be sure to get it next turn. Thataboy." I never won the Tweety Bird, although each year I would blow my money—25 cents at a time—trying.

For the first time since I was a kid, I returned to the Three County Fair in Northampton. I bought a ticket—entry alone was now five dollars—from Gordon Shoro, a local man in his 60s who has worked at the fair the past couple of years. I asked Shoro why he decided to help out at the fair.

"It takes me back," Shoro said. "I remember coming here when I was ten years old with only 52 cents in my pocket. I used to sneak in through a hole in the fence and then run like heck." Shoro, a gentle, quiet-voiced man, shook his head. "I don't know. It kind of seems to me there was more to see then. The chance booths were easier to win. And I knew everyone by sight. Now I hardly know anybody. This used to be more of a family fair. Can't get the kids to come nowadays."

One reason may be that Northampton, a market town with limited agriculture around it, has a lot of the upscale amenities of a big city. Young people, mostly students from the five nearby colleges, drift in and out of the ethnic restaurants, espresso bars, cybercafés, and pricey boutiques along Main Street. Very few are aware that less than a 15-minute walk away lie the grounds where one of the oldest continuous county fairs in the U.S. has been operating since 1818.

For years the biggest draw at the fair was the racetrack, but these days it's hard to get enough horses together to run the races. Passing through the entrance gates, I immediately came upon the track. Knots of people pored over racing forms, smoking cigarettes down to the filters, or sat on lawn chairs facing TV monitors, drinking beer from big plastic cups. There appeared to be more losers than winners on this gray day: A woman in a pair of stretchy lime green pants, a scarf knotted under her chin, kicked angrily

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Freelance writer JOHN MCCARRY and photographer RANDY OLSON are expanding their county fairs coverage for a National Geographic book to be published later this year. Randy Olson's work also has appeared in newspapers, books, and two previous NATIONAL GEOGRAPHIC articles.

Appetites undampened by rain, visitors to Iowa's Clay County Fair graze among scores of food stands in a straw-slurping, chocolate-coated, on-a-stick, nine-day snack marathon. Winner of more than five dozen Humboldt County, California, gardening prizes, 93-year-old Mary Coppini (below) has now retired from competition, making way for other ribbon-hungry green thumbs.

Accustomed to the pace of horse-drawn buggies and plows, Ohio Amish women watch a professional harness racer blur past on the Geauga County fairgrounds' half-mile track. Later they'll cheer as their men take up the reins for a high-wheel-cart challenge that highlights the Labor Day race card.

at the litter of empty plastic cups and discarded racing forms scattered across the asphalt; another, lugging an outsize plastic shopping bag, muttered to herself, "Worse than a house of pain."

I walked along a muddy lane where a handful of pitchmen were trying to get the

attention of a thin stream of passersby. I saw a woman hawking some sort of 20th-century snake oil and a man demonstrating an Electrolux vacuum cleaner.

At the far end of the fairgrounds, back near the rest rooms, Capt. Russell J. Myette stood at attention. Dressed in Union blue with a red stripe running down his pant leg to identify him as an artilleryman, Myette posed next to a reproduction of a 19th-century cannon, arms folded squarely across his barrel chest.

Born and raised in Northampton, Myette had worked as a maintenance supervisor for 38 years. After retiring in 1995, he devoted himself full-time to his living-history project. Taking their encampment all over the state, he and 13 other history buffs visit schools and teach young people about the Ninth Massachusetts Light Artillery, which suffered 37 casualties while making a valiant stand at Gettysburg.

Myette has invested $55,000 in his living-history display, which fills three trailers and takes four and a half hours to set up.

Here in Northampton all of this effort appeared to be almost for naught. "I don't know what's happened to us," Myette said, his voice sinking to a husky whisper. "Our sense of community seems to be gone. This fair here should be a reason for us all to come together, to teach one another things. But all anybody cares about are those horse races. The old-timers just don't care anymore. I see people I've known since I was a kid walk by and not even bother to take a look at my exhibit."

I left the fairgrounds through a modest wooden gate that was once the fair's main entrance. Is this what's happened to the fair of my childhood? Is this what's happened to America? I wondered as I walked along Route 9 toward Main Street and its crowds, feeling as dark as the ribbon of blacktop that stretched before me.

JUST INSIDE THE ENTRANCE to the Clay County Fair in Spencer, Iowa, a semicircle of a hundred or so John Deere tractors glinted yellow and green in the dying afternoon light. Stationed at the top of this enormous horseshoe were Edward Morisch and his son, Michael. I asked Edward, a solidly built man with green suspenders and a John Deere cap, how they had gotten involved in the Northwest Iowa Two-Cylinder Club.

"Memories," Edward replied. "A few years back I saw an old B-John Deere advertised in the paper, and I recalled that back in the 1940s my dad traded in his pair of horses for his first tractor. It was a B-John Deere."

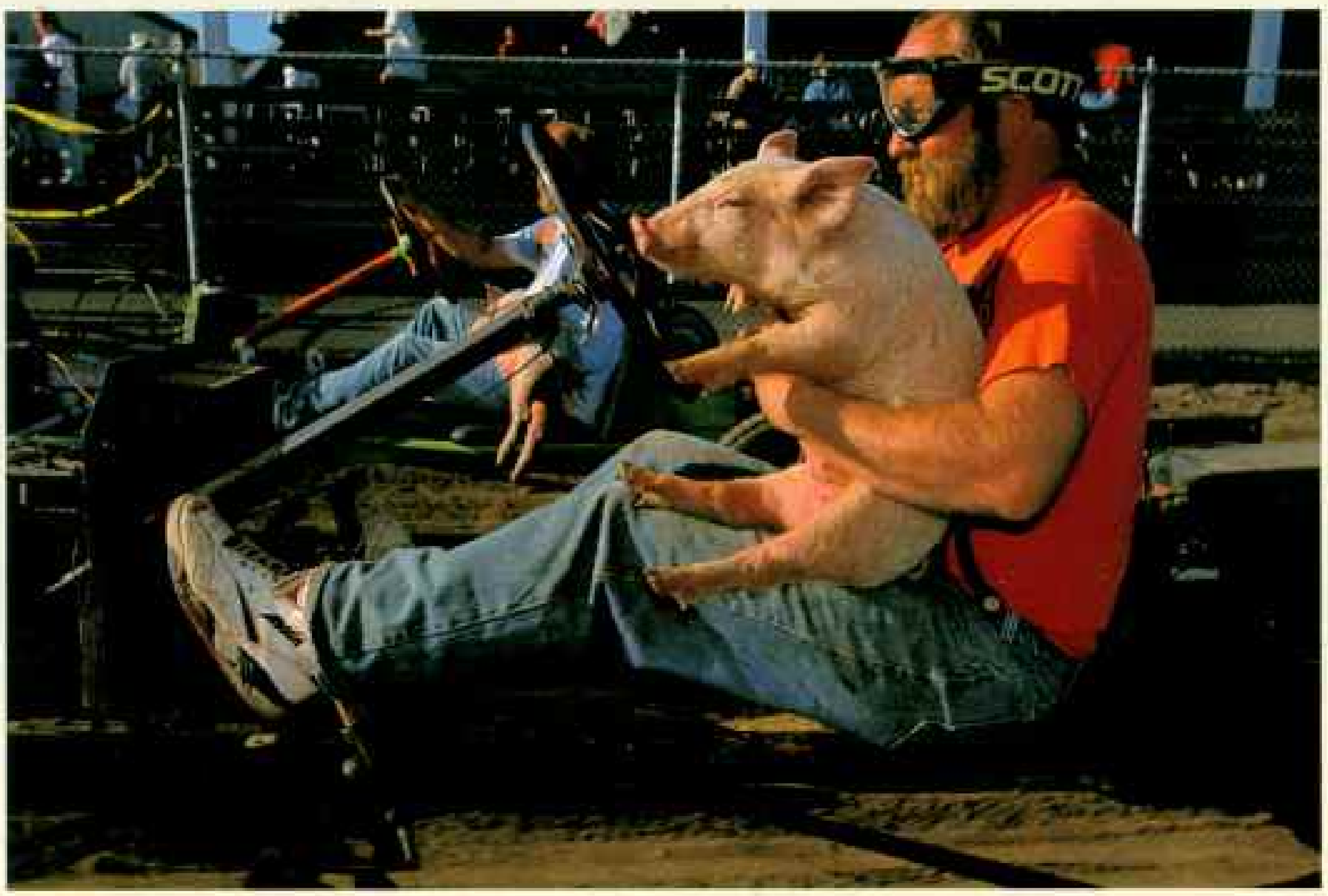
Michael added, "A lot of people did that, traded in their horses for B-John Deeres because they worked better with horse-drawn implements than other tractors. And maybe because of that, people are very close to their John Deeres. Just like people and horses, there's that deep kind of connection."

I asked the Morisches if they took their club's tractors to other fairs. "Nope," Michael said. "This is the only fair we do because

Warming up their waves at the state fair, Minnesota's regional dairy princesses have their likenesses carved in 85-pound blocks of butter. Anna Vander Kooi (below) first saw the sculptures when she was ten. "Those butter busts inspired me!" Preparing for the Nobles County Fair (facing page), Anna grooms a prizewinning heifer. "But I'd exhibit my animals even if I wasn't a dairy princess."

Eager to reach Oregon's Curry County Fair, young John Swenson coaxes his lamb and calf toward a livestock trailer. In fair competitions—serious or whimsical—agricultural communities honor their members' stalwart labors and celebrate the abundance they produce.

Managing your pig with poise (while keeping an eye on the judge) matters far more than the pig's looks in the Del Norte, California, swine showmanship contest. Drivers in the Pig-N-Ford Race (below) in Tillamook, Oregon, also struggle with swine control as they brace for takeoff in their Model T's. With a docile heifer on a short lead, Vermonter Anne Burke (opposite) is more relaxed.



this is the only fair in the area worth doing."

After five days in Spencer, I concluded that it would be near impossible to find anyone who would disagree. Just like farmers and their John Deeres, there's a deep kind of connection between the people of Clay County and their fair.

Although the population of Spencer is only about 12,000, the fair draws some 300,000 visitors. Once a year, rising from the endless flatness of the Iowa countryside, a crowd forms—to stroll, to hear big country music acts like the Statler Brothers, to sell a grand champion boar, to buy a new silo.

In recent years, however, the fair has served another function: to keep everyone together. Since the farming crisis of the 1980s, when many banks overextended credit to farmers and then had to foreclose on those not able to pay back their loans, the fair has given farmers something to be proud of. As one fairgoer said: "You know, out on the East and West Coasts they get all these new ideas that ain't new at all. It takes a village? Hell, we've known that in Iowa all along."

The Clay County fairgrounds even look like a village, with handsome brick buildings and lawns and uniform street signs. Within the large buildings fairgoers can buy car wax or sets of dinner dishes, but most are interested in products that will make their farms more productive. In a pavilion where more than a dozen seed companies competed for attention, Marc Whipkey, seed salesman, told me: "This is the farmers fair. People come here to wheel and deal in machinery, equipment, seeds."

Like most county fairs, the Clay County Fair is a not-for-profit endeavor that relies on volunteers like Mary Christensen, who lives on a nearby farm. Christensen stood behind a display case of cookies and pies. An old woman was peering inside the case, her nose against the glass, intently examining a cake baked to look like a loaf of Wonder Bread in its wrapper. She looked up at Christensen and said, somewhat testily, "Back in 1930 they used to sell the cakes after they were judged," and shuffled off.

Christensen seemed unfazed. I asked how long she had been coming to the fair. "Forty-five years." And how long had she been volunteering? "Fifteen." Did she enjoy working at the fair? "We all come back. I guess something must bite ya." Preparing myself for a telegraphic reply, I asked why she volunteered.

Christensen looked at me for a long moment: "We're proud of our fair. We want to keep it going. People start talking 'fair' months in advance. The 1980s were hard on farmers. The fair forces us to stick together."

PAUL CASH, ECO-MAGICIAN, sat on a tree stump at the "Caring for the Land" exhibit, on the edge of the 487-acre grounds of the Los Angeles County Fair. In Cash's act rabbits do not vanish by some kind of legerdemain but because of environmental degradation.

Has the fair been good for Cash? "Oh sure. It's great exposure. And it's steady work. I'm doing three shows a day for 24 days. But I think the rabbit is beginning to get a little burned-out. Right now I'm looking for another rabbit, so if this one gets really stressed, I can give her some time to just kind of mellow out for a bit."

The Los Angeles County Fair evolved from a commercial-industrial show first held along the Southern Pacific Railroad siding in downtown Pomona in 1921. In 1996, more than a million people visited, making it the largest county fair in the United States. With eight hangar-size pavilions, a grandstand, a major

horse-racing facility, 12 acres of carnival grounds, and an eight-story hotel, the fair has remained faithful to its commercial origins.

Before the Second World War, dairies and orchards flourished in L.A. County. Now, amid the urban sprawl, only a few farmers with tiny specialized plots remain. Yet the fair survives—not so much as an agricultural event but as a buoyant celebration of the diversity and energy of Los Angeles County.

To stroll through the Fairplex is to stroll through L.A., if such a thing were possible. Passing among the palm trees, I saw grab joints selling not only funnel cakes and corn dogs but also vegetarian tacos and Indian fry bread. To wash it down, I could certainly get a Coke—but why not a microbrew? Or a glass of Chardonnay from the Sonoma Valley?

In Fiesta Village, a re-creation of a plaza in a Latin American town, I watched a band perform Latin jazz. Poking around the shops on the square, I saw "Brown Power" T-shirts and Hispanic family shields. In the youth pavilion, Kids on Stage for a Better World—an outreach program of the Church of Scientology—sang a song by L. Ron Hubbard.

Back outside I wandered through the crowd, admiring the mission architecture, feeling the sun. A woman on stilts loped past, and a man riding a unicycle zipped by in the other direction. Someone handed me a flyer: "Don't let negative karma and experiences of a past life affect you in your present incarnation." I examined incense being sold by a Rasta with impressively long dreadlocks and thought about getting my picture taken astride a Harley-Davidson. "Only five bucks for a memory—what a deal!" the biker babe with the tattoos said.

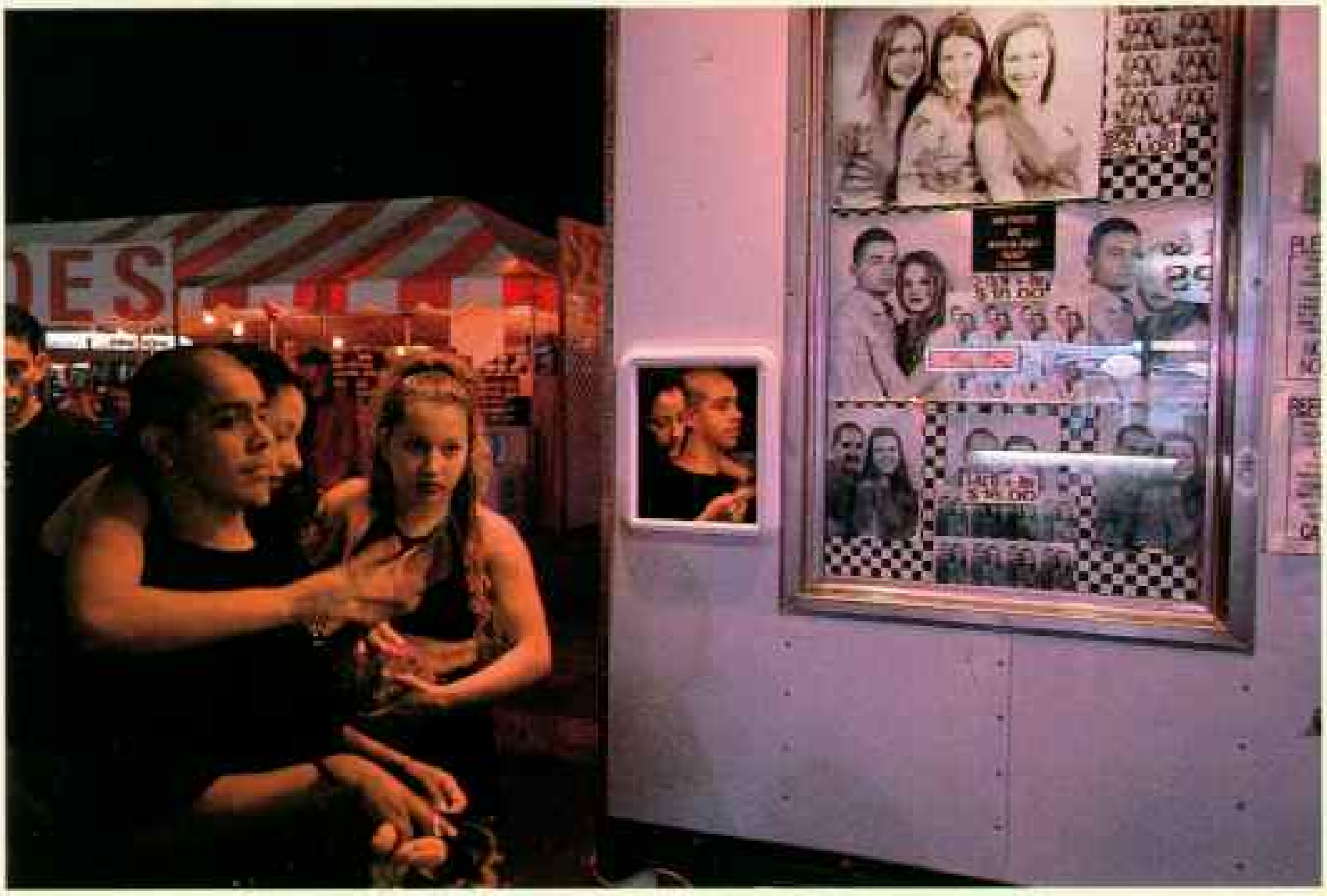
I walked over to the High Tech Expo, where scores of computer monitors glowed, luring passersby into cyberspace. Like a great postmodern bazaar, the pavilion was a crush of activity as computer wonks shouted for attention and fairgoers elbowed their way onto the information highway. In the middle of all this, Gordon Ross was selling the future.

Ross, who works for an investment corporation in Vancouver, has developed Internet software called NetNanny, which prevents hate literature, pornography, and bomb and drug formulas from reaching your computer terminal. A tall man whose intelligent eyes reflected the quick blue flicker of a computer screen, Ross explained, "You can't legislate the Net; it's impossible. So what NetNanny does is give mom and dad a sense of security by protecting the kids from cyber strangers."

Ross, it would seem, has developed an appropriate product for an America that long ago lost its innocence. In an era when cyber strangers lurk in a new dimensionless world, the county fair, that homely American tradition, thrives.

Although agriculture continues to provide a motif, county fairs today are less about farming than they are about community—however it may define itself. They are where we Americans can go, in our ever increasing diversity, and feel that we belong. □

Fire breathing still wows them in Ohio. Iowa heads turn toward a giant-screen TV when speakers broadcast squeals of delighted terror from "Ejection Seat" riders hurtling skyward. And amid the midway glitz at Los Angeles County's mammoth Fairplex, teenagers (below) line up for snapshots of family and friends when fair time comes to city streets as well as country lanes.



The Promise of

A Muslim whose orphanages and hospitals serve Pakistan's poor, Abdul Sattar Edhi has often been compared to India's Mother Teresa, but he insists he's no religious missionary. His nation, though, was forged by the fervor of Muslim nationalists who 50 years ago demanded, and won, an Islamic state of their own.

Pakistan

Bound by common belief, Muslims celebrate the end of Ramadan at Lahore's Badshahi Mosque. Born when Britain partitioned India in 1947, Pakistan gave Muslims a homeland and haven apart from

Hindus. "We are different beings," said Mohammed Ali Jinnah, Pakistan's founding father. "Our names, our clothes, our foods. . . . We challenge each other at every point of the compass."

Guns may guarantee a peaceful election day near the village of Sharqpur, but civilian rule hasn't guaranteed stability, with nine prime ministers serving Pakistan in the past ten years. Patience with parliamentary

democracy has worn thin too. Leaders have repeatedly abrogated or rewritten the constitution, and for half the years between 1958 and 1988 they enforced martial law.

Otherworldly terrain of the Karakoram Range makes for uplifting scenery, but the region's political landscape poses a dispiriting thicket of claims and counterclaims. Fifty years ago the area was part of the

princely state of Jammu and Kashmir. Since partition both Pakistan and India have claimed the state, fueling a dispute that has ignited two wars and that still resists a political fix.

BY **JOHN McCARRY**
PHOTOGRAPHS BY **ED KASHI**

FAISAL HASSAN sat with his eight-year-old grandson, Bashir, on the patchy lawn that stretches before the tomb of Pakistan's founding father. Resting beneath an almond tree in Karachi, the two gazed from their uneven circle of shade as men and women, teenagers and children dressed in the long tunic and baggy trousers that is Pakistan's national dress climbed the series of steps leading to the domed mausoleum where Mohammed Ali Jinnah, the Quaid-e-Azam, or Great Leader, lies at rest.

It was March 23, and on that same day back in 1940 Jinnah, then president of the All-India Muslim League, the political party of colonial India's Muslim minority, called for the creation of a sovereign homeland for the Muslims of the Indian subcontinent. When the British quit India seven years later, the territory was divided into two independent nation-states, Hindu India and a Muslim Pakistan split into two halves; East Pakistan, which was separated from present-day Pakistan by a thousand miles of Indian territory, seceded in 1971 to become Bangladesh. A little more than a year after the creation of his dream nation, Jinnah died of tuberculosis, leaving Pakistan in search of direction.

Looking for a reprieve from the heavy afternoon sun, I invited myself to sit with Hassan and his grandson beneath the shade of their tree. Sharing a small newsprint envelope of roasted corn kernels with me, Hassan told me that he comes once a week to the tomb of the Quaid-e-Azam to find *sakoon*—peace.

A shrunken man whose thinning hair had been colored red with henna, Hassan, speaking in Urdu, Pakistan's national language, said, "I have brought my grandson with me on this day so that he too can understand the meaning of the word 'sakoon.' It is an important word for me because it is the gift that Pakistan has given to me. I came here myself the same year that this country was made, in 1947. There were lots and lots of people coming to Pakistan at that time, on foot, on bicycles, in trains, with all of their things stacked up high, with their animals. I hid in the back of an oxcart with ten other people; I'm the only one left alive."

In the few—but cataclysmic—weeks before and after the division of the subcontinent, some 15 million people uprooted themselves in what was probably the most massive transfer of people ever, with Hindus moving out of what would be Pakistan and Muslims moving in.

Faisal Hassan looked for a long moment at his grandson, who was staring at him with large, liquid eyes, before continuing. "There

A kick to the head requires no translation, which partly explains why foreign martial arts movies like *Lady Punisher* enjoy cult status in Rawalpindi (right) and throughout the country. Although the Board of Film Censors weeds out any movies that undermine Islam or malign Pakistan, plenty of mauling and mayhem gets through.

JOHN McCARRY, a frequent contributor, wrote about the Hunza region of northern Pakistan for the March 1994 issue. San Francisco-based ED KASHI has photographed subjects ranging from water issues in the Middle East to the Kurds and, most recently, Beirut (September 1997).

was a lot of fighting in India then," he said gently. "People would hit you if they found out you were Muslim. It was an unhappy life. When Pakistan was created, Muslims were overjoyed to have a place where they could go, where people wouldn't hurt them just because of who they were. We only wanted to be free, and now, Praise Be to Allah, we have our freedom."

Hassan looked up at the white marble dome of Jinnah's mausoleum, almost blinding in the stark afternoon light. "The Quaid-e-Azam was a great, great man," he said. "When he died, so soon after his dream of Pakistan came true, the entire nation wept."

I could not help asking: Would Pakistan be a different place had the Great Leader lived? The old man smiled at me indulgently and opened his palms toward the heavens. "It was the will of Allah that he should die when he did."

PAKISTAN is a nation founded on faith. Faith here is a literal faith, a faith in one God, Allah, and in the teachings of his Prophet, Muhammad. But I find there also exists another kind of faith, a deepening faith in the survival of the nation, whose birth was so traumatic. After years of intermittent military rule, Pakistan has had an uninterrupted period of democracy since 1988, when former Prime Minister Benazir Bhutto—the first woman to lead an Islamic state—was first elected. In fifty years the idea of Pakistan seems to have touched each of the five major ethnic groups—the Punjabis, Sindhi, Pashtun, Muhajirs, and Baluchi—who make up the country's 140 million people. Nevertheless the sort of economic prosperity that has swept East Asia, creating tigers out of countries like Malaysia and South Korea and Singapore, has yet to find its way to the nations of the

Paint and plastic convert a truck into truly moving folk art (and a fanciful windbreak for its bushed, blanketed driver). Many privately owned trucks display such handiwork, which often include elaborate murals with secular and sacred themes.

subcontinent. While Pakistan's per capita income of $460 is above India's $340, it is well below Thailand's $2,740.

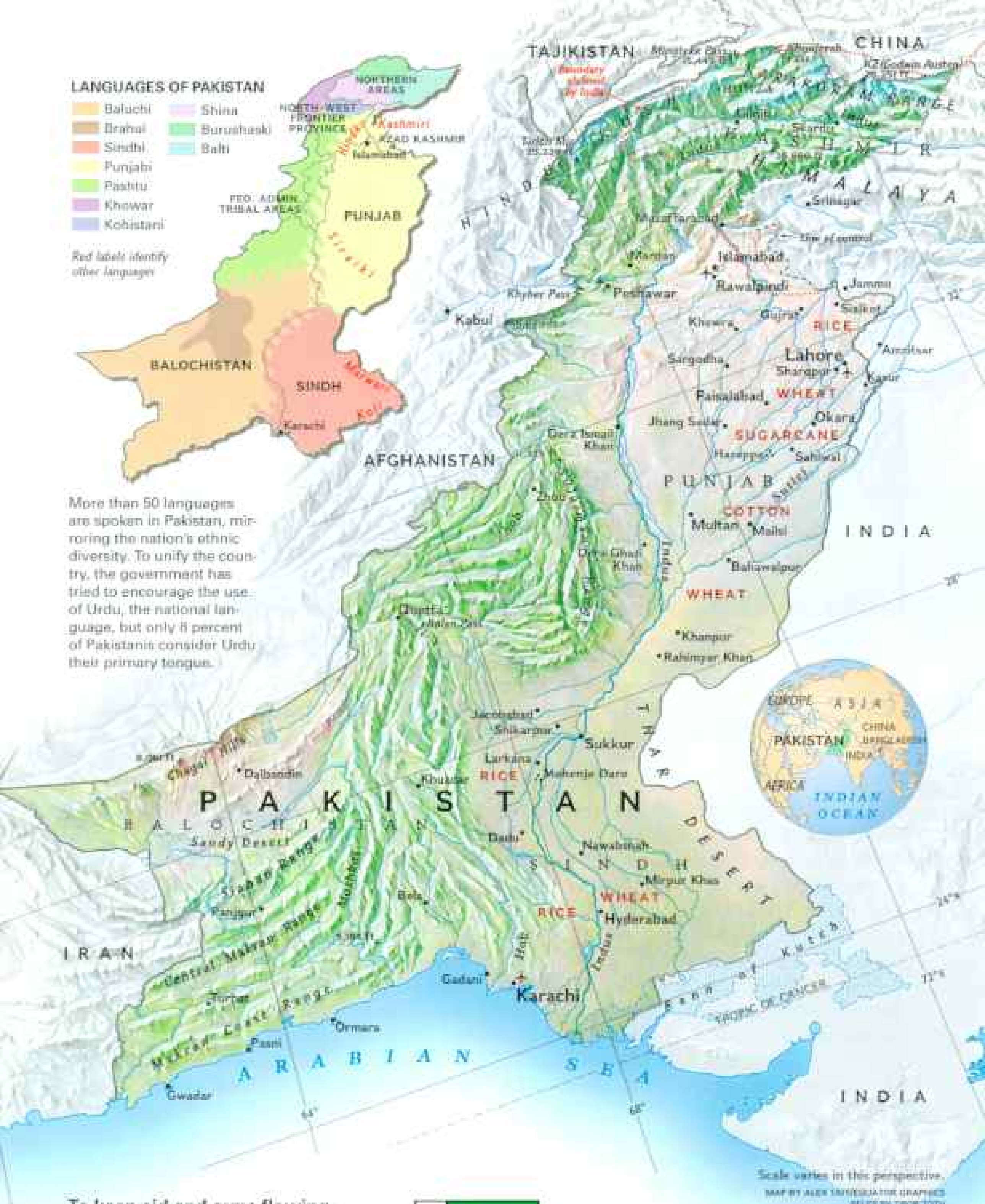
I have visited Pakistan several times over the past decade, and it is, I realize upon reflection, the extraordinary vibrancy of the bazaars in the great city of Karachi that keeps drawing me back. A walk through the bustling, hot streets is not only a thousand different sensations—the sweet sound of a reed flute, the contorted voice of a man in a turban hawking a pushcart full of mangoes, a whiff of sandalwood, a dense knot of diesel fumes—but also countless small human interactions.

It is to be invited by people you've never met before for a cup of tea; it is to struggle to convince a well-meaning stranger that just because you've mentioned that you like his sandals doesn't mean he has to take them off his feet and give them to you; it is to be hugged by a *fakir*, or holy man, dressed in a long tunic of shimmering electric green material, strings of beads around his gaunt neck, and blessed; it is to have a boy, holding a tray of sweets aloft with one hand, zoom past on a bicycle and cry out "Oprah Winfrey!"; it is to have schoolchildren in uniform walk up and, practicing their English, scream up at you: "One two three four five six seven!"

And it is to have people, at the least provocation, share with you their dreams, just as Muhammad Khan, a Pashtun from the North-West Frontier Province, did with me. Khan, 18, works in a noisy eatery that, like many such mainly lunchtime establishments in the subcontinent, is, mysteriously, not called a restaurant but a "hotel." Shuttling demitasse-size cups of sweet, milky tea to the boisterous tables, Khan, a tall man with pale skin and green eyes, paused to tell me about himself. He recounted a story I had heard countless times before—how his uncle had been the first in his family to come to Karachi in search of work; how, having secured a job as a night watchman, he had brought Muhammad Khan's elder brothers, and then, eventually, Muhammad Khan himself to live with him in his small dwelling on the outskirts of the city. The story ended just as all the other such stories, with Muhammad Khan finding not just a job but a new identity too.

"I am a Muslim first, then I am Pakistani, and then I am a Pashtun," he said. "It was in coming to the city that I learned this. In the village where I am from, our elders are poor farmers. They think in terms of the village, and that's it. They don't look into the future." He indicated the busy tables around him, where young Pakistanis of all ethnic backgrounds sat together. "Pakistan is *our* future," he said.

BY HIS OWN ADMISSION Jinnah received "a moth-eaten" country. The western provinces, or what would remain Pakistan after the secession of Bangladesh in 1971, were, with the exception of the fertile Punjab, a mosaic of mostly arid landscapes and inhospitable mountains. The young nation inherited little of the British raj's industrial infrastructure and had few educated or skilled workers. Most of

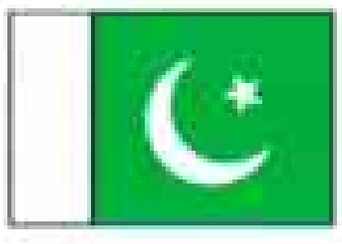


More than 50 languages are spoken in Pakistan, mirroring the nation's ethnic diversity. To unify the country, the government has tried to encourage the use of Urdu, the national language, but only 8 percent of Pakistanis consider Urdu their primary tongue.

Scale varies in this perspective.

MAP BY ALEX TAYLOR/NATIONAL GEOGRAPHIC
RELIEF BY THOR TOTH

To keep aid and arms flowing, Pakistan has presented many faces to the West: A bulwark against Soviet expansion in the 1980s, a strategic ally near the oil-rich Persian Gulf, a moderate Islamic state in a region torn by religious nationalism, and a geopolitical power that might brandish nuclear weapons.



AREA: 307,374 sq. mi.
POPULATION: 140 million.
CAPITAL: Islamabad.
ADULT LITERACY: 38%.
AGE DISTRIBUTION: 41% younger than 15 years.

LIFE EXPECTANCY: 60 years.
ECONOMY: Textiles, food processing, chemicals.
RELIGION: Sunni Muslim (77%), Shiite Muslim (20%), Christian (2%).

Learning Urdu and English puts this boy in the Hindu Kush leagues ahead of most children in the countryside, where schools enroll only 47 percent of boys under age 10 and 31 percent of girls. Here many poor families withdraw their children so they can go to work.

those were Hindus, who had fled en masse for India. Great parts of Punjab and areas of the Sindh were ruled by a medieval feudal system in which single families owned vast lands and held immoderate power. In the North-West Frontier Province and Balochistan an age-old tribal culture predominated.

Almost immediately after the partition of the subcontinent, Pakistan and India went to war over Kashmir, a mountainous region whose population had been Muslim since the 14th century. The dispute continues, and a sizable amount of Pakistan's budget—about 5 percent of the gross domestic product—goes into defense against its much bigger neighbor, which tested its first atomic bomb in 1974. American military aid, heaped upon Pakistan during the Soviet occupation of neighboring Afghanistan, was abruptly suspended in 1990, when the United States announced it could no longer certify that Pakistan hadn't developed an atomic device of its own. The Pakistani government has long denied that it has a nuclear weapons program.

Until 1947 Pakistan had mainly been a source of raw materials for the rest of India, and considering that the nation had to build itself more or less from scratch, its development over the past 50 years, although slow and fraught with difficulties, has been notable. The economy grew at 6 percent a year during the 1980s and early 1990s, one of the highest rates in the region. An expansive irrigation system has made a fifth of the nation arable, and agriculture leads the economy. Manufacturing, principally textiles and yarnmaking, is concentrated around Pakistan's two biggest cities, Lahore and Karachi, the capital until federal authority was shifted to Islamabad, a Brasília-like conception in Punjab.

Nonetheless Pakistan confronts intractable problems, not least of all poverty. The population has increased fourfold since independence and continues to grow at around 3 percent a year. What's more, 3.3 million Afghan refugees flooded in during the Soviet occupation of their country—along with countless Soviet- and American-made weapons and a heretofore

"Perseverance Commands Success"—that's the motto, at work and play, of Aitchison College, an all-boys school in Lahore. Originally established to turn children of the aristocracy into leaders of what was then British India, the school now calls itself "avowedly Islamic."

nonexistent heroin trade. Despite the essential egalitarianism of Islam, the official religion, concepts of status and caste, some of which date back thousands of years, still exist. What is termed by critics in the country the "sahib culture," in which the few and privileged hold not only enormous wealth but also inordinate influence, has permitted corruption and cronyism to go unchecked.

AS THE COUNTRY has grown, so have its cities, most spectacularly Karachi, ballooning from a quiet, provincial settlement at partition to a megacity of more than ten million today. City life has been attended by rising prosperity, expanding educational possibilities, and the incipient breakdown of an age-old system of agriculture.

But an increasingly urbanized Pakistan has experienced traumas, most notably the civil unrest in Karachi that began in the mid-1980s and flared again as recently as last spring. In more than a decade of violence, thousands have been killed.

Despite the violence, the city has remained energetic with the kind of activity that has made it the country's economic powerhouse—and the vanguard of change. The heart of this metropolis, which continues to expand hungrily into the surrounding deserts of Sindh, lies in a congested area known as Saddar. When the British wrested control of Sindh from the Talpurs in 1839, Karachi was little more than a sleepy fishing port. The British began to build Saddar as a commercial area for themselves, apart, as was their habit, from the existing "native" bazaars. Christians from Goa and Parsis from other parts of India began to settle there as merchants, and Sindhi, both Muslim and Hindu, came from the arid countryside in search of labor.

To this day Karachi beckons Pakistanis from every province. Many gravitate to Saddar, the city's nexus for wholesale and retail trade. Fifty years ago Saddar was a quiet line of shops along what is still referred to by locals as Victoria Road. Today it is a sprawling configuration of bazaars, where everything—from spices to

Bowing out with a bang, old cargo vessels are intentionally run aground on Gadani Beach, then attacked by hundreds of ship breakers armed with sledgehammers, crowbars, torches, and

wrenches. They whack, rip, strip, burn off, and unbolt anything that can be salvaged and sold, from pipes to portholes to toilets. It's a labor-intensive business, like much of Pakistan's economy.

CD-ROMs—is bought and sold on a mass scale. The pompous sandstone buildings of the British with their precocious orientalist arches and curlicues have for the most part either collapsed under the weight of their own irrelevance or been bulldozed to make room for multistory shopping complexes. Many that do remain, squeezed between cinemas and leather-jacket emporiums, have been reduced to crumbling facades, their roofs long gone, the salons that they once shielded from native eyes now no more than pieces of sky visible through shutterless windows.

The tranquil, discreet air of colonial Saddar has vanished as well. Clogging the main arteries of the district today is traffic of every description: bulbous buses whose sides have been painted with pastoral mountain scenes and images of soaring F-16s, whining rickshas, sleek Mercedes-Benzes with darkened windows, bullock and camel carts.

Karachi is also a place where women may go about their lives with far fewer constraints than elsewhere in this Muslim country. Karachi women not only run their own businesses but also marry whom they want, get divorced if they want, buy their own homes, and drive their own cars. The anything-goes air is a source of pride for many Karachiites. I recall barely missing death when a yellow taxicab zoomed out of a Saddar intersection. Behind the wheel was a woman dressed entirely in veil. The man standing next to me, who was from the largely tribal (and gender segregated) province of Balochistan, shook his head, smiled, and said, "*Ye Karachi hai*—That's Karachi for you."

As Shomaila Loan, a young entrepreneur, put it, "Living in Karachi is like living in London in terms of the freedoms women are allowed." She and her sister, Saima, recently set up a state-of-the-art factory, with machinery imported from Japan, for producing lingerie—a challenging item to bring to market

Working in the salt mines is a low-tech affair at Khewra salt mine (left), one of the largest in Asia. One result is lagging productivity—a problem in agriculture too: One-third of all farmers don't own the land they work. Many who do can't invest in new equipment because they can't get loans. "We are trying to modernize," says Faisal Malik (below, at left), who owns 150 acres near Bahawalpur. "But if I go to the bank for money to buy machinery, they'll tell me to get lost."

in a traditional Muslim country. A handsome woman fashionably dressed in jeans and a silk blouse, Loan said, "More and more you're seeing middle-class women entering the workplace alongside their brothers to help supplement the family income. These women are finding jobs in what might be considered 'seemly' fields by their families—like trade and services, sales and marketing, secretarial work. This is a huge change from ten years ago, when these sorts of job opportunities didn't exist simply because those sectors hadn't begun to develop. Everything in this country changes according to economics."

The changes are having a profound effect on the way Pakistanis see themselves. A young man from the North-West Frontier Province who found work at a garment factory in Korangi, Karachi's industrial zone, told me, "The men who are coming to the cities from villages like mine are not just earning money—they're getting *jaan*, spirit."

NOWHERE is this spirit—Pakistanis taking control of their own lives—more apparent than in Punjab, one of the most important power bases for the country since partition. The power brokers in Pakistani politics have long been the *zamindar*, the Urdu word for big landowners, and the richest lands in the whole country are in Punjab, where many of the country's cash crops of cotton, wheat, rice, and sugarcane are grown. (Punjab, or "five rivers," derives its name from the five tributaries of the Indus River.) Under the old zamindar system, a landowner would often rent out parcels, piece by piece, to villagers; since the landowner controlled the water supply as well as almost every other resource, these small tenant farmers were beholden to him. This is all changing.

At Multan, an ancient city in the heart of the country's cotton-growing region, I met up with Omer Khan, 28, and his wife, Ayesha, who is 26. Omer and Ayesha divide their time

On the set of *The Veil Is Burning*, a newlywed wife is gagged and killed by her in-laws, who are furious over the paltry dowry she brought to the marriage. Though such murders are now rare, the view that a married woman belongs exclusively to her husband's family has been slow to die.

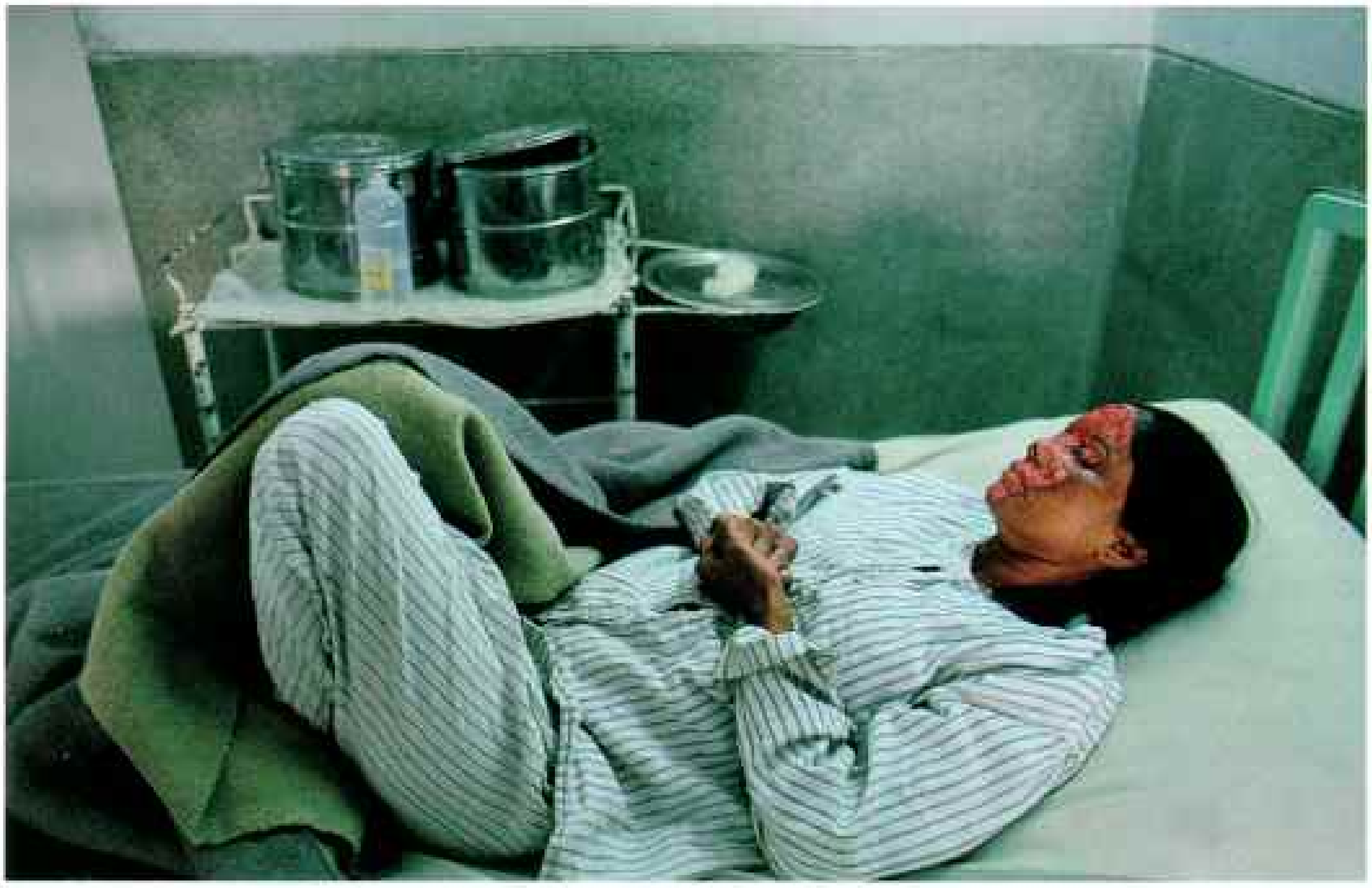
between Karachi, where Ayesha works as a magazine editor, and Omer's ancestral village, Kot Ata Muhammad Khan, a two-hour drive southeast of Multan. Omer owns 60 acres of land on which he grows cotton, Pakistan's biggest cash crop.

The Khans both grew up in Karachi. Like many of the country's urban elite, they were sent abroad to college—Omer to the United States, Ayesha to England. Less characteristically, Omer, who by definition is a feudal landlord, made the decision to return to his lands and farm rather than stay in the city and simply live off the money the villagers pay to rent small parcels from him. Even more unconventionally, he brought his wife to live alongside him, returning in the off-season to Karachi so she could pursue her own career.

Staring out the open window of our rented car as we left Multan, I surveyed a scene of green and endless fields, their geometry defined by the straight-edged canals that feed from the Indus. Every square inch of land, it seemed, was cultivated. Pakistan has the world's largest contiguous irrigation system. More than 39 million acres—an area larger than Illinois—can be irrigated by bringing water through 38,000 miles of canals.

We passed village after village, small, cramped, bazaar-like settlements with lines of open-faced shops on either side of the treacherously pocked road. Passing in either direction was an unending procession of humanity: women with belongings wrapped up in shawls atop their heads, old men in turbans and sarong-like garments called *lungi*, children running in flocks, lumbering bullock carts and the occasional rusted tractor carrying whole families. The people—tall, dark-skinned, and strong—looked as robust as the land itself. "It's the water," laughed Ayesha. "It makes everything grow here. I'm convinced it makes you fat just to bathe in it."

When we turned off the main road toward Omer's *dehra*, or village residence, Ayesha, out of etiquette, covered her face with her shawl. In the fields we could see women stooped at work. I thought it curious that I could see no men



Badly burned, a woman awaits plastic surgery at a Lahore hospital after her husband allegedly held her face to a stove. According to Amnesty International, domestic violence against women is widespread, yet the crimes are often treated as private matters and rarely punished.

around and said so. Ayesha, speaking through her veil, replied, in her Oxbridge intonation, "All the labor is divided. Men do the planting and sowing. Women do the harvesting and gathering—a baby on the back, a baby in the arms, and a baby in the stomach."

The car almost tipped over on the narrow mud road that stretched through the cotton seedlings. Chuckling, Omer shook his head and said, "Every year this road gets narrower and narrower. As the villagers are seeding the fields, they chisel away an inch from either side so they can make their plots just that much bigger." It is an understandable indiscretion in a country where more than 90 percent of landowners have plots of less than 25 acres, and a third, less than 5 acres.

KOT ATA MUHAMMAD KHAN was a huddle of mud huts founded by Omer's great-great-grandfather, a Pashtun named Nasir Khan. Nasir Khan had been smuggled to this place as a boy in the late 1850s by a family servant after all the other males in his family were killed during a war in the princely state of Bahawalpur.

Outside the village we strolled through Omer's cotton fields, alongside the ubiquitous canals. Omer said that when he first came to live on the lands, he knew nothing about farming and would wander the fields in the sneakers he'd bought as a student in San Francisco. Now he wears only *khusas*, traditional slippers made of kidskin that are so supple you can collapse them in the palm of your hand. "In khusas," he said, "I can feel the soil through the soles of my feet and know, as I walk the land, just what to plant where."

Omer grows cotton on 30 of his 60 acres and rents out the rest for 8,000 rupees ($200) an acre a year to four or five families who live in the village. He represents a new breed of feudal lord. Over time the ancestral lands have been divided into smaller and smaller areas through inheritance. In the past feudal lords used their holdings as platforms from which to rise into powerful political positions, but now many landowners have found that their power

base has shrunk—quite literally—beneath their feet. Some, like Omer, have no interest in a political career; they simply want to farm.

THAT NIGHT we sat in the garden of Omer and Ayesha's dehra, a modest stucco structure with a shady veranda that had fallen into neglect before Omer's arrival. Sitting on stiff wooden chairs dragged out from the four-room house, we gathered around a bonfire, eating kebabs cooked on the flames.

Sitting with us were Ghulam Ali Baloch, a tall, bearded man who works as Omer's farm manager, and Ghulam Ali's cousin Zafar Baloch. Five times a day Ghulam Ali excuses himself from his duties to climb up into the minaret of the tiny village mosque and call the azan, signaling the time for prayer for the villagers at work in the fields. Zafar, a young man of 21, not only helps Ghulam Ali manage Omer's business affairs but has gone into farming himself.

As the evening progressed and the conversation turned to reminiscence, I learned that Ghulam Ali and Zafar were descended from the same servant who smuggled Omer's great-great-grandfather Nasir Khan—dressed as a girl in veil—to safety here. He was adopted by a landowner who had no children of his own. According to family lore, the servant dressed her own son up as the son of her feudal lord and sent him into the enemy camp, where he was summarily killed. Then she stole her master's son away to Punjab to ensure that Omer's family bloodline would live on.

Loyalty in Punjab no longer takes such extreme proportions. Standing over us, warming his hands by passing them over the flames, Ghulam Ali said, "Even 50 years ago when this country was first made, a man had to prostrate himself before his zamindar. He had to sit on the floor, with nothing to eat or drink, and bow his head. Now the zamindar who wants power must stand for election. He must go to the people, even the poorest people in their small mud huts, and ask them nicely for their votes. And we will give the vote to him only if he is a nice man. It doesn't matter to us if he is a zamindar or not."

Like Omer, Zafar Baloch grew up in Karachi, where he studied until the tenth grade, and, like Omer, had come to live on the land because he saw farming as a good business opportunity. Zafar came back to the village, he said, when he was 17, just a year after Omer had moved into the dehra. That first year he leased five acres, on which he grew cotton; at the end of the season he had made one lakh of rupees ($2,500)—the biggest profit margin in the village.

"I followed my own logic," he said. "Early on in the season the crops became infested, so I collected the insects and took them directly to the chemical company in Karachi. I didn't just go to the local pesticide wallah, who would have tried to sell me the most expensive thing. I got the company people to diagnose the problem directly. It helped the whole village."

As we ate the kebabs, served with grilled onions grown in this very soil, the three men lapsed into Siraiki, the poetic, sweet-sounding language that is spoken in the southern part of Punjab, laughing at their own jokes, amusing one another with stories. If three generations ago the relationship between these two

Hungry for ways to energize their economy, Pakistanis recently revised their weekly work regimen. By order of Prime Minister Nawaz Sharif, weekends no longer begin on Friday, Islam's holy day, but on Saturday instead. By putting Pakistan on a Western schedule, businessmen hope Islamabad (right) and the rest of the nation will lure more Western trade and investment.

families was that of master and retainer, now I saw in the warm, friendly light of the bonfire, it was not just a very urban kind of business partnership; it was a friendship.

I asked Zafar how he had done in the four years he had been farming. He replied, "Now I own one acre of land, I have 20 on lease, and I have five lakhs of rupees in the bank. If I die tomorrow, my little brother and sister will not have to worry. But my biggest asset," he said after a moment's thought, "is knowledge."

GHULAM ALI insisted that I join him the next morning when he went into Mailsi, which, like many such settlements in Punjab, has grown in recent years from a tiny village into a busy market town. I thought we were going to Mailsi for shopping, but Ghulam Ali had another purpose in mind. Leaving the car on Mailsi's crowded main road, we passed through the gate of a homely, low-slung building and onto a sunny terrace, at the back of which, in a small room, children were singing beneath a Pakistani flag.

We had arrived, Ghulam Ali told me, at the Al-Kasim Public School. Despite its name the school was private, charging 60 rupees ($1.50) a child a month in tuition—a not unaffordable sum for Punjab's new class of town dwellers. A child with large black eyes came up and shyly shook my hand; it was Ghulam Ali's son, Sajjad.

In the context of rural Pakistan, education is a relative term. *Taaleem*, the expression used in Urdu for "education," signifies not only formal school training but also something close to the English word "knowledge." The word is used repeatedly in the Koran; indeed, one of the essential instructions for all Muslims is to seek knowledge wherever and whenever one can.

School enrollment in Pakistan has increased dramatically since independence, with the number of girls at school growing. Still, the overall literacy rate remains low, with only 38

Sticking close to the photographer, a Pakistani guard at the Nasir Bagh refugee camp scatters inquisitive Afghan boys. Of the some three million Afghans who fled to Pakistan during the Soviet occupation, more

than a million have not returned home. "They take menial jobs from Pakistanis," says Father Gregory Rice, a Roman Catholic relief worker, "and that brings out resentment."

percent of the population able to read and write. In 1973 Pakistan's schools were nationalized in an effort to promote free education for all. But the move did more harm than good: Primary schooling remains available to only half the country's children, and secondary schooling to less than one-fifth. Recently many schools have been reprivatized, and new ones like Al-Kasim have been built throughout Pakistan.

Al-Kasim was started four months before by two young men from the area. A government school already existed in Mailsi, but the teachers were so underpaid that they played hooky more often than their students. The whole community helped the two founders build the new school, donating bricks, offering their labor. Al-Kasim now has 67 students—40 boys and 27 girls, ages 6 to 13—and four teachers, two men and two women, all in their early 20s.

I was introduced to Fiaz Ahamed Ayaz, one of the teachers and founders of the school, and asked him what, to his mind, were Pakistan's greatest accomplishments in the 50 years of its existence. A serious person, he thought for a moment before answering my question in elaborately enunciated Urdu, so as to display his ease with a tongue that, though Pakistan's language of instruction, is native to only 8 percent of the population.

"Before, there was education only in the cities," he replied. "Now we have schools in the countryside too. Before mostly just boys went to school; now girls go to school as well.

A 3-D model of the Khyber Pass overlooks the real thing, which for centuries was the main invasion route from Central Asia. Still buffeted on its borders, the nation also shakes from within: How can Pakistan, "land of the pure" in Urdu, remain true to its Islamic heritage even as it endeavors to put the past behind?

Women are 50 percent of our population, so men and women should work together to build our nation."

What hopes did he have for his students? He worded the reply in his head, then said, "These are my children. My hope is that they will acquire education and with that education help to change this area, to fulfill its needs."

And what are the greatest needs of the area? No hesitation this time. "Education," he said.

AT THE TIME OF PARTITION Lahore was Pakistan's center of learning—as well as its main city. Capital of the Punjab for a thousand years, it is an architectural accumulation of all of those who have conquered it. Mogul mosques stand next to Sikh temples, which stand next to British administrative buildings. Yet even in the Old City, a kinetic bazaar shoehorned inside the city's original Mogul walls, the old is very much the new.

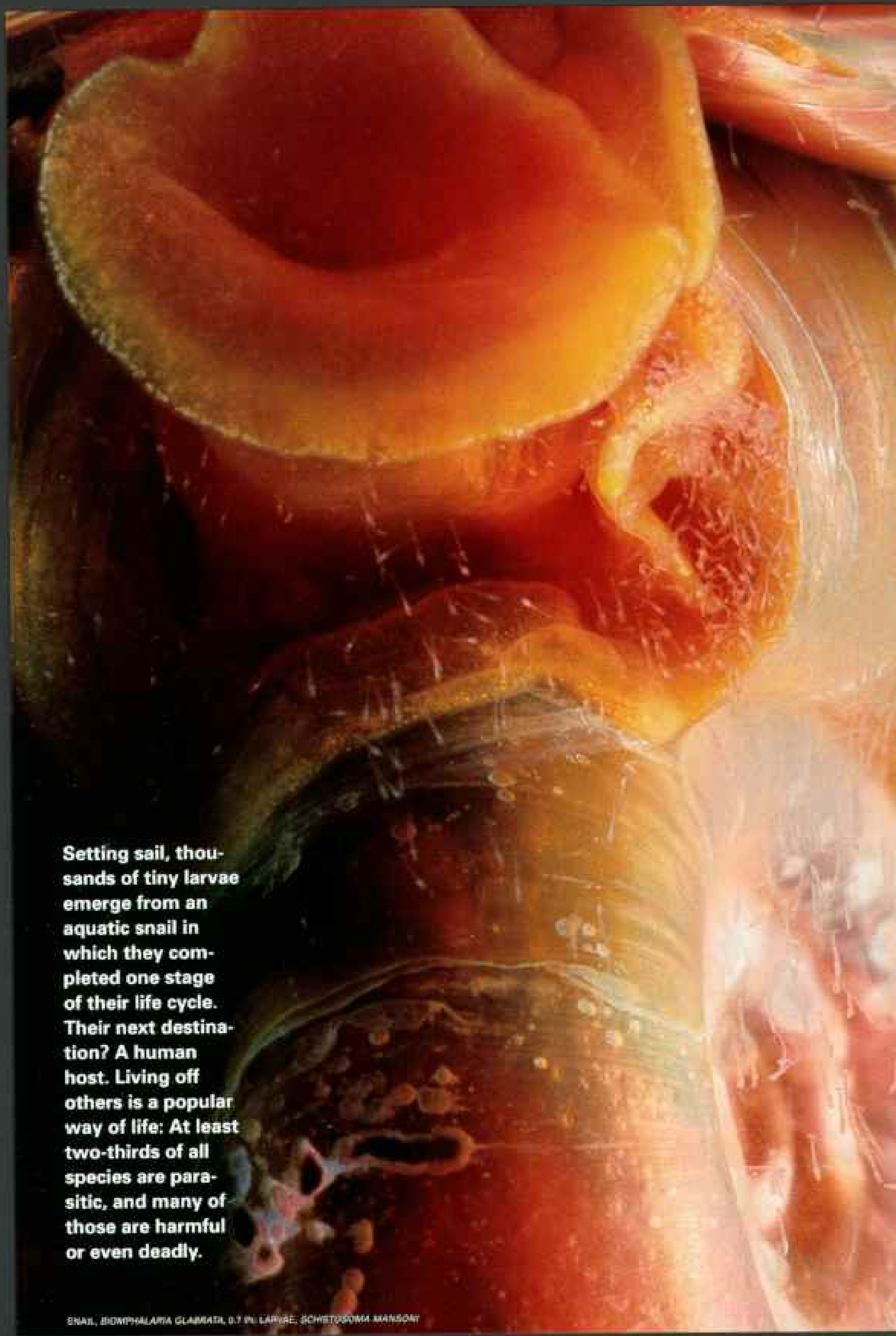
In the narrow, crooked alleyways where Mogul noblemen once passed like shadows to tryst with geisha-like courtesans, a producer of Punjabi films now stalks, cell phone at the ready, watching for new female talent. Old teetering houses with intricate latticework lean against homely structures in utilitarian concrete built where more traditional homes long ago collapsed. Perched atop their roofs, satellite dishes suck in *Oprah* and *The Bold and the Beautiful* from space.

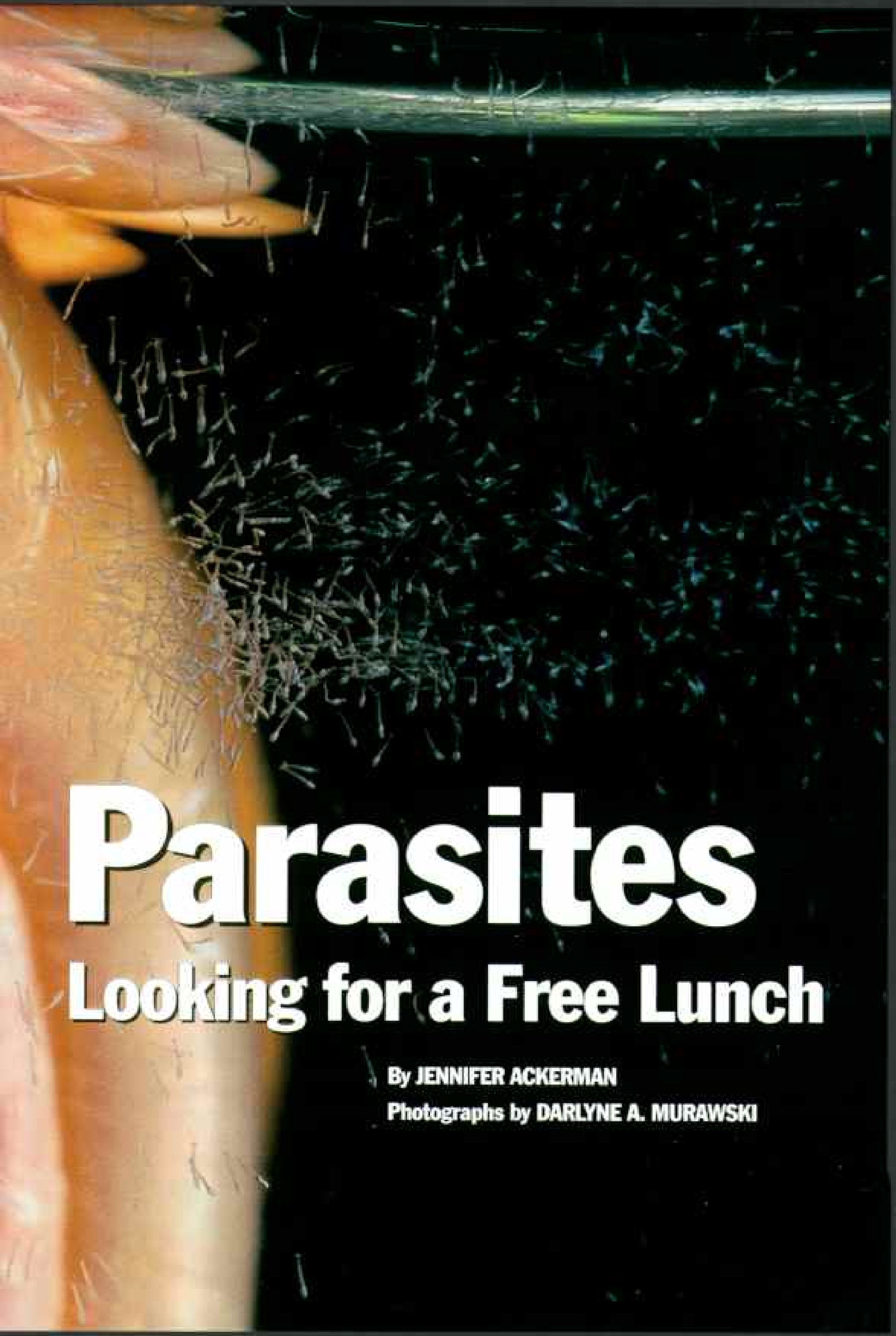
At the far end of the Old City stands the Lahore Fort, a massive edifice embellished and expanded upon by four successive Mogul emperors. Sitting near the Alamgiri Gate, a once private entrance to the royal quarters built by the emperor Aurangzeb in 1674 that is big enough for elephants to pass through, I fell into conversation with three college students, all self-described members of Pakistan's emerging middle class.

Despite all the history around them—a history that dates back to the great Indus Valley civilization, a highly sophisticated agricultural and commercial society that flourished for a thousand years beginning around 2,500 B.C.—the young men were much more interested in discussing the future than the past.

"The Quaid-e-Azam made this country for us so that we could be free," one of the three said. "Allah, in his infinite wisdom, took our leader from us early because he wanted us to find our own way in this world. Like orphans, we have had to look out after ourselves.

"It has been difficult, and we have made mistakes," he admitted. "But from those mistakes has come knowledge. We have a long way yet to travel, but we are not afraid, because we, as Muslims and as Pakistanis, have our faith to guide us." □


Setting sail, thousands of tiny larvae emerge from an aquatic snail in which they completed one stage of their life cycle. Their next destination? A human host. Living off others is a popular way of life: At least two-thirds of all species are parasitic, and many of those are harmful or even deadly.
SNAIL, BIOMPHALARIA GLABRATA, 0.7 IN; LARVAE, SCHISTOSOMA MANSONI



Parasites

Looking for a Free Lunch

By JENNIFER ACKERMAN

Photographs by DARLYNE A. MURAWSKI

BUTTERFLY CATERPILLAR (*HEBERNIA SP.*, X 2.5) IN PARASITIZED BY BRACONID WASP LARVAE

Leech, bloodsucker, cootie, vermin, flea. By popular reputation parasites are repugnant creatures, the ugly of the universe, the creepy, slimy, and weird. In ancient Greek the word *parasitos* means one who eats at the table of another. In nature these organisms seem to have lost their table manners. They invite themselves to lunch and then dine on their hosts, sucking blood, leaching nutrients, devouring whole organs. One fish parasite destroys the tongue of its victims, then settles itself in the tongue's place. The larvae of a parasitic wasp (**above**) slowly consume their caterpillar host from the inside out, keeping the helpless creature alive by preserving its heart and brain while slowly completing their feast of fat and digestive organs.

For years parasites have been dismissed as odd sideshows in the natural world, grotesque in form and gruesome in act. But lately they are finding a new place in the biological spotlight. A growing cadre of scientists now see these organisms as subtle, complex creatures, admirable in their own way and much more powerful than anyone ever imagined. Parasites have profoundly shaped life for billions of years; many of the traits we see in plants and animals evolved in response to their presence. Parasites may have given the zebra its bold stripes, shaped the behavior of animals from crickets to horses, even changed human genes.

In a corner of J. Ralph Lichtenfels's office is a collage of cartoons. One, by Gary Larson, shows a rhinoceros on a quiz show panel: "OK, Bob, I'll try 'annoying parasites' for 50, please." Everywhere are piles of scientific texts on parasitology. Lichtenfels, a tall, mild-mannered man with a serious demeanor, is curator of the U.S. National Parasite Collection, guardian of more than 100,000 types of nematodes, trematodes, tapeworms, protozoans, lice, ticks, and other miscellaneous parasites. This unusual museum, which has its home on the rolling grounds of the Beltsville Agricultural Research Center in Maryland, specializes in helminths, an elegant name for parasitic worms.

The collection resides in a climate-controlled gallery down the hall from Lichtenfels's office, next door to the lunchroom. A couple of researchers sit around eating breakfast, unfazed by their proximity to a mob of intestinal nematodes. I decline their offer of a doughnut. I've always taken delight in snakes, scorpions, and spiders. But who hasn't dreamed of worms wriggling out from the skin or, worse, wriggling *in*?

Down a long, narrow corridor of shelves

Jennifer Ackerman gained respect for trematodes while researching her book, *Notes from the Shore*. Darlyne Murawski, a research associate at Harvard University, has photographed butterflies and moths for the magazine but finds parasites just as engaging.

Parasite preserves line shelves at the U.S. National Parasite Collection in Beltsville, Maryland, where curators J. Ralph Lichtenfels (above, at right) and Eric Hoberg oversee specimens ranging from minute protozoans to giant tapeworms that grow in whales.

Enemy within, the broad fish tapeworm may grow to 35 feet and live ten years inside a person's intestine. Each mature segment comes complete with male and female sex organs resembling Japanese characters. A yen for raw fish increases the risk of infection.

Flowering in a Peruvian rain forest, Helosis cayennensis with its dime-size blossoms lacks chlorophyll for photosynthesis. Instead underground runners "explore the soil," says botanist James Mauseth. "When they encounter tree roots, they parasitize them."

stuffed with jar after jar of flatworms and hookworms, tongue worms and heartworms, Lichtenfels pulls out a bottle holding the limbless white ribbon of a 25-foot tapeworm. Its color is unearthly, the translucent white of things that never see light. "A tapeworm spends its entire adult life in the intestines," explains Lichtenfels. "Its head, or scolex, has specialized structures—suckers, hooks, spines—to latch on to the intestinal wall. From the scolex grows a chain of segments, each with a complete set of sexual organs." The worm lacks any trace of a digestive system but absorbs nutrients directly through tiny fingerlike projections that cover its body.

The tapeworm seems no proper animal at all—little more than a wet string of sex organs dedicated to producing eggs. I can too easily imagine it coiled inside, a ghostly echo of my own intestinal tract. The two-inch trematode Lichtenfels hands me, a kind of flatworm that lives in an elk's liver, seems less threatening. The little brown blotch looks formless and primitive, one small step up the evolutionary ladder from mud.

It is not, of course. The life of a trematode is highly evolved, more complex than anything invented by Rube Goldberg and just as improbable. "A trematode requires as many as four hosts to complete its life cycle," Lichtenfels tells me, "say, snail, tadpole, snake, and hawk." The same is true for other animal parasites. *Anisakis* worms need at least three hosts: crustacean, fish, whale, for example—or person dining on sushi. In each host the worm may assume a different disguise. Many animal parasites have this extraordinary ability to metamorphose like little Merlins as they move through their life cycles, at each stage emerging as almost wholly different creatures.

Nobody knows how many kinds of parasites there are. Millions probably, perhaps tens of millions. They range in size from the smallest virus, inconceivably small at one one-thousandth of a micron, to whale tapeworms a hundred feet long. Some, like ticks, fleas, and chiggers, live on the surface of their hosts. Others—trematodes, tapeworms, nematodes—live within, denizens of blood, intestines, liver, and heart.

Many are specialists. The so-called pork tapeworm can mature only in humans, says Lichtenfels. One kind of trematode lives only on the first gill arch of one species of cod. The green conure parrot of Mexico harbors at least 15 species of feather mites; each lives on a particular part of a particular feather on the bird's body. Fleas, ticks, and leeches are usually more catholic in their choice of hosts, feeding on the blood of a variety of animals. A rat flea deprived of a rat will happily settle on a bat.

Certain parasites are innocuous. Two varieties of mites live harmlessly on the landscape of the human face, tucked into hair follicles of the forehead and cheeks. However, many parasites

"A flea hath smaller fleas that on him prey," observed Jonathan Swift. Here a fly has parasitic fungi hitchhiking on its thorax.

pester, maim, or kill the animals they infect. Several of those suspended in the jars of the national collection cause enormous suffering, especially in tropical and subtropical countries. Hookworms, little leechlike vampires of the intestinal tract, suck the blood of a billion people a year and kill perhaps 100,000. Blood-dwelling trematodes known as schistosomes infect 200 million people, sometimes causing severe disease of the gastrointestinal tract, bladder, and liver.

For humans, the worst offenders are protozoans of the genus *Plasmodium*, the parasites

A rogue's gallery of hangers-on reveals how some parasites stay hitched to their hosts. Clockwise from top left: Both fleas and ticks bristle with spines that snag hair and fur; back-slanting serrations keep the tick's harpoon-like hypostome firmly implanted. A thorny-headed worm brandishes rows of hooks for burrowing into the intestine of a host rat. A marine trematode attaches to the gut of reef fish using its two suckers, while a lamprey holds fast to the bodies of host fish with its toothed suction-cup mouth.

ALL BUT BOTTOM LEFT PHOTOGRAPHED WITH THE ASSISTANCE OF EDWARD SELING AND THE HARVARD MUSEUM OF COMPARATIVE ZOOLOGY

that cause malaria. Under the microscope these creatures appear as tiny crescent-shaped objects and as minute rings studded with a ruby nucleus—different stages in the protozoans' life cycle, which are apparent to the eye but often invisible to the body's defenses. Nearly half a billion people are infected with malaria, and each year as many as two million die from the disease, mostly in tropical Africa.

The National Parasite Collection, extensive though it is, represents only a slice of the spectrum. Not present are plant parasites such as tropical mistletoes, which send their roots deep into the vascular systems of their green hosts. Or kleptoparasites, animals that steal or pirate food, and social parasites, which exploit the labors of other species. The brown-headed cowbird is an egg dumper, depositing its eggs in the nests of warblers, which feed the giant, greedy cowbird nestlings before their own chicks.

"What all these things have in common is their way of life," says Lichtenfels. "Parasites are not a natural group, like birds or mammals, but a collection of organisms that live at the expense of other organisms, relying on them to survive and reproduce and usually doing some harm in the process."

It's a popular lifestyle. Of the more than 1.5 million forms of life counted so far, parasites outnumber free-living species by at least two to one. And those organisms that are not parasites are usually hosts. We are shared, occupied, nibbled by umpteen organisms, all perfectly adapted for life on our bodies.

"IT'S REMARKABLE how little trouble we have with them," says Daniel Brooks, a zoologist at the University of Toronto. "In general it's not in a parasite's best interest to kill its host." Brooks considers parasites splendid creatures. He has spent a good part of his career attempting to dispel myths and misconceptions about them, including the notion that they are primitive and degenerate, lesser beings than their nonparasitic relatives. "Parasites are successful, innovative creatures," he says. "If you compare them with related species that are free-living, parasites are often more complex. They give you a healthy respect for the power of little things."

Brooks's research ranges from pinworm biology to patterns of animal dispersal over continents. While observing parasites in freshwater stingrays of the Amazon Basin, Brooks turned up a surprise. "Scientists had assumed that the freshwater stingrays in the Amazonian watershed descended from ocean rays that made their way up rivers from the Atlantic," he explains. "But the parasites told a different story. The worms found in the freshwater rays, it turns out, are more closely related to the worms infecting Pacific Ocean rays."

Millions of years ago, before the Andes rose, the east-flowing Amazon River flowed west into the Pacific. Geologists had hypothesized as much, but Brooks's studies of the stingray parasites offered the first biological evidence.

PARASITES—even invisible ones—affect life in profound ways, determining what organisms look like, what they eat, where they live, how they mate. Because most multiply so rapidly and prolifically (roundworms can produce 200,000 eggs in a day; some tapeworms as many as a million), their effects are especially powerful, at least as powerful as other challenges faced by an organism, such as cold, hunger, or predation.

Some parasites can change the habits of animals, prodding them to adjust their usual behavior. Take parasitic flies, a group that includes midges, mosquitoes, snipe flies, blowflies, botflies, and tens of thousands of other species living in every conceivable environment. Horses of the Camargue in southern France leave their creekside habitat for higher ground during hours of peak horsefly activity. Field crickets in Hawaii adjust the timing of their mating songs to avoid attack by parasitic flies, says Marlene Zuk, a biologist at the University of California, Riverside. The flies, which home in on the loud love songs of the male cricket, usually do their hunting at dawn and dusk. Zuk has found that in areas infested with flies, crickets avoid wooing their mates at these twilight hours, singing only in full darkness.

Even the stripes of a zebra may be an adaptation for evading the blood-sucking tsetse flies of sub-Saharan Africa. Tsetses often carry parasites called trypanosomes, microscopic protozoans that cause sleeping sickness in humans and nagana in animals, a disease marked by fever and anemia, which usually ends in death. When an infected fly bites, it not only sucks blood but also inoculates its victim with

Parasite Plagues

MALARIA: The world's number one parasitic killer, this mosquito-borne scourge strikes down some two million people every year, mostly in tropical regions. Ninety percent of cases occur in Africa, where in rural areas it kills one in 20 children under the age of five. The culprits are four protozoans of the genus *Plasmodium*. Their multistage life cycle, illustrated here, makes them elusive targets, and finding a cure for this "poor man's disease" has not been a priority for most drug companies.

An infected mosquito has in its saliva spindle-shaped forms of the malaria parasite called sporozoites. When it bites (1), these enter the bloodstream and move to the liver. There each divides into thousands of merozoites. Exiting the liver (2), the merozoites invade red blood cells. Feeding on hemoglobin, they grow and multiply, deforming the blood cells (3).

Two to three days after invasion, the blood cells rupture (4), releasing many new merozoites to attach more red blood cells.

As the cycle continues, the victim suffers recurring fever bouts as each new wave of cells ruptures.

Some merozoites develop into sexual forms of the parasite, or gametocytes (5). If and when another mosquito bites the host, some are ingested into the insect's gut, where they reproduce. Their progeny end up in the mosquito's salivary glands, and the cycle begins again.

outbreak

Cryptosporidium parvum in sheep's intestinal wall, 14,500 x.
U.S. DEPARTMENT OF AGRICULTURE

CRYPTOSPORIDIOSIS: The illness that made Milwaukee miserable in 1993 during the biggest outbreak of waterborne disease in U.S. history is caused by a one-celled parasite called *Cryptosporidium parvum*. Ensconced in the intestine, it induces diarrhea in its victims and can prove fatal to infants, the elderly, and AIDS patients.

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accidental parasite

ANISAKIASIS: Tiny coiled worms in sushi and other raw fish (left) cause this gut-wrenching ailment that can feel like appendicitis. But don't blame the *Anisakis* parasite. It aims to be swallowed first by a crustacean, then by a fish, and finally by a seal or other marine mammal. Seafood lovers become unwitting hosts when they interrupt the cycle.

through the skin

SCHISTOSOMIASIS: This debilitating disease infects one in 30 people worldwide. The *Schistosoma* parasite multiplies in water snails, then emerges as cercariae that worm into any human in the water. After maturing, the adults pair for life (above), producing myriad eggs that damage organs. Infection is rife along the Nile, where water projects spread host snails.

thousands of trypanosomes. The flies hunt visually by targeting large, dark objects. Compared with other large African mammals, such as antelope, the zebra suffers few bites from the flies; its stripes may confuse them. Zebras in central Africa, where tsetse flies abound, have the boldest stripe patterns.

"Many biologists see the relationship between parasite and host as a kind of biological arms race," says Daniel Brooks. Over evolutionary time a host finds a way to resist a parasite, only to have the parasite evade that defense and adopt a new trick to continue the plundering, which the host then counters, in a game of one-upmanship. Parasites tend to have the edge: They are usually shorter lived than their hosts and reproduce more rapidly, so they evolve at a quicker pace. Still, the contest rarely ends in victory or defeat. It's more like the Red Queen's race in Lewis Carroll's *Through the Looking-Glass*, where the Queen says to Alice: "Now, *here*, you see, it takes all the running *you* can do, to keep in the same place."

Greta Smith Aeby, a zoologist at the University of Hawaii, has found evidence of such a game between parasite and host in coral reefs off the island of Oahu. The parasite is a trematode that lives for a time in a species of reef coral and completes its life cycle in the intestines of marine fish. When the trematode invades the coral colony, it forms swollen pink nodules on the brown polyps, "coral zits" Aeby calls them. These draw the attention of butterfly fish, which pluck them from the coral like berries from a bush. This selective feeding has two effects: It ensures that the parasite will be passed along to its next host and that the coral will be cleansed of its parasites. So those pink swellings may be a sort of uneasy alliance, benefiting both players in the game.

Like fish and crickets, birds have their share of parasite troubles. They suffer from mites, lice, roundworms, even malaria. William Hamilton of the University of Oxford and Marlene Zuk suggest that in some species of birds, a female selecting a mate will scrutinize partners for signs of parasites. In experiments with red jungle fowl—brightly colored ancestors of domestic chickens—Zuk has shown that hens are preoccupied with the presence of roundworms in potential mates. Male jungle fowl have many showy traits, including gaudy plumage and bright combs, that might draw a picky female. Males infected with roundworms have normal plumage but smaller, duller combs and wattles. In selecting a mate, says Zuk, hens usually go for the male with the biggest, brightest comb and wattle. "While a hen may not be able to directly diagnose a male's health," she explains, "she can find out who's wormy and who's not by looking at traits that reflect disease status and use that information in selecting the best father for her offspring." Females of species from bowerbirds to barn swallows tend to choose their mates in similar fashion.

AFTER TALKING with Zuk and other biologists bent on plumbing the depths of parasites, I assembled a list labeled "Wonders of the Parasite World." Now, these features of parasites may never displace the old Seven Wonders, the Hanging Gardens of Babylon and all the rest, but they seem wondrous in their way.

Most parasites evolved from free-living plants and animals that came to depend on another organism for nutrition. Eventually they traded the freedom of life in the open for the security of constant food and shelter. In so doing, many parasites evolved ingenious strategies for finding a home. From a parasite's perspective, a host is an island in a vast, inhospitable sea. Some parasitic insects, for instance, can detect minute amounts of chemicals wafting through the air, which they use as homing signals to track their hosts. Tsetse flies follow plumes of odors from the breath of horses and cattle. Some parasitic wasps eavesdrop on the sex pheromones their beetle victims send out to prospective mates.

Once a parasite has secured a host, it must find its niche within. A kind of mite that infests the ears of *Leucania* moths does so in a remarkable way. Asher Treat, a retired entomologist, has studied the lives of these tiny interlopers since he discovered them tucked away in a moth's ear more than 40 years ago. Treat found that the mites migrate to only one ear in their moth hosts, leaving the other ear intact as a detector of ultrasound, the moth's main defense against predatory bats. "The adaptive value of this behavior is obvious," Treat believes. "If an infested moth is caught by a hungry bat, not only does the moth perish but the mites as well." Somehow the mites know this and communicate the message to

STALK BORER, *CHILO AURICILIUS*; 1 IN; FLIES, *STURMIOPSIS INFERENS*

Pitting parasites against pests, a researcher in India (top) releases flies that attack sugarcane-destroying caterpillars. The growing maggot (visible as a bulge in the stalk borer caterpillar above, at right) eats the insides out of its doomed host. After eviscerating it, the white fly larva emerges, middle, then pupates, left. Unlike insects such as praying mantises that devour both bad and beneficial bugs, many parasites are host specific—"picky eaters," says one expert—ideal agents for targeted biocontrol.

She may be downright ugly, but this female anglerfish hooked a mate: The appendage below her tail is a parasitic male that taps her circulatory system for his every need. In return he fertilizes her eggs—and never lets go.

BOROPHRYNE APOGON; 6.5 IN (FEMALE)

newcomers. He suspects that they signal recent arrivals with a pheromone that says in effect: Colonize only *this* ear.

Parasites that must pass from one host to another to complete their life cycles face even greater challenges. Not long ago when I was wandering the mudflats near my father's beach home on the Atlantic coast, I came across a puzzling sight: a bevy of mud snails stranded on top of some dry sandbars. Mud snails prefer low, wet tidal swales. Why were these snails out of place? Had a freak wave washed them up?

When I consulted Larry Curtis, a marine biologist at the University of Delaware, I was astonished by his explanation: The marooned snails were victims of a trematode capable of manipulating their behavior. To complete their life cycle, trematode larvae lodged in a mud snail must find their way into a beach flea and, from there, into the digestive system of a bird. "The snag is this," says Curtis: "Mud snails and beach fleas don't frequent the same terrain." So the trematode arranges a meeting. The larvae gobble up the mud snail's glands and then somehow prod the snail to leave its customary habitat and move to the higher ground traveled by beach fleas. There they emerge from the snail's body and enter the body of a flea. When a shorebird eats the flea, parasite and all, the larvae mature in the bird's gut and produce eggs, which are released with the bird's feces onto the flats. The cycle then begins anew.

Parasitic aliens invading the body, forcing it to do their will as they multiply and spread to other victims: In science fiction it's a popular device. "Yet the notion that parasites can make animals behave differently is not limited to fiction," says Janice Moore, a biologist at Colorado State University.

Moore was the first to demonstrate that a parasite can alter the behavior of its host to improve its chances of transmission. Recently she found that one kind of worm can change the behavior of so resilient a creature as the common cockroach. The thorny-headed worm robs the roach of its normal escape response, making it grow less wary, increasing the chance that it will be snapped up by the rats or other mammals the worm favors for its next host.

In any host, even a cockroach with its guard down, parasites face constant attacks from elaborate immune defenses. Many have evolved complex strategies for dodging such attacks. Schistosomes, which live in the bloodstream, borrow molecules from their hosts to wear on their surface so the host's immune system can't recognize the parasite as alien and marshal the necessary defenses. The trypanosome uses a change-and-conquer strategy to escape its host's defenses. Every five to ten days it produces new populations with a slightly different immunological appearance, always staying ahead of the antibodies directed against it. It can keep this up for 20 years, never presenting the same look twice.

Some parasitic wasps use the services of an agent to disarm the defenses of their host, a kind of caterpillar known as the tobacco hornworm. Nancy Beckage, an entomologist at the University of California, Riverside, has found that when a female wasp injects her eggs into a hornworm, she also sends in a fluid cocktail loaded with a special virus. The virus makes the hornworm's immune cells, which would normally attack the eggs, self-destruct.

For farmers this is not a bad turn of events: Hornworms are agricultural pests—notorious lovers of tomato, potato, and tobacco plants. Some farmers are trying to harness the targeted attacks of parasitic wasps and flies, breeding the killer parasites and setting them loose in croplands to hunt down hornworms, mealybugs, sugarcane borers, and other insect pests.

YOU HAVE TO ADMIRE the ingenuity of a thorny-headed worm, the keen chemical sense of a parasitic wasp, the diligence of a moth ear mite. While parasites may never qualify as poster art, they have a kind of beauty when you view them on their own terms, an enviable precision, elasticity, even elegance.

The horse in the field, the snail on the mudflats, the cricket hurtling itself around in my yard, all may be swayed by parasites. Even the lovely swallow darting about to snatch gnats may owe its long, splendid tail to their existence. I've begun to think of my body, of all bodies, as habitats—miniature ecosystems where whole creatures live out their lives and call it world enough. For better or worse, parasites are intrepid scholars of their worlds and powerful agents of change. They are not, it seems, simply nabbing a free lunch, but actively fashioning the menu. □

Learn more about the tricks of the parasite trade at www.nationalgeographic.com.

ANTS, *PROTOMOGNATHUS AMERICANUS*, 3X IN, AND *LEPTOTHORAX CURVISPINOSUS*; MOTH, *LEUCANIA COMMODES*, WINGSPAN 1.6 IN; MITES, *DICROCHELES PHALAENODECTES*

Life in an acorn is easy for black Protomognathus ants (top). These social parasites enslave red Leptothorax ants, which hunt for food and rear the young while their masters groom one another and mount slave raids. Life isn't so sweet for a Leucania moth with an earful of mite eggs (above, at right). Its sonar-sensing organs help it evade foraging bats. With astonishing prudence, the mites attack one ear only, avoiding the other in seeming recognition, says an entomologist, "that a one-eared moth is a safer vehicle than a deaf one."

The Most Ancient Americans

By RICK GORE
SENIOR ASSISTANT EDITOR

Photographs by KENNETH GARRETT
Art by GREG HARLIN

IT WAS TOO EARLY for the band to play in the bar across from the beach in the Chilean village of Pelluco. At 8:30 on a midsummer evening bathers still strolled the black sands, and the sun remained high above the green islands across the bay. But for more than two hours a group of scientists seated around a long table had been filling the back of the bar with enough noise of their own as they argued and traded insults over several rounds of beer.

The group was a jury, a select committee of 12 specialists in early American archaeology, assembled to reach consensus about the age and authenticity of a nearby site called Monte Verde. The stakes were high. Monte Verde, a small prehistoric settlement, was poised to break a hallowed time barrier.

For more than 60 years most archaeologists have believed that the first humans to reach the Americas were immigrants from Siberia who trekked across the Bering land bridge less than 12,000 years ago. Called the Clovis people, they were named after a site in New Mexico where archaeologists first found a fluted stone spearpoint that has become their signature.

But over the past few days these scientists had seen persuasive evidence that,

More than 12,000 years ago in what is now southern Chile an Ice Age hunter pursuing llama-like prey brandishes a bola and a wooden lance. Such weapons, among a unique array of dated artifacts from the site of Monte Verde, prove that people came to the Americas much earlier than once thought.

Beside a creek in a cool, damp forest a few dozen hunter-gatherers stayed for a cycle of seasons. Then rising waters flooded their settlement. "The same thing happened to us," says archaeologist Tom Dillehay. "We had to move to higher ground." Beneath a peat bog he and his crew found extraordinarily well-preserved remains—including a hunk of mastodon meat.

far to the south, people had occupied Monte Verde at least a thousand years *before* the oldest Clovis settlement, which dates back 11,500 years. The scientists had visited Monte Verde and pored over hundreds of artifacts, from tools to pieces of mastodon meat.

Some of the arguments at the bar focused on how radiocarbon dates might have been contaminated by carbon spewed from nearby volcanoes. Skeptics contended that floods could have washed the artifacts in from a younger site. But finally even the most diehard Clovis supporter relented in favor of the Chilean site. As the arguments subsided, the group's coordinator, Alex Barker of the Dallas Museum of Natural History, called for a show of hands. The vote was unanimous. Barker smiled and raised his beer bottle: "I'd like to propose a toast to the passing of a paradigm."

THE PARADIGM THAT EVAPORATED in the bar in Pelluco was that Ice Age glaciers across Canada had barricaded passage from Siberia into the heart of North America and beyond before 12,000 years ago. Many scientists had long been unhappy with that time constraint, especially since several sites even farther south than Monte Verde were about 11,000 years old.

"How could people possibly have raced all the way down there from Alaska in a few hundred years?" asked David Meltzer, an archaeologist at Southern Methodist University in Dallas. "They were pioneering a landscape that was becoming increasingly

When not on the road photographing archaeological subjects, KENNETH GARRETT makes his home in Broad Run, Virginia, with his wife and two daughters.

unfamiliar as they moved south. They had to find water and figure out which plants and animals were edible, useful, harmful, or even fatal. They had to cross formidable barriers and cope with new diseases. And they had to do all this while raising families on a vast continent devoid of other people. All of that takes time."

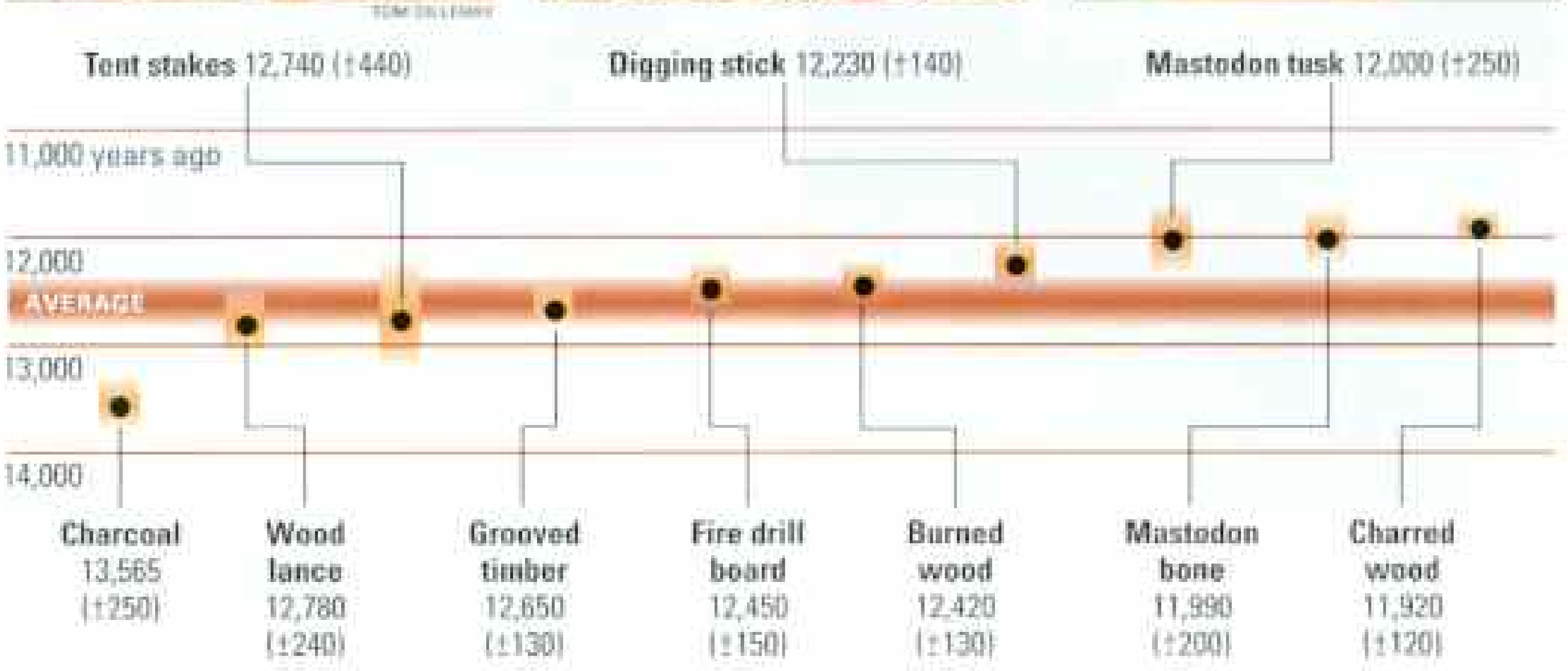
Also, linguists and geneticists have pointed out that Native Americans are too rich in languages and genetic diversity to have had common ancestry only 12,000 years ago.

Since Monte Verde now proves people were in the Americas earlier, how and when did they arrive? Could they have skirted the glaciers, coming down along the coast by boat from Alaska? Or could they have migrated through a narrow corridor that might have separated the ice sheets in eastern British Columbia? Sailing across the Pacific from Asia to South America in numbers large enough to colonize seems too difficult a journey for primitive seafarers.

A more likely explanation: They migrated into the lower reaches of North America even before the ice sheets developed more than 20,000 years ago. Indeed, a second site at

New Latitudes

Long-held dogma says the first Americans came from Asia, passing between retreating glaciers about 12,000 years ago. Yet Monte Verde—whose stratigraphy was verified recently by visiting scientists (above left)—and a number of other sites now show that humans lived in this hemisphere while ice still blocked the land route from Beringia. Did they skirt the glaciers by boat? Or did they walk south *before* the ice became an obstacle?



How Long Ago Did People Settle Here?

Context is critical when interpreting the results of radiocarbon dating. These artifacts, clearly from occupied areas, provide the best possible dates for the site. Some recall a human touch—tent stakes secured timbers and likely anchored a hide covering; a digging stick worked like a crowbar; a tusk fragment found near a grooved log was probably a gouge. Burned or charred wood and charcoal lay on hearths. Averaged, the dates suggest an age of about 12,500 years.

Monte Verde has revealed stones that may have been flaked by human hands 33,000 years ago.

Still, it is Monte Verde's 12,500-year-old date that broke the Clovis barrier. Not much remains of the site, which came to light in 1976 when local lumbermen, cutting back the banks of Chinchihuapi Creek to widen a trail for their oxcarts, unearthed mastodon bones and pieces of wood in the wet peat. The next year Tom Dillehay, an American archaeologist who headed the anthropology department at Southern University of Chile, in Valdivia, began nearly a decade of excavations with Chilean colleagues.

"When we first came here, this was all cool, misty rain forest," said Dillehay as I traveled with the scientists down a bumpy gravel road lined with gray tree stumps. We had driven about 40 miles from the port city of Puerto Montt into rich farm country in the shadow of a snowcapped volcano called Osorno.

"When we came back to visit in 1988, most of our site had been wiped out by a bulldozer blade," said Dillehay, now at the University of Kentucky. And so all that the scientists and I saw was a gouged-out creek bed cutting through a deforested field. Behind us settlers were nailing wood siding onto a new house. Cows grazed on seeded pasture, and a flock of

Mastodon tooth fragment

Knotted reed twine

Charred ribs

Stone tools

Throwing stones

Evidence of a Distinct Culture

Tools testify to ingenuity: A fragment of mastodon tooth shows wear, perhaps from use as an engraver. A hearthstone had sharp flakes struck off. A long tapered piece of slate might be a drill. A basalt point may have brought down a mastodon. Reed twine bound two timbers. Mastodon ribs likely were fire pokers. A large round stone may have been thrown in a hunt. A replica of a smaller stone fits in a sling used by the modern Mapuche.

geese waddled along the barely flowing creek.

As the scientists explored what was left of the site, I walked along the creek and let my imagination carry me back 12,500 years. . . .

A MUSCULAR MAN in his early 20s emerges from the tall evergreens lining the creek and hurries toward the settlement. About five feet two, he has black, shoulder-length hair and wears only a hide strap around his middle. He shouts a cry of victory. In his hands he holds the huge tooth of a mastodon.

People rush out of a 60-foot-long, tentlike pole structure that houses the settlement's 30 or so residents. Built on a log foundation and draped with hides, the longhouse has 12 units arranged in two rows, like cubes in an ice tray. Separated by hide curtains, the units serve as living quarters, workshops, and storage areas.

Several of the young man's comrades, spattered with blood, appear on the footpath bearing the mastodon's meaty rib bones. Hoots and cries welcome the group as they drop the ribs near one of two large hearths outside the longhouse. As a soft mist rolls in, an old man builds a fire in the hearth. Other men carry the ribs across the creek to be butchered.

The young man enters the longhouse and crawls through an open flap. On a carpet of hide sits a young woman playing with a child. The man beams as he presents his mate with the mastodon tooth and tells her how he and his friends had found the mastodon mired in mud by the river. He brags how he had thrust a killing blow with his lance.

As a grimace of pain twists his face, the woman notices a gash in his leg. She sends him to see the healer, an old woman whose hut lies apart from the others, near where the bones are being butchered. Also hide-draped, the hut has a wishbone-shaped foundation of sand and gravel hardened with animal fat. The healer begins to chant as she cleans the man's wound. Then she presses seaweed and boldo leaves into a chewing wad and hands it to him. The leaves, which come from a tree that grows far to the north, are analgesic and hallucinogenic. As he chews the wad, the pain eases.

Boldo leaves and seaweed are but a few of the 22 varieties of medicinal plants that excavators collected in and near this hut. Coincidence or not, all of those plants are still used by the indigenous people for healing.

"The medicinal plants match up beautifully with the kinds of medical problems the Monte Verdeans probably had in the cool, wet climate," said Jack Rossen, an ethnobotanist from Ithaca College who helped study the site. The spores of a club moss from the Andean highlands to the east, for example, make an excellent powder to soothe skin irritations. A leaf called *nalka* reduces the fever that accompanies respiratory ailments.

Excavators also found remnants of some 45 edible plants. More than a fifth of them came from distant regions as far as 150 miles away, indicating that the Monte Verdeans either ranged far or traded with other groups.

"The amount of plant foods we found at the site—notably wild potatoes, bamboos, mushrooms, and juncus seeds—was astounding," said Rossen. "Their harvest of them approaches agriculture."

Luckily, because Monte Verde died a sudden death, those perishable remains were preserved. For unknown reasons, perhaps increased rainfall, the water table rose abruptly. Water pooled at the camp, forcing the residents to leave. Soon a peat bog smothered the campsite, protecting it from bacterial attack and destructive changes in humidity, the way formaldehyde pickles lab specimens.

That peat also preserved at least one human footprint, probably left in the sandy mud as the Monte Verdeans were moving on. Stored in a lab at Southern University with dozens of other artifacts, the print is encased in a plaster jacket and kept in a metal box. Mario Pino, a co-director of the excavation, lifted the cotton covering to show us. My companions soon moved on to examine and debate the other evidence in the lab.

I lingered at the footprint. Only about five inches long, it was probably made by a child. Those five toes, that depressed ball, and the slightly elevated heel of a child overwhelmed everything else my companions were debating so heatedly. That footprint made Monte Verde human for me. I saw a child, rain soaked and crying, running after its mother as she abandoned the settlement. The steps of that child insisted that someone like us had indeed reached the forests of Chile surprisingly long ago. Now the scientists have a lot of explaining to do. □

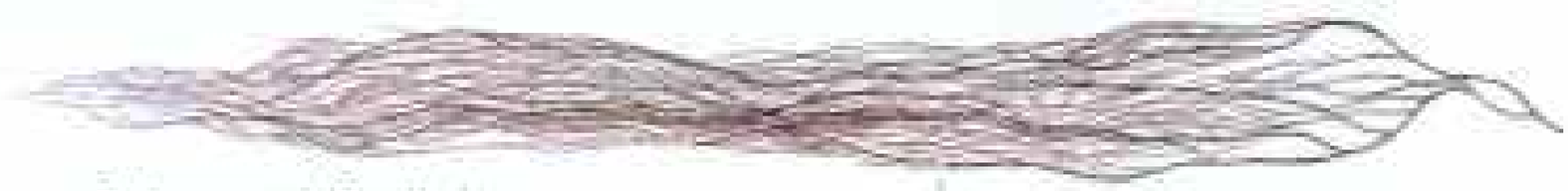
TOM DILLEHAY

From heel to toe a tiny footprint survives in clay that was spread like concrete around a fire pit. Two partial prints accompany it. "If you look at the three together, you see left foot, right foot, left foot," says Dillehay. "Someone walked there."

Botanical Lore

Stalks of juncus, like these that nod near the site today, provided a nutritional grain. Ethnobotanist Jack Rossen made an experimental porridge. "It's an acquired taste," he admits. Some medicinal plants also grew locally, yet others were imports. Boldo, now brewed as tea for stomach ailments, likely came from forests 150 miles to the north. Rolled into a cud with two kinds of seaweed (right), it apparently was administered by a healer in an isolated wishbone-shaped shelter—Monte Verde's version of a hospital, perhaps. Such plant knowledge could only have come with time, pushing back yet further the arrival of the area's first residents.

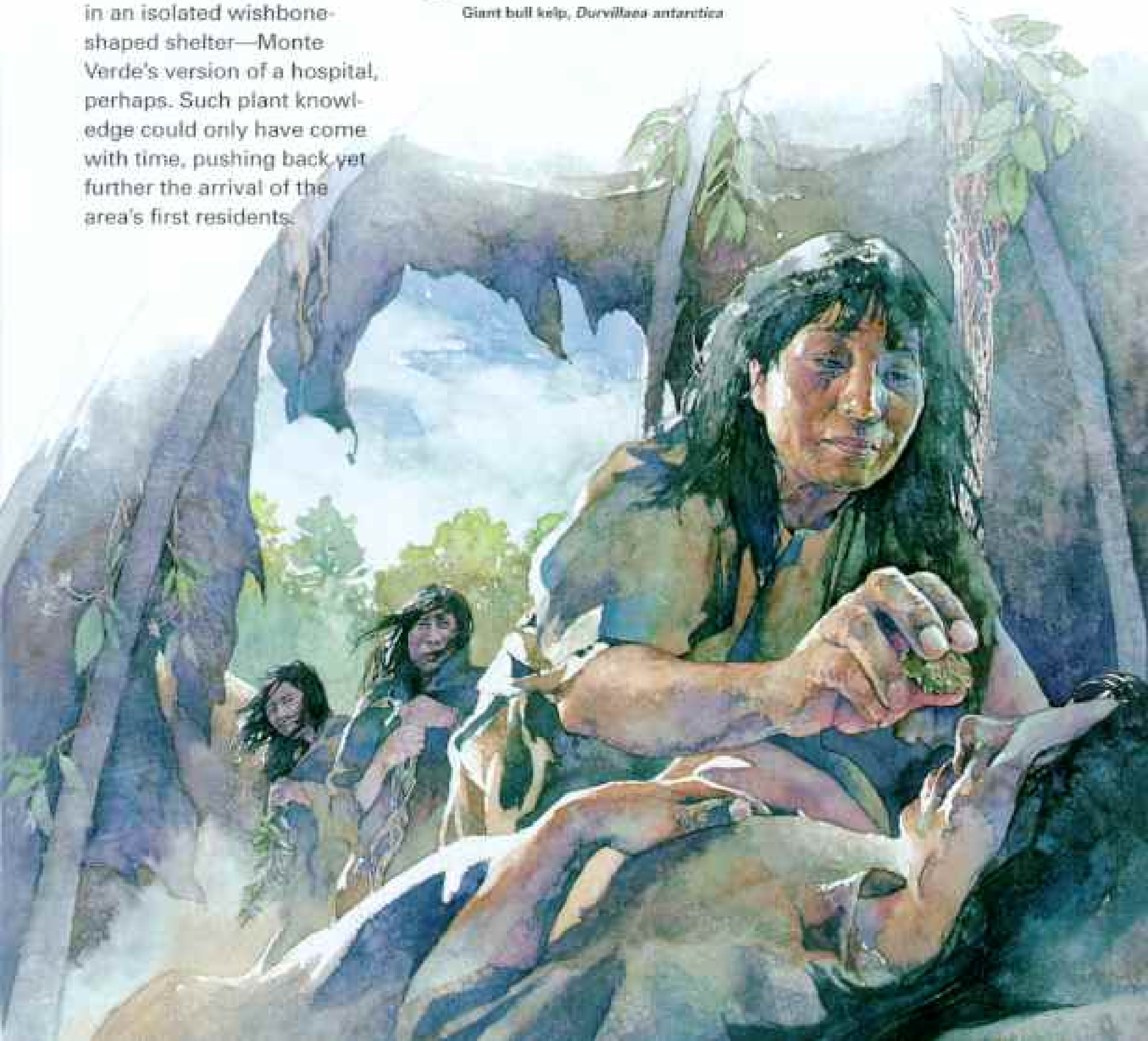
Boldo, *Peumus boldus*

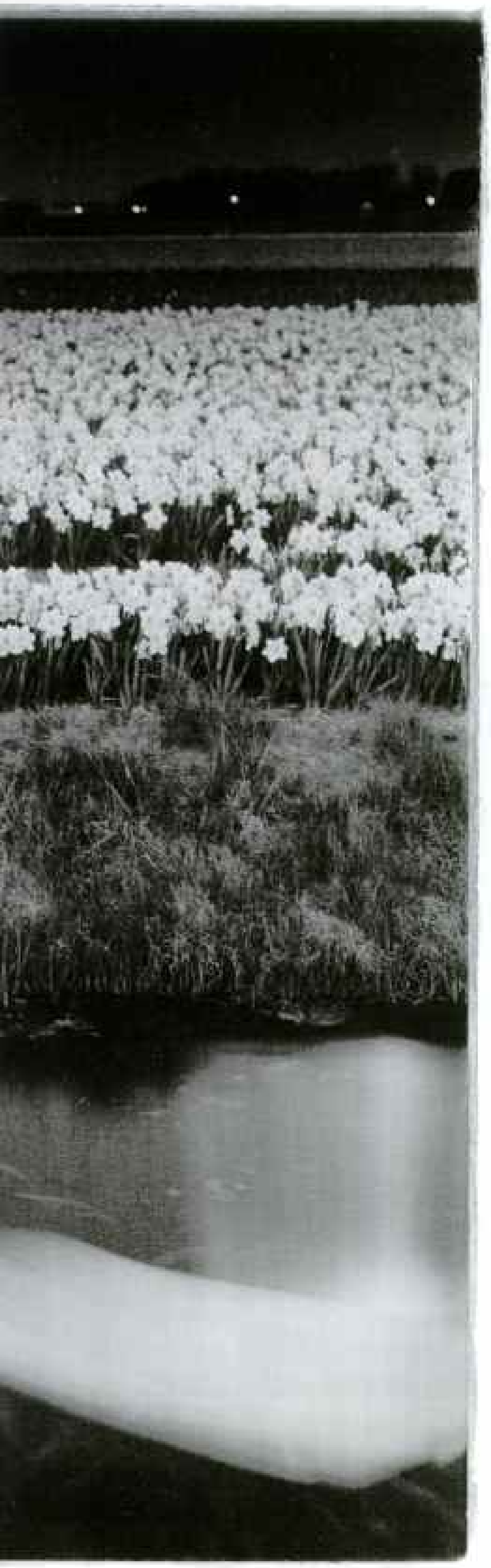


Red seaweed, *Gracilaria* sp.

Giant bull kelp, *Durvillaea antarctica*

SOURCES FOR PLANTS: PLANTAS MEDICINALES DE USO COMUN EN CHILE; ALGAS MARINAS DE CHILE



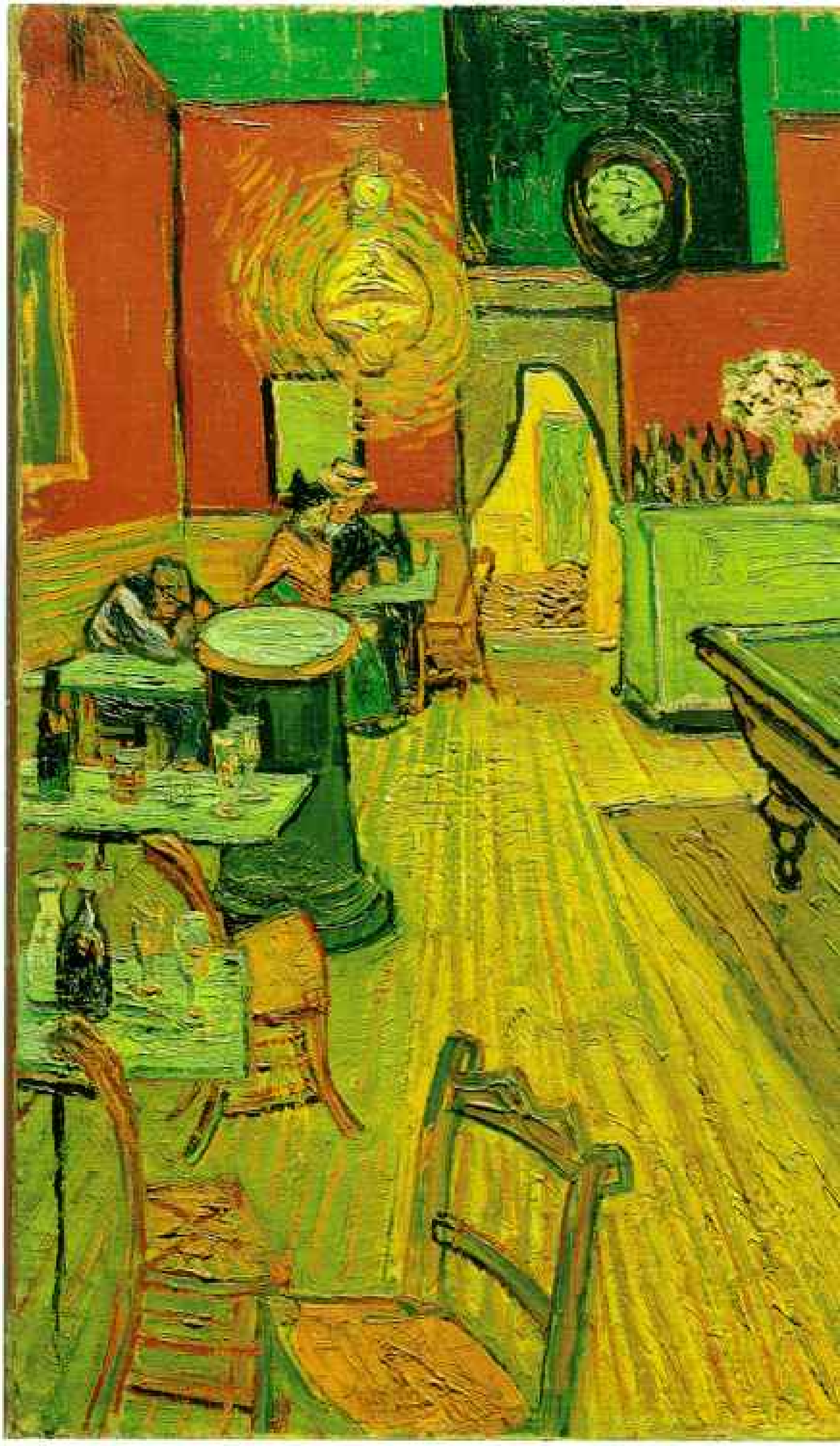


VINCENT VAN GOGH

LULLABY IN COLOR

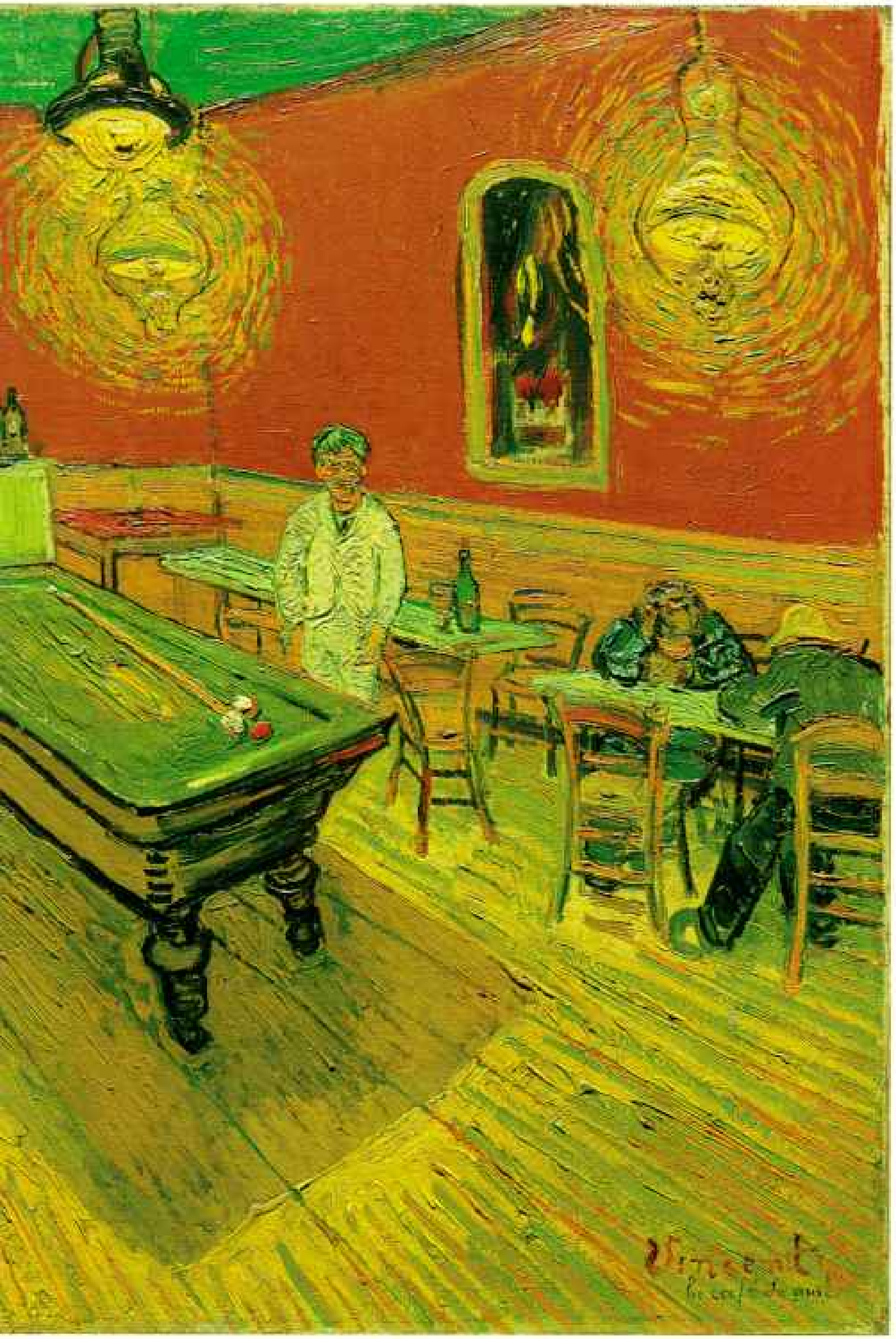
VAN GOGH MUSEUM, AMSTERDAM

"Sorrowful yet always rejoicing," Vincent van Gogh, who grew up walking the Dutch countryside, traveled through life seeking the eternal "Light that rises in the darkness"—like these swans readying for flight south of Amsterdam. From the pain and beauty of his journey, he created masterworks of passion, including penetrating self-portraits, such as this one at age 34. Van Gogh likened painting to performing music. "Whether I really sang a lullaby in colors," he wrote, "I leave to the critics."



Greens and yellows bathe an all-night café van Gogh painted to express "the powers of darkness in a low public house . . . where one can ruin oneself, go mad or commit a crime." Four months later, at the height of his talent, he sliced off an earlobe and collapsed into nightmares and hallucinations.

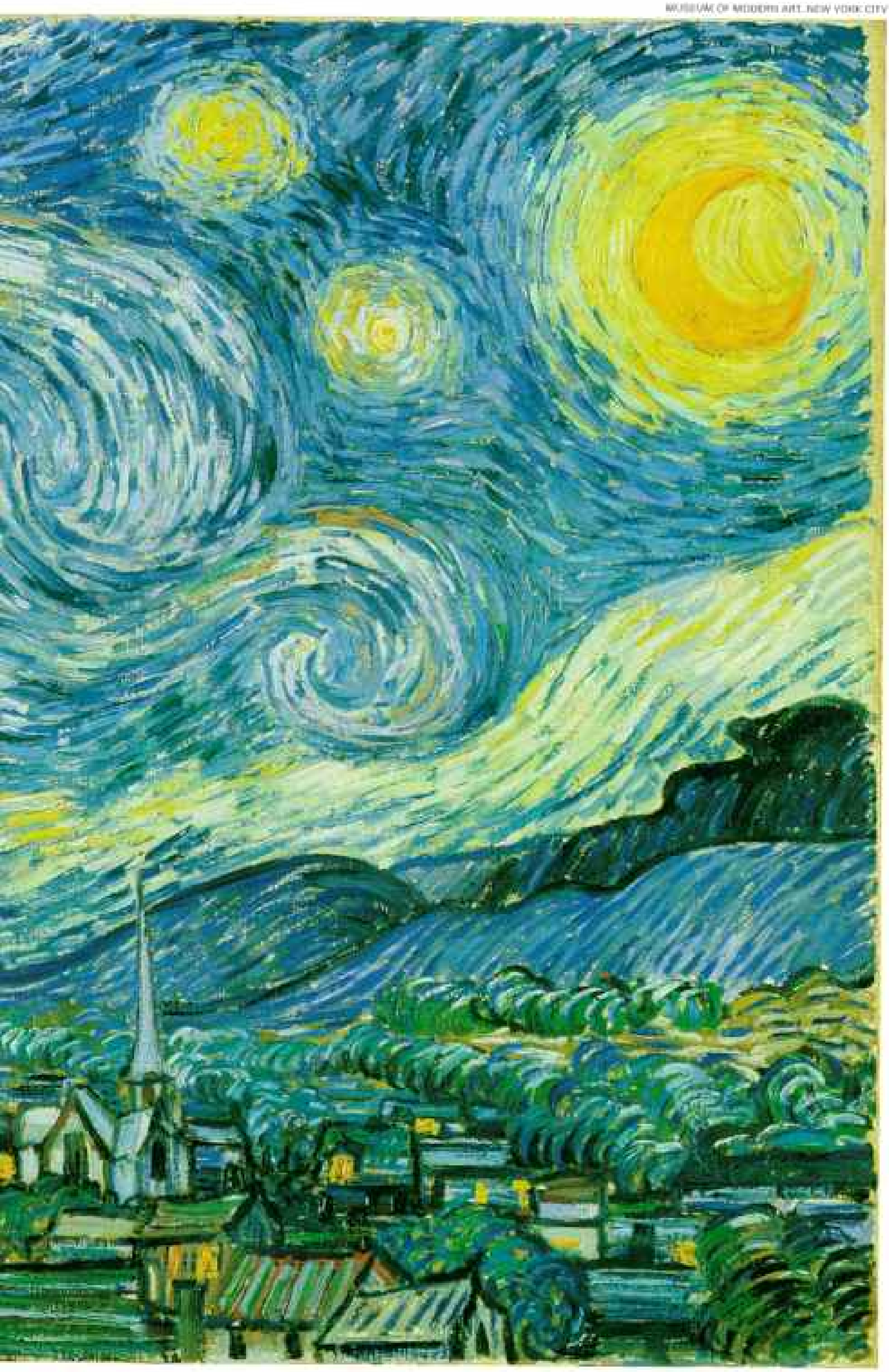
YALE UNIVERSITY ART GALLERY, NEW HAVEN, CONNECTICUT



THE NIGHT CAFÉ, SEPTEMBER 1888

Looking through his barred asylum window, van Gogh saw a vast night sky, which his imagination transformed with swirls of color and stars of "exaggerated brilliance." In such views the artist glimpsed something "one can only call God . . . eternity in its place above this world."

MUSEUM OF MODERN ART, NEW YORK CITY



THE STARRY NIGHT, JUNE 1889

By JOEL L. SWERDLOW
ASSISTANT EDITOR
Photographs by LYNN JOHNSON

THE LETTERS FROM VINCENT VAN GOGH to his brother Theo are yellowed. Some are torn at the corners or have holes from aging. Acid from ink eats through the cheap paper.

I have come to this bombproof vault in the cellar of the Van Gogh Museum in Amsterdam to begin my search for Vincent. Who was this man who said he "sang a lullaby in colors," and why does he have such a hold on us? His paintings sell for the most money; his exhibitions attract the highest number of visitors; reproductions of his work—on socks, sheets, party napkins, coffee cups—permeate homes and offices; the song "Vincent" has sold more than ten million copies since 1971; movies mythologize his life. No other artist, at any time in any culture, has been more popular.

THE 650 LETTERS from Vincent to Theo fill three volumes. Their first surprise is immediate: I knew that Theo financed Vincent's painting and had assumed Theo was the big brother. But Vincent was older. The letters begin in 1872, when Vincent was 19 and Theo was 15.

Vincent was working in The Hague. His uncle had got him a job with Europe's top art dealership. The family had decided that Theo too would become an art dealer. Vincent wrote Theo a letter of congratulations. *I am so glad that we shall both be in the same profession.** Big brother Vincent began to offer advice. *Keep your love of nature, for that is the true way to learn to understand art more and more.*

Before I began reading, I had a clear image of van Gogh: Untutored genius. Bohemian. Poor. Forsaken in love. Lonely. Sold only one painting. Crazy. Committed suicide. But the voice in Vincent's letters is insightful and literate. *How beautiful Shakespeare is! Who is mysterious like him? His language and style can indeed be compared to an artist's brush, quivering with fever and emotion. But one must learn to read, just as one must learn to see and learn to live.*

Despite obvious intelligence, Vincent kept failing. After the art dealership fired him because he argued too much, he taught Bible in England, worked as a clerk in Dordrecht, a small town in southern Holland, and then moved to Amsterdam to study for the ministry. He wrote to Theo that the solution to his troubles lay in God. *There is a God Who knows what we want better than we do ourselves, and Who helps us whenever we are in need.*

In Amsterdam the 24-year-old Vincent was so depressed he thought he might die. Walking through the city made him happy, Vincent reported to Theo in letters, but the depression continued. *My head is sometimes heavy, and often it burns and my thoughts are confused.*

I meet Peter Hanneman, director of the Psychiatric Crisis Center in Amsterdam, who specializes in treating troubled young adults, and describe Vincent's symptoms: Argumentative. Obsessive. Often anxious. *My stomach has become terribly weak.* Eats mostly bread and coffee. Trouble sleeping. Denies himself pleasure. Heavy smoker.

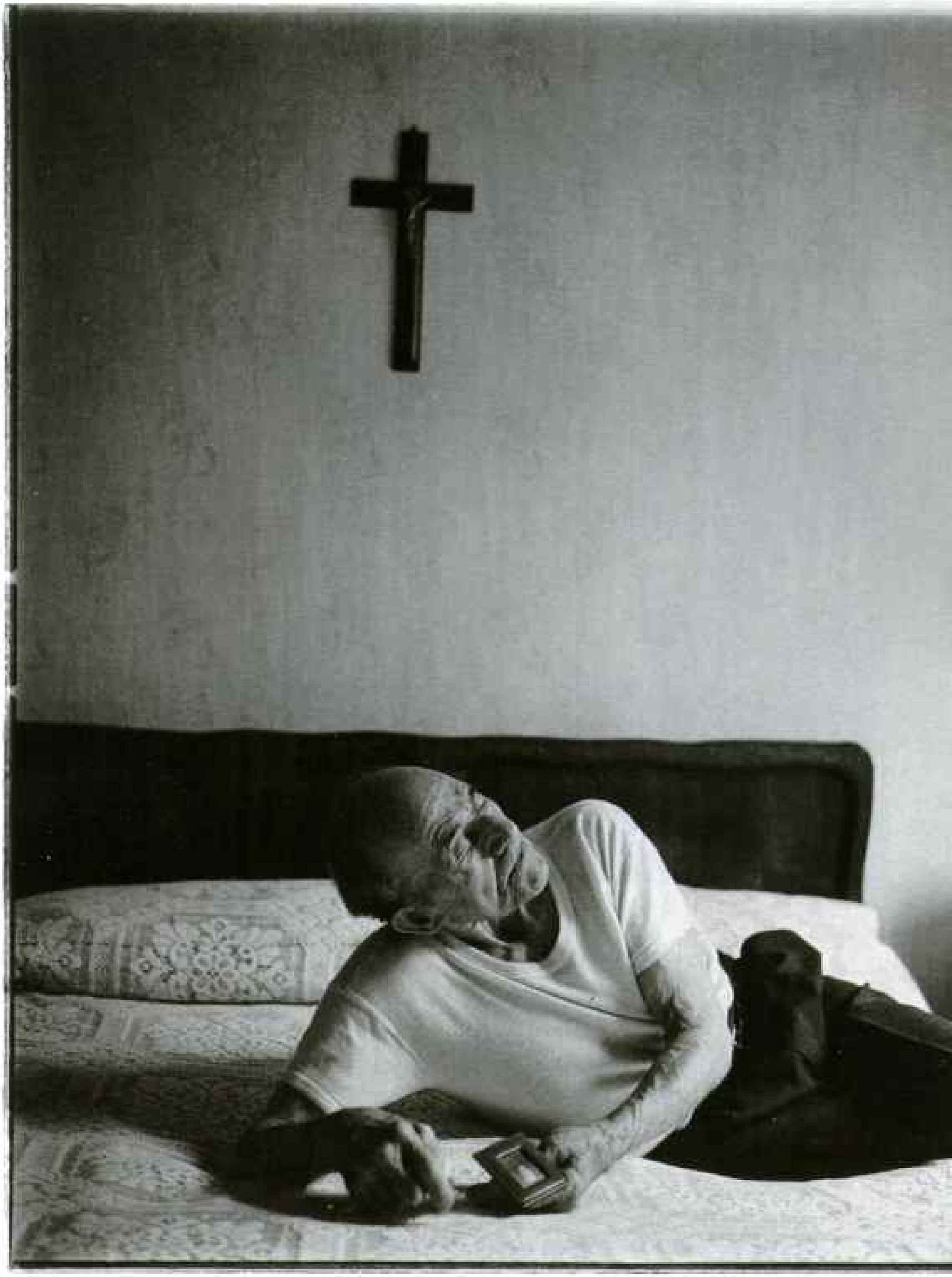
"Most helpful for such a person would be to help him find the part of himself he does not ordinarily use," Dr. Hanneman says. "It would take time. But there is a genius in everybody. If he finds it, his so-called problems can disappear or seem less important."

I explain to Hanneman that as a child and

*From *The Complete Letters of Vincent van Gogh.* By permission of Little, Brown and Company in conjunction with the New York Graphic Society. All rights reserved.

VAN GOGH MUSEUM

Lopped again and again, branches of an ash sprout thick from knobby limbs near Dordrecht, where at 24 van Gogh considered himself a failure. Like the tree's branches, his careers as an art dealer, lay preacher, and bookstore clerk had been pruned away. Still, convinced of God's calling, he moved to Amsterdam to study Latin and Greek in preparation for the ministry. In May 1877 he wrote (left) to his brother Theo: "My conscience tells me there is something greater in the future."



KRÖLLER-MÜLLER MUSEUM, OTTERLO, THE NETHERLANDS

THE REAPERS OF THE BURDEN, EARLY 1881

BORINAGE *Back broken by a coal tunnel cave-in 45 years ago, Giovanni Russo (left) rests in his bedroom in the Borinage region of Belgium. He fingers a photograph of his wife, who prayed to St. Anthony to bring him home safely from the mines. After abandoning religious studies, van Gogh moved to this bleak area on the French border to work as an evangelist among the poor, giving away most of his clothes and spending his nights nursing miners burned in underground explosions. His neighbors called him mad or a saint. His church superiors dismissed him for lack of eloquence. At 26, jobless, he decided to become an artist, copying drawings and prints. In one of his early works (above), women bend under sacks of coal as they pass a shrine containing a crucifix. Van Gogh believed the miners' labor and lowly status brought them close to Christ, who bore the sins of a world that despised him. Van Gogh saw his work as an artist in a similar light. "I consciously choose the dog's path through life," he wrote to Theo. "I shall be poor; I shall be a painter; I want to remain human."*

THE HAGUE *Echo of the woman van Gogh hoped to marry, a prostitute poses in Amsterdam's red-light district. Having moved to The Hague for the company of artists, van Gogh found companionship of a different sort—with an unwed mother named Sien (drawing at right), who sometimes walked the streets. "I have a feeling of being at home when I am with her, as though she gives me my own hearth," he wrote of their life together in his apartment. But with money tight and both families hostile, he left the city, alone.*

VAN GOGH MUSEUM

WOMAN WITH A CHILD ON HER LAP, 1883

young adult Vincent had loved to draw. His work showed talent. Yet no one encouraged him to become an artist. His father, a small-town minister, thought he should be a sales-clerk. Theo, who knew Vincent best, thought he should be a bookkeeper or a carpenter's apprentice. "What if someone had directed Vincent toward art?" I ask. "What if he had been spared the ten years of confusion and failure? Could that have helped?"

"Self-discoveries must emerge at their own pace," Hanneman says. "Van Gogh had to discover himself when he was ready."

Van Gogh abandoned his ministry studies. He then went as an evangelist to the Borinage, a coal-mining region that spans the Belgian-French border—where he nursed injured miners and gave away the money Theo had started sending him. In the Borinage, as throughout his life, reading helped shape how he viewed the world. Vincent compared the miners to the slaves in *Uncle Tom's Cabin*. *There is still so much slavery in the world.*

The last mine in the Borinage closed in the 1960s. To find miners, I stop at a hospital. One 76-year-old has a strong handshake. He began to work underground at age 14. "One lung is broken, and the other does not work well," he explains. He describes gas explosions, suffocations, accidents, the daily descent. His neighbor in the next bed, a retired baker, listens. "They were slaves," he says, interrupting. Vincent's exact words.

While in the Borinage, van Gogh discovered himself just as Dr. Hanneman described. In March 1880, just before his 27th birthday, he walked from the French border city of Valenciennes to Courrières—about 30 miles. His goal: to visit the studio of Jules Breton, one of Europe's leading painters. He had little to show Breton, only pen and charcoal drawings.

Van Gogh stood outside Breton's studio, too scared to enter. He wandered into the town's church, admired a copy of Titian's painting "Burial of Christ," and walked the 50 miles back to his home in Cuesmes, Belgium. *Three days and three nights in the beginning of March, in wind and rain, without a roof over my head.* During this journey van Gogh realized he was a painter. He never explained to anyone why or how this happened. *From that moment everything has seemed transformed for me.*

I retrace his journey, imagining him wet and penniless, getting bread by trading drawings—none of which has ever surfaced. The countryside is much as he saw it. But most of the church and many of the houses in Courrières are made of new bricks. "Allied soldiers were in the church during World War II," an elderly woman explains as she guides me through the church. "They refused to surrender, so the Germans burned down the church and the town. Several hundred people died." Some walls of the church still have bullet holes.

Perhaps sensing my disappointment, my guide says, "My aunt had six sunflowers that van Gogh did here. She lost them during World War II."

Van Gogh did not paint sunflowers until seven years after Courrières, so her story could not be true. But I appreciate her desire to be part of van Gogh and do not correct her.

VINCENT KEPT MOVING—Holland, Brussels, Antwerp. As I follow him, his letters read like a play with two major characters. One is offstage because Vincent rarely saved Theo's letters.

Many nights I stay awake, unable to stop reading. The letters open a window on the soul, sometimes so intense, so personal, I look away from the page. *My youth is gone—not my love of life or my energy, but I mean the time when one feels so lighthearted and carefree.* Vincent is becoming my friend. Knowing how his letters will end, I read slowly. When I fall asleep, I force myself awake and continue reading.

Wherever Vincent lived, he studied art. In Antwerp one teacher called his work "putrefied dogs." But Vincent developed according to classical academic training: drawing, charcoal, anatomy, wood engravings, perspective, composition, tone, and color. He could produce realistic sketches, but he failed classes because he refused to follow instructions.

More of my preconceptions about van Gogh begin to fall away. Bohemian café life? No. He had a strict regime. Up at 4 a.m. to work. Poor? Yes, but by choice. He received 150 francs from Theo every month, more than double what a laborer made. Most went for

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LYNN JOHNSON used special-format black-and-white photography for this story because she wanted, through light and composition, to evoke the feeling of van Gogh's time. "How fearful it made me," she says, "to be on a page with the work of van Gogh."

paint, tobacco, and models. Sold only one painting? Before producing great works, he sold drawings and traded his work for supplies. Lonely? True. *There may be a great fire in our soul, yet no one ever comes to warm himself at it, and the passers-by see only a wisp of smoke.*

His behavior was self-destructive. He would admire a woman from a distance, then announce his love, scaring her away. During 1882 and 1883 he lived with a prostitute and her two children, demanding that Theo support them. This contributed to a near break in the brothers' relationship. For about two weeks Theo stopped answering Vincent's letters.

THEO MOVED from Holland to Paris in 1880, eventually becoming a branch manager for a leading gallery. He lived in Paris the rest of his life. I skim ahead, looking for references to him. Shy. Black eyeglasses. Fastidious dresser. Saves Vincent's letters in a desk drawer. Ill health: sciatic pain, persistent cough, seizures, weeks of inability to think clearly. Vincent was worried. *I am very sorry to hear that you don't feel well either.*

Theo never threatened to stop sending money and, in effect, bought all work that Vincent did not trade or give away. When Theo complained that business was bad, Vincent told him to borrow money and send it. Vincent was also skilled at manipulating Theo's emotions. *I am sorry that I didn't fall ill and die in the Borinage that time, instead of taking up painting, for I am only a burden to you.*

Vincent paid models before buying food and often had nothing to eat until Theo's next letter. Living on bread and coffee for days as Vincent did leaves me light-headed and preoccupied with food. To earn a meal, why didn't Vincent work as a laborer? He was broad shouldered and strong. The letters make his answer clear: Painting was more important than food.

Vincent's financial dependency was complete. *My underwear is also beginning to fall apart.* Nonetheless, he remained the big brother, eager to instruct Theo. *The best way to know God is to love many things. Love a friend, a wife. . . . But one must love with a lofty and serious intimate sympathy.*

Although he wanted to show the dignity of daily survival, Vincent's subject matter remained downbeat. He sought unattractive models and unpleasant scenes. *I see drawings and pictures in the poorest huts, in the dirtiest corner.* His work so far, to me, is unappealing. Why be reminded about life's ugliness? Yet Vincent believed that people would want to look at his drawings. *No result of my work could please me better than that ordinary working people would hang such prints in their room or workshop.*

IN SEPTEMBER 1883, when Vincent was 30 years old and had been an artist for three years, he discovered color. *I have felt a certain power of color awakening in me.* This awakening came roughly at the point at which most new artists turn to color. Van Gogh's actions, however, were extreme. Color soon dominated all his perceptions. Vincent began piano lessons, telling the teacher that musical notes range from dark blue to yellow. He thought Vincent was crazy and refused to continue the lessons.

Van Gogh's courtship of color, his one successful love affair, was not the mad dabbing portrayed in *Lust for Life*, the 1934 best-seller made into a 1956 Academy Award-winning movie. He developed a rigorous system, based on the "laws of simultaneous contrast and complementary colors" described by Michel-Eugène Chevreul, a 19th-century French chemist. *The laws of the colors are unutterably beautiful.* At times, he stepped back and stared at a canvas for two hours before selecting his next stroke. *If one combines two of the primary colors, for instance yellow and red, in order to produce a secondary color—orange—this secondary color will attain maximum brilliancy when it is put close to the third primary color not used in the mixture.*

Vincent's mastery of color grew in late 1883 and 1884. On a warm summer day I follow Vincent's footsteps from Nieuw-Amsterdam to Zweeloo, in the part of the Netherlands that has changed least since his time. Cars stop to offer me a ride. They cannot understand why I want to walk. Only by going slowly, as Vincent suggests, can you see. I look inside a white potato blossom and find soft shades of purple and yellow.

Van Gogh did not notice—or care to paint—such colors. Instead, he focused on his traditional subject: ordinary people. In early 1885, encouraged by Theo's willingness to try selling his paintings, he completed "The Potato

VAN GOGH MUSEUM (BOTH)

THE POTATO EATERS, MAY 1885

HEAD OF A PEASANT WOMAN WITH CAP, 1885

NUENEN *Their skin "the color of a very dusty potato," peasants gather for an evening meal in van Gogh's first major painting, set in a hut near his parents' house in rural Nuenen. "I have tried to emphasize that those people, eating their potatoes in the lamplight, have dug the earth with those very hands they put in the dish," he wrote. "It speaks of manual labor, and how they have honestly earned their food." To prepare, van Gogh spent the winter drawing peasant hands and heads, such as the one at left, in a series modeled after black-and-white magazine illustrations depicting the toil and misery of ordinary people. On the final canvas he exaggerated the coarseness of the peasants' features and the darkness of the hut, applying paint like worked earth. "If a peasant picture smells of bacon, smoke, potato steam—all right, that's not unhealthy."*

WOMAN AT A TABLE IN THE CAFÉ DU TAMBOURIN, 1887

SUNFLOWERS, LATE SUMMER 1887

PARIS *Under the Impressionists' influence van Gogh abandoned a dark palette, rendering still lifes (above) in "intense color and not a gray harmony." He showed his work for the first time in the Café du Tambourin (left). Joining the avant-garde, he hung his canvases with theirs in working-class restaurants like the one below. A friend wrote that the exhibition was "more modern than anything that was made in Paris at that moment."*

Eaters." It is his first work of genius because of his successful color experimentation. I examine the canvas in Amsterdam's Van Gogh Museum, and it reveals a jungle of color. Blacks and browns are not what they appear. Like every color in the painting, they are made by combinations of primary colors—red, yellow, and blue. Reds and greens fight. Even the shadows have colors, all of which carry energy, convey emotion, and capture what is beyond the visible.

How Vincent's vision emerged remains a mystery. His letters provide intimate access to the creative process—more than is possible with any other artist—yet leave us at a dead end when we seek the source of genius. In van Gogh's case it was a combination of inherited skill, willingness to challenge accepted truths, and an intuitive grasp of color relationships. Obsessiveness was also essential. Unencumbered by job or family, he devoted every moment to developing his skills.

Sensing what color made possible, Vincent began to ask Theo about Impressionism. He knew that a movement existed but remained unaware of Impressionism's bright colors, happy scenes, dabs of paint, and impression of spontaneity—even though the first major Impressionist exhibition had been in Paris ten years earlier. *Here in Holland it is rather difficult to find out what Impressionism really means.* Vincent had been studying Japanese woodcut prints, the same type the Impressionists studied, yet knew little about developments in nearby Paris.

Theo, who apparently found Vincent's intensity difficult, tried to persuade him not to come to Paris. But in March 1886, after 18 months of asking about Impressionism, Vincent sent a note to Theo's office. It announced his arrival in Paris. *Do not be cross with me for having come all at once like this.* Vincent moves in with Theo, and the letters stop.

Few Impressionists had sold, yet Parisian artists continued to devise new techniques, such as Georges Seurat's pointillism—small dots or strokes of color that blend when seen from a distance. Vincent met these artists at studios and cafés, and many quickly recognized him as a genius. Only six years after that walk in the rain to Courrières, Vincent was at the heart of the avant-garde.

Vincent confined himself to a compact area within Montmartre, a hilltop section of northern Paris known for nightlife. I visit the apartment he shared with Theo; the area where he first felt drawn to—and painted—sunflowers; and the cafés where he argued art.

SELF-PORTRAIT, SPRING 1887

In his pocket Vincent carried red and blue chalk, drawing on walls when describing his latest theories. To better understand color combinations, he studied balls of colored yarn, which he kept in a lacquer box. Purple and yellow. Pink and blue. Yellow and yellow. Orange and red. Instead of grays and browns, his work began to emphasize blue and red, then yellow and orange—which he added to some works completed in the Netherlands.

Within months of arriving in Paris, van Gogh began to see like the van Gogh we know today. He was a failed preacher, using color to whisper his sermon: Go slow. Stop thinking. Look around. You'll see something beautiful if you open yourself.

I want to go to van Gogh's "Restaurant de la Sirène at Asnières." No place, his painting suggests, could make you happier. The actual restaurant disappeared long ago. Bogomila Welsh-Ovcharov, author of *Van Gogh à Paris*, joins me to eat in a café that seems ordinary until I begin to listen to van Gogh. Blue table cloth. Thick floorboards. Ivy growing on stone wall. Plants in curved vases. Green. Yellow. Red. Orange. Sun shimmers on a red-tile roof.

We choose this quiet café because terrorists have been placing bombs in popular places. A newspaper headline reports massacre and rape in Bosnia. "How can van Gogh be important when such things are happening?" I say. Welsh-Ovcharov's response—"Such things make van

Gogh even more necessary"—helps answer a fundamental question: Given Vincent's suffering and his acute awareness of suffering in others, why do his Paris paintings make me happy? His work offers consolation, escape.

Few who lived in van Gogh's time saw value in his work. They laughed when Theo showed them Vincent's paintings.

Are today's dealers selling works by geniuses, who—like van Gogh—must wait for death before being recognized? Wandering around Parisian galleries, I find new artwork using video and computers boring. If they are saying something, I cannot hear—just as people could not hear van Gogh.

How do sensitivities change? I stand in the Luxembourg Gardens where van Gogh stood as he painted. I look at the garden, then at a reproduction of his work in a book, and back at the garden. I see combinations of colors I had not noticed before. Trees, flowers, and people relate with a grace I had not seen. "I need classes to help me read his paintings," I say to Welsh-Ovcharov. "He's teaching me to better appreciate the actual garden."

"You don't need a teacher," she responds. "Van Gogh is accessible. A part of his art can be understood by everyone." Skeptical, I go to the Musée d'Orsay to look at van Goghs. A man stands in front of "Starry Night Over the Rhône." His eyes have tears. I ask why. "Beauty and truth are always sad," he replies.

The man shows me how starlight fails to hit only one spot on the shore: where a couple strolls. They are in darkness. I ask if he learned this from a class or a book. "No," he says. "It's something I just saw."

"STARRY NIGHT OVER THE RHÔNE" was painted in Arles, an agricultural town in southern France, where Vincent moved on February 20, 1888—after two years in Paris. He rented a room in one of the first places he passed and began to work. Nearby were apricot, almond, cherry, peach, and olive trees. Eleven miles in the distance are les Alpilles, the Little Alps.

I take Vincent's favorite route, nearly three miles to Montmajour, a hilltop abbey. The massive stone walls, curved ceilings, and echoing hallways are a scene from medieval mythology. Vincent came here to paint flowering fields visible in all directions and sometimes stole figs from nearby fields. It is hot. A cicada chorus sings, just as it did for Vincent.

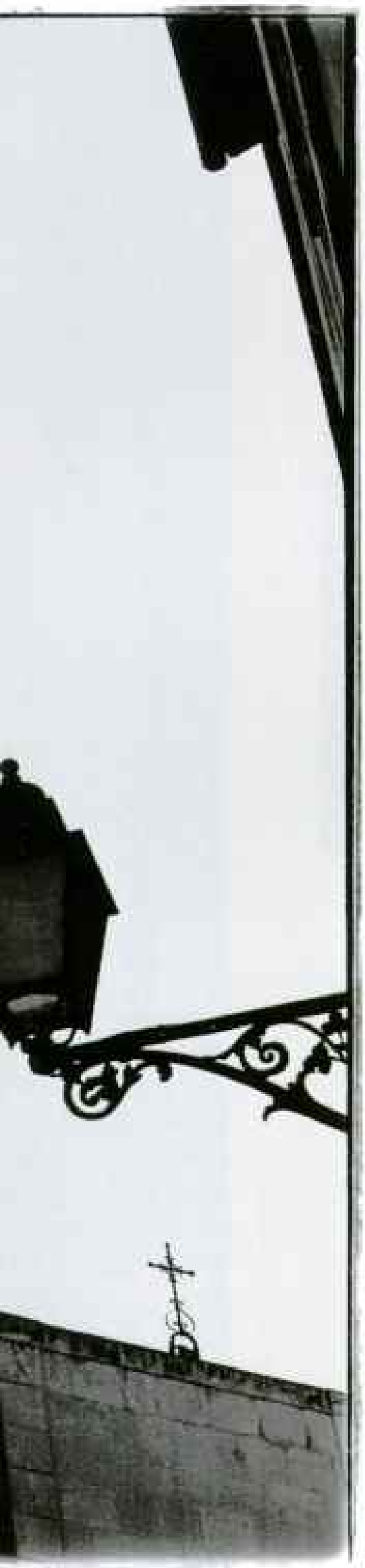
At the top of a hill is a windmill, one of the few remaining from van Gogh's time. On its walls and ceiling is a drawing. "It charts 32 winds that blow over these hills," the windmill keeper explains. The winds are so strong, so reliable, so familiar, each has its own name. "Wind comes down the Rhône River Valley," he says. "At Arles the Rhône splits into the Grand Rhône and the Petit Rhône, and the wind spreads." He gestures toward the sky. "Why do you think the sky here is so clear?" he asks. "Wind blows away the clouds. That is why we have such good light."

I am glad that Vincent starts to write again. His almost daily letters to Theo reveal a heightened color-consciousness. *I saw a stable with four coffee-colored cows. . . . the stable bluish-white . . . and a great green curtain in the doorway. . . . I saw another very quiet and lovely thing the other day, a girl with coffee-tinted skin . . . ash-blonde hair, gray eyes, a print bodice of pale pink . . . against the emerald leaves of some fig trees.*

Colors rushed from his fingertips. "Wheat Fields with Sheaves" shows wheat with at least six shades of yellow. I look at an actual wheat field, thinking van Gogh exaggerated. Then I close my eyes, remind myself that to see requires a willingness to see, and look again. The wheat really does have six yellows.

Van Gogh's style had always been to study other artists, absorbing what seemed useful and rejecting what he did not like. Within months of arriving in Arles, he began to reject Impressionist color combinations. *All the colors that the Impressionists have brought into fashion are unstable.* For color inspiration he turned to established painters such as Eugène Delacroix, Adolphe Monticelli, and Félix Ziem. For inspiration on painting outdoors he turned to Jules Breton—whose studio he had been afraid to enter in Courrières. Vincent was drawn back into a respect for Chevreul's laws of color. Artistic innovation, van Gogh thus reminds us, is not linear: The way forward sometimes comes from looking back.

Using color more freely, van Gogh's love affair with nature intensified. *I am ravished, ravished with what I see. . . . I have a lover's insight or a lover's blindness.* What had required hours now came quickly. The human eye may be able to *(Continued on page 122)*

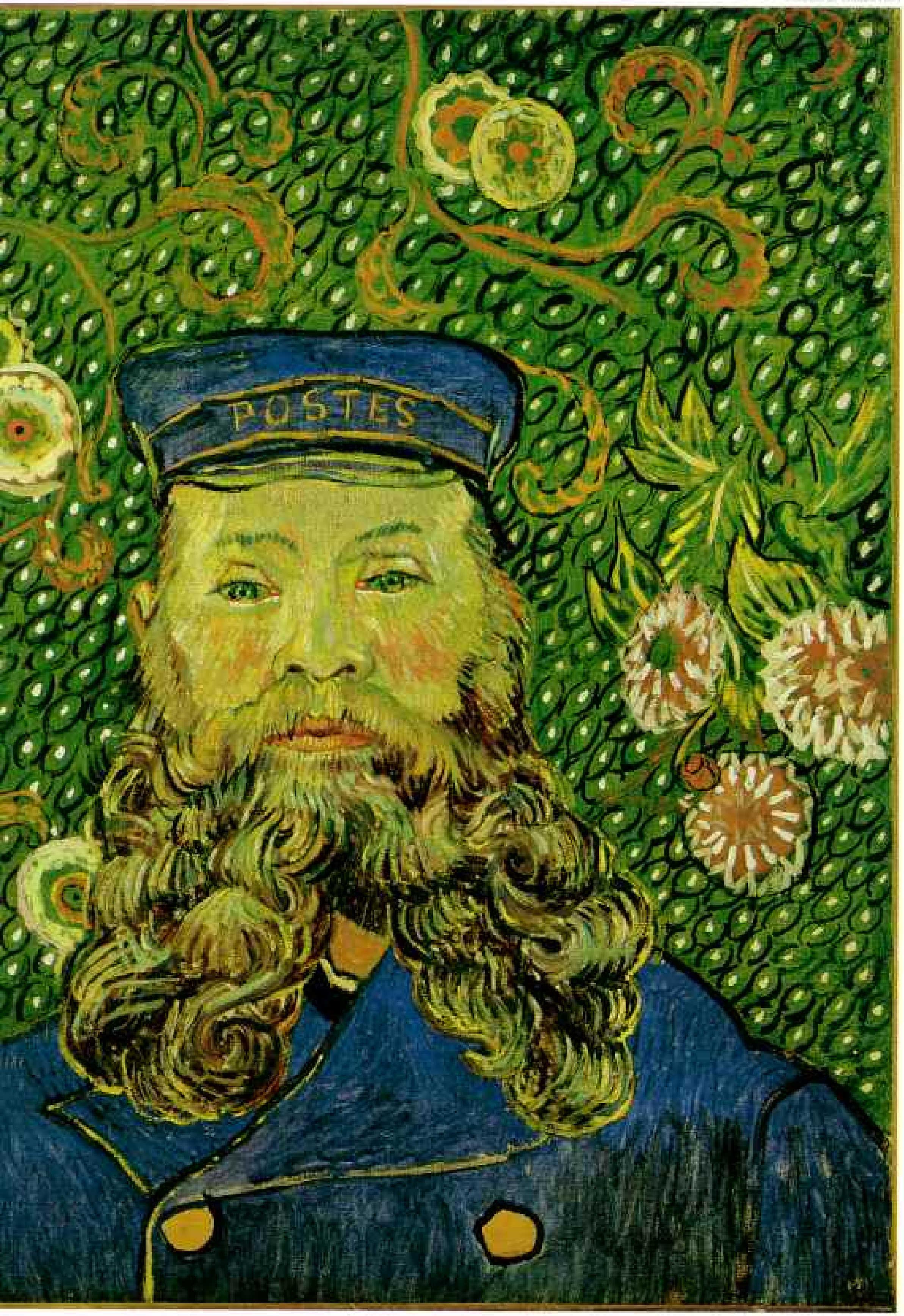


VAN GOGH'S BEDROOM IN ARLES, SEPTEMBER 1889

ARLES *Lit by a vigorous sun, a sheet casts a long shadow on a building in Arles (left), an ancient town in the south of France where van Gogh journeyed to seek luminous colors like the ones in Japanese prints. Walking the streets and fields, van Gogh captured "the land of the blue tones and gay colors" in a series of paintings considered among his best. Here van Gogh created "a new art," writes critic Meyer Schapiro, by replacing traditional light and shadow with bounded areas of pure color—in hues drawn as much from the artist's mind as from nature. After working at a pace that left him "half dead," van Gogh withdrew to render his bedroom (shown above in a copy he made) in tones suggesting sleep. "Looking at the picture ought to rest the brain, or rather the imagination," he wrote. Alone in Arles van Gogh hoped to found an artists' community, but two months with painter Paul Gauguin ended in quarrels and the first attack of mental illness, when van Gogh cut off part of his ear and gave it to a prostitute.*

THE DANCE HALL, DECEMBER 1888

ARLES *Adorned in silk and lace (top), Arlesians gather in a cluster of festival gowns. Renowned for their beauty, the town's women captivated van Gogh, who painted them as a colorful multitude (above). Delving deeper, he used radiant hues to give ordinary people "something of the eternal which the halo used to symbolize." He painted his friend, the postman Roulin, as if reflecting "tenderness, such as an old soldier might have for a young one."*



THE POSTMAN ROULIN, JANUARY–FEBRUARY 1889

distinguish as many as ten million different colors and tones; an infinite number of combinations is possible. Perhaps someone armed with powerful computers will one day decipher van Gogh's color concoctions. They are instantly accessible yet maddeningly complex.

VINCENT OFTEN could not eat or sleep. *To attain the high yellow note that I attained last summer, I really had to be pretty well keyed up.* After working all night on a self-portrait, he was unhappy with it and traded it for five Japanese prints. The Arles shop owner sold it to a cleric, and its history disappears—until 1946, when Reeves Lewenthal, a young American art dealer, got a flat tire on the outskirts of Paris. Lewenthal entered a bistro to call a mechanic. The bistro was dark and grimy with paintings on its walls. Lewenthal recognized one as a van Gogh.

Some art historians still believe this painting—"Study by Candlelight"—is genuine, but by the 1970s most regarded it as a fake. The persistence of such stories helps explain Vincent's popularity. Find a van Gogh and get rich quick. A new one turns up about every decade. So do forgeries. Annet Tellegen, one of the world's leading experts on van Gogh, says that about one in fifteen currently accepted van Goghs—including some of the most famous—are forgeries. Because owners have invested so much money and prestige, they have little interest in learning the truth.

A COMBINATION of fake and real greets me as I enter the Place du Forum, just north of the open square that was a center of Arlesian life under Roman rule—from the first century B.C. through the fifth A.D. There it is! The subject of his "Café Terrace at Night." Restored in 1980, its tables have silk sunflowers. It is called the Café van Gogh. Next door is Snack Bar Le Tambourin, the name of Vincent's favorite café in Paris. A cup of coffee costs two dollars.

My hotel room overlooks the terrace café. Sounds drift in as I continue Vincent's letters. I am angry at Theo, whose records show that he sold one of Vincent's self-portraits to a buyer in London. Theo never told Vincent, and no one knows how much the buyer paid.

At 1:30 a.m. I go looking for what Vincent portrayed in "The Night Café," completed several blocks away near the railroad station. In contrast to the happy glow of "Café Terrace at Night," it uses the conflict between colors to capture lonely people awake in the middle of the night. *I have tried to express the terrible passions of humanity by means of red and green.*

VAN GOGH MUSEUM

SELF-PORTRAIT WITH STRAW HAT, 1887

The only open café I find is a McDonald's with plastic sunflowers and a tile replica of van Gogh's "The Night Café."

After I return to my room, Theo suddenly walks onstage. Vincent—for unknown reasons—saved 36 of his letters, beginning in Arles. They convey a deep sensitivity I had not expected: "The sympathy an artist feels for certain lines and for certain colors will cause his soul to be reflected in them." "It is such a pleasure for me to look at your pictures. They make the rooms so gay, and there is such an intensity of truth." "You have repaid me many times over, by your work as well as by your friendship, which is of greater value than all the money I shall ever possess."

Theo's words could not touch Vincent's loneliness. *Often whole days pass without my speaking to anyone.* "We regarded him as crazy," Jeanne Calment tells me. "He lit candles in the brim of his hat as he painted outside at night. People called him *fada*, touched by fairies."

Calment, born in 1875, and the world's oldest person whose birth is documented, smiles and thrusts out her breasts. This, she says, is how she flirted with Vincent when she was 14. He had come into her cousin's store. "I was very pretty, but he wanted only to discuss painting," she says—still annoyed.

How I'd like to settle down and have a home!

Vincent never lost faith in romantic love, but for companionship he turned to prostitutes—plentiful because Arles was a garrison town for French troops.

Three months after arriving in Arles he rented what he called the Yellow House, which he hoped to transform into an artists' commune. I look for the house but learn that Allied bombers flattened it while trying to destroy a bridge over the Rhône shortly after D day.

Where the house stood is now a street. Vincent huddled here in the rain, preparing for the arrival of Paul Gauguin, whom he had met in Paris. *I am vain enough to want to make a certain impression on Gauguin with my work.* Gauguin had sold a few paintings and by the early 1900s would be famous for his midlife escape to Tahiti and paintings that use color and distorted perspective to express emotion. Both Theo and Vincent recognized Gauguin's genius. He was to receive the same 150-franc monthly payment from Theo—who, thanks to Vincent's influence, had become the principal dealer for Paris's avant-garde.

Gauguin arrived in late October 1888. Never has more artistic talent been assembled than when the two worked together. Friction was immediate. Gauguin believed artists must paint from memory; van Gogh needed to see what he was painting. *Our arguments are terribly electric.* On December 23 Vincent may have threatened Gauguin with a razor—the source is Gauguin, who sometimes lied—and then cut off his own earlobe.

The question most frequently asked about van Gogh is, Why? Maybe he was emulating the ear cutting at bullfights in Arles. Maybe he had Ménière's disease, excess fluid on nerve endings in the inner ear that causes annoying sounds. *I hope I have just had simply an artist's fit.* A coincidence difficult to ignore is that Vincent's ear cutting came shortly after Theo became engaged. Vincent had compared one of Theo's previous girlfriends to Lady Macbeth.

Theo rushed to Arles. When he arrived, he put his head on the pillow next to Vincent's—yet he left the same day to rejoin his 26-year-old fiancée, Johanna Bonger, called Jo.

Vincent never explained what happened with Gauguin or why he cut his ear. *To suffer without complaining is the one lesson that has to be learned in this life.* Maybe nothing could have stopped his self-destruction. "If he might have found somebody to whom he could have disclosed his heart," Theo wrote to Jo, "it would perhaps never have gone thus far."

THE NEXT STAGE in Vincent's decline came about a month later—attacks during which he would hear strange sounds and think people were trying to poison him. *The unbearable hallucinations have ceased, and are now getting reduced to a simple nightmare.* He asked to be committed to Saint-Paul-de-Mausole, a mental hospital at St.-Rémy, some 15 miles from Arles.

Since his death van Gogh has been diagnosed more than any other artist in history. Diagnoses include epilepsy, manic-depression, and schizophrenia. Drinking large amounts of absinthe, which contained toxic wormwood, could also have poisoned him. Van Gogh thought that his problem had physical roots, a belief supported by recent studies that reveal that physical abnormalities of the brain contribute to mental illness. *I am beginning to consider madness as a disease like any other.*

Is such mental illness related to creativity? Many writers and composers, including Lord Byron, Virginia Woolf, and Robert Schumann, have had severe mental illnesses. As with van Gogh, illness both impeded and fueled their creativity.

When attacks came—they lasted for three and a half of his twelve months in the asylum—Vincent could not work. But amid the howling of other patients, he completed more than a hundred masterpieces. *Working on my pictures is almost a necessity for my recovery.* Some see craziness in these paintings, pointing for example to the swirls in "The Starry Night" (pages 104-105). "The Starry Night," however, is the result of rational thought. Its construction resembles the Japanese prints Vincent studied. At 4 a.m., June 19, 1889, around the time Vincent executed the painting, Venus and the constellation Aries were where he placed them. He had also read magazine accounts of comets.

THE ASYLUM'S DOCTORS thought Vincent might have epilepsy and treated him with baths. The bathtubs are now planters outside the hospital. During attacks they locked Vincent up. I look up at his window—it no longer has bars—through which he painted "The Starry Night." Then I stop. The former monastery is still a

WHEATFIELD WITH A REAPER, JULY 1889

ST.-RÉMY *Framing a view that inspired van Gogh, a window lights an art therapy studio newly opened in the asylum to which the artist retreated, shaken by his illness. Fearing mental breakdown, van Gogh embraced nature: "My ambition is limited to a few clods of earth, sprouting wheat, an olive grove, a cypress." His forms sprang to motion, pushed by curving, pulsating brushstrokes. Van Gogh described a sawed-off trunk (below) as an expression of anguish and a reaper (above) as an image of death.*

THE GARDEN OF SAINT PAUL'S HOSPITAL, OCTOBER 1889

WHEATFIELD UNDER THUNDERCLOUDS, JULY 1890

THE RAISING OF LAZARUS (AFTER A DETAIL OF AN ETCHING BY REMBRANDT), MAY 1890

VAN GOGH MUSEUM (NOTH)

AUVERS-SUR-OISE *Like Lazarus waking from the dead, van Gogh rose from two months of mental confusion to paint this version of a Rembrandt etching (left) and journey from a year's confinement in the asylum to Auvers, an artists' colony north of Paris: "The whole horrible attack has disappeared like a thunderstorm and I am working . . . with calm and a steady enthusiasm." In 70 days he produced some 70 paintings. But increasingly he worried that he was a financial burden on his brother Theo's family. Uneasy after a visit, he returned to the country to paint wheat fields (above). They expressed, he wrote, "the health and restorative forces" of nature, but also "sadness and extreme loneliness."*

mental hospital, yet people, drawn by the van Gogh story, picnic all around it.

I can no longer avoid something that has bothered me since Paris. There, I saw people make a pilgrimage to van Gogh's paintings as though he were a religious figure or a rock star. Some had tears in their eyes. Others posed for photographs in front of his work.

Looking at the St.-Rémy picnickers, I want to stop focusing on van Gogh's private life, to skip my next stop: Auvers—where Japanese tourists leave family ashes on Vincent's grave. Everyone, including me, should stop treating the places he lived as sacred shrines and let his paintings speak for themselves. Little is known about what was going on in Shakespeare's life when he wrote *Hamlet* or *Macbeth*, but that does not get in the way of our understanding his plays.

It is too late to cancel my lunch with Philippe Latourelle, director of St.-Rémy's art center. He shares my concern. "Pretty soon they'll be taking pictures at every tree or rock where van Gogh stood," he says.

But to my surprise, I switch sides. While describing my feelings at the window through which he painted "The Starry Night," I argue against my own conclusion that we should not focus on Vincent's private life. Knowing that he painted "The Starry Night" while in an asylum—about a year before he committed suicide—changes how you see it.

The picnickers also answer my question about van Gogh's popularity. The van Gogh story gives them something they need. Misunderstood. Resisting materialism. Needing love. Alone. Unappreciated. We have all been van Gogh. We find pieces of ourselves in him. In Amsterdam I had asked a student from Mexico why the Van Gogh Museum excited him. "He kept working hard, he never gave up," the young man replied. "I want to earn money to get through college. I won't give up either."

Such attitudes help explain the high prices paid for van Goghs. His "Portrait of Dr. Gachet" sold for $82.5 million in 1990, breaking the world record of $53.9 million held by his "Irises." People are buying great art. They are also buying a piece of the story.

I leave the lunch in St.-Rémy laughing at myself. Now that I recognize the value of Vincent and Theo's story, I want to enlarge it—to embrace Theo's wife, Jo.

Theo had met her in 1885, but Jo had discouraged him. She had rekindled the relationship in 1888, just before Vincent left Paris. Vincent may have wanted to give Theo's romance room to grow.

Another attack came on July 8, a few days after Vincent heard that Jo was pregnant. Vincent's health problems often seem associated with anything that bound Theo closer to Jo.

Three-and-a-half months after the baby—named Vincent—was born, Vincent left St.-Rémy. *I shall probably arrive in Paris about five o'clock in the morning.*

Vincent stayed only three days. In 16 years of correspondence—not counting the Paris years—he and Theo had rarely spent time together.

VINCENT RENTED A ROOM in Auvers-sur-Oise, a small town on the Oise River just north of Paris, and began painting immediately. *Auvers is very beautiful. . . . There is a great deal of color here.*

It is still beautiful. Dominated by its church. Stone houses. Narrow streets. Tile roofs. Wheat fields. Hills. Van Gogh produced roughly one masterpiece a day for the 70 days he lived here—today they could be worth more than a billion dollars. At Ravoux's, the inn where he lived, I eat at the *table d'hôte*, where he sat. After dinner he often drew the sandman for the innkeeper's two-year-old daughter.

Such camaraderie did not curtail Vincent's unhappiness. *I see no happy future at all.* Maybe loneliness can kill. Maybe Vincent thought he was losing Theo to illness or to Jo. The letters offer one strange clue. Vincent and Theo had signed their letters, "Yours sincerely" or "With a handshake." In the year before Vincent's suicide, Theo sometimes added "From the brother who loves you."

I read the letters more slowly, knowing I am at the end. The three reunited in Paris and discussed money. *We are all rather distressed and a little overwrought.* Evidence of family tension is visible in Vincent's work: The more than 2,000 pieces include not one sketch of Jo or the baby.

Vincent borrowed or stole a gun. On the afternoon of July 27, 1890, he went out to the country and shot himself in the upper abdomen. He then walked to his room, where he lay alone, bleeding—exactly what he had done after cutting his ear. The innkeeper's family became anxious when Vincent missed dinner. They saw him come in limping, and the innkeeper went up to see if he was unwell. A doctor was summoned, but he could do nothing.

Theo arrived the next morning. They were alone for more than 12 hours. No one knows what was said. Vincent died on July 29, 1890. He was 37 and had been a painter for ten years. In his pocket was an unmailed letter. *There are many things I should like to write you about, but I feel it is useless.*

On the afternoon of July 27, I take his final walk. The flowers and fresh air seem out of place. At 1 a.m. I am alone in Vincent's attic room. He was awake here all night. Calm. Smoking. Whimpering. The room is hot, airless and cell-like. A hook in the ceiling held the lantern. The small window looks out on the building next door. Dominique-Charles Janssens, a Belgian businessman who restored the inn in 1993, has left the room empty. Janssens was correct when he told me, "There is nothing to see, everything to feel." I lie where Vincent's bed was, look up, and see nail holes where he hung his paintings—the last things he saw, his last companions.

Vincent's body lay on the table d'hôte. White linen. Sunflowers. Yellow dahlias. Vincent's paintings. Theo wept so much he could not speak.

Theo died six months later. To say he died of grief adds to the myth, but for years he had suffered from seizures, bronchitis, and syphilis.

Widowed at 28 with little money and a baby, Jo moved to her native Holland and opened a boarding house. Ignoring advice to throw away Vincent's paintings, she arranged his first posthumous shows and published his letters.

Her grave in Amsterdam is covered with ivy. She planted this same ivy over the graves of Vincent and Theo in Auvers, where the vines have grown together.

Rain hits as I leave the Auvers cemetery. I seek refuge in the nearby church. A woman is singing. Her voice echoes in the empty church. I float with the music, knowing I need not say good-bye to Vincent. *Looking at the stars always makes me dream. . . . Why, I ask myself, shouldn't the shining dots of the sky be as accessible as the black dots on the map of France? Just as we take the train to get to Tarascon or Rouen, we take death to reach a star.* □

AUVERS-SUR-OISE *An empty chair stands in the attic bedroom where van Gogh died of a self-inflicted bullet wound in July 1890. "It is useless," he wrote in his last letter (right), which carried a sketch of a final painting. But already the art world recognized his genius. "Men like him do not die entirely," wrote G. Albert Aurier, one of the first to praise him. His work "will make his name live again and for eternity."*

VAN GOGH MUSEUM

FIRST LOOK AT VAN GOGH SKETCHES

SOMEONE, presumably bored in church, drew in a Dutch hymnal. Annet Tellegen, a leading scholar on van Gogh and van Gogh forgeries, says that these "clumsy and nonchalant scribbles" are van Gogh's.

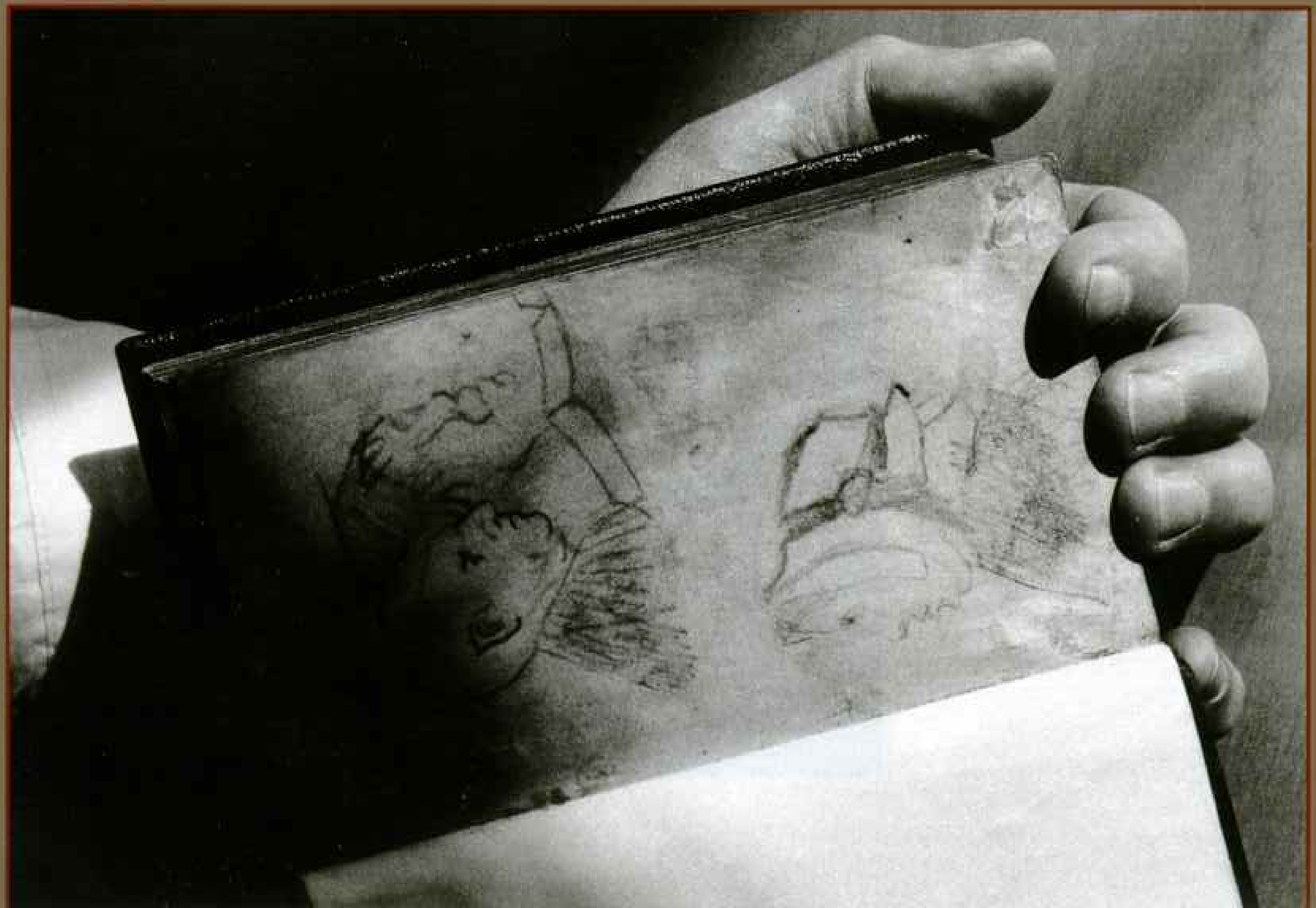
"That's characteristic of van Gogh in the early to mid-1880s. Forgeries tend to be more perfect."

"These drawings by van Gogh have never been published," says Sjraar van Heugten, Curator of Prints and Drawings at the Van Gogh Museum in Amsterdam, who attributes them to 1881.

Provenance, or history of ownership, is crucial when judging whether such a work is genuine. The sketches' owner received them as a gift from the great-grandson of van Gogh's sister Elisabeth.

Like Vincent's other two sisters and his youngest brother, Cor, Elisabeth took little interest in his work. She probably kept the hymnal despite the sketches.

On Christmas Day, 1881, Vincent's father threw him out of the house, in part for refusing to go to church. Vincent, however, remained a Christian his entire life. Christ, he wrote in 1888, was "a greater artist than all other artists."



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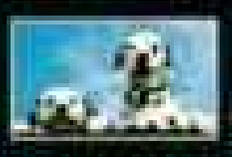

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OCTOBER 1997

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Behind the Scenes

Alexander the Greatest

Practice pays off! Alex Kerchner, last year's youngest finalist, is the 1997 National Geography Bee champ. The 12-year-old from Kirkland, Washington, won a $25,000 scholarship from National Geographic and Sylvan Learning Centers. "He's been giving me driving directions since he was five years old," says Alex's mom, Wanda Meadows. "And he was always right back then too."

MARK THIESSEN, NGS

Still a Winner

When Jack Staddon won the first National Geography Bee in 1989, he was an eighth grader from Great Bend, Kansas. "The Bee gave me a new sense of confidence," he says. This fall Jack entered the University of Minnesota Medical School.

KEVIN O. MOONEY

Let's Hear It for the Girls

Just 4 of the 57 finalists at this year's National Geography Bee were girls. Why do so few make it this far? "Who knows?" says Massachusetts' Jamie Kettleson, at far right. "Maybe they don't know how satisfying it is to beat all those boys." Jamie and, left to right, Megan Storm of South Dakota, Amy Nugteren of Iowa, and Darlene Dela Cruz of Hawaii won over thousands of competitors in their home states to reach the national finals this past spring in Washington, D.C. They encourage more girls to study geography and to set their sights on winning the Bee. "If you really want to do it," says Megan, "you can."

MARK THIESSEN, NGS

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The Picture of Happiness

When Reid and Margaret Hamilton were married on August 21, 1938, our J. Baylor Roberts happened to be photographing their church, Nashua's Little Brown Church in the Vale, for an article on Iowa. His wedding-party picture (right) was never published.

Last January granddaughter Sherry asked us for a copy for the Hamiltons' wedding anniversary, explaining that her grandfather was quite ill. Our print was displayed at an early anniversary celebration. Reid died later that night.

J. BAYLOR ROBERTS

PATRICK WITTY

The Belts Keep It Together

When Assistant Editor Don Belt and photographer Annie Griffiths Belt got married nine years ago, they both traveled a lot. They still do—but now they bring their kids, Lily, 8, and Charlie, 4, whenever possible. Lily's first foreign adventure came at age 2, when Annie was shooting in Vancouver; Charlie learned to walk in England's Lake District. For three years the family spent Easter in the Middle East, while Don and Annie worked there. "It takes a whole lot of planning," says Annie, shown hurrying with Don and the kids through an airport en route to another shared assignment, "but we're a family. And families need to be together."

Mapping It Out

Eleven years ago backpacking enthusiasts Bill and Mary Kay Stoehr liked the recreational maps of Colorado they were using so much they bought the company that produced them. Now they turn out "the best backcountry maps there are," says Allen Carroll, managing director of National Geographic Maps. National Geographic Enterprises, a new for-profit subsidiary of the Society, acquired the Stoehrs' Colorado-based firm, Trails Illustrated, in January. Our first cooperative effort, a series of U.S. national parks maps, debuts in 1998.

MARK THISSEN, NGS

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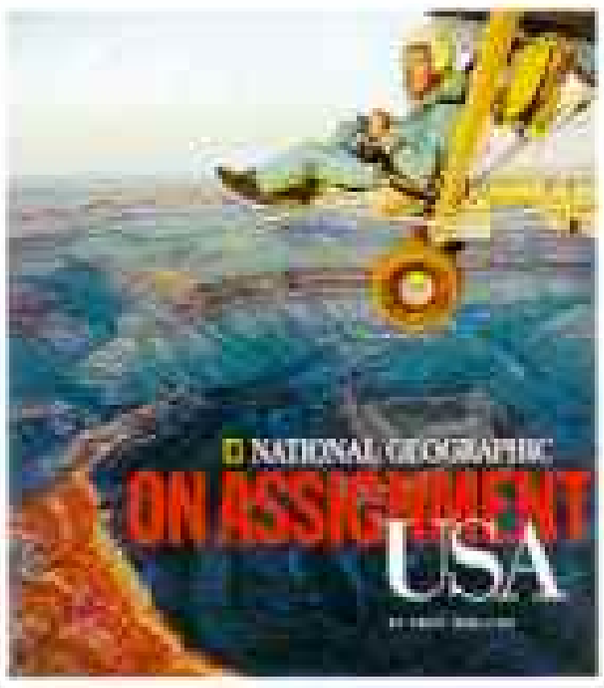


Don't Forget to Write!

Twenty-four years as a GEOGRAPHIC staffer—with 23 articles on far-flung places appearing under his byline—have made Priit Vesilind a real authority on writing from the road. So who better to pen our new book, *On Assignment USA*?

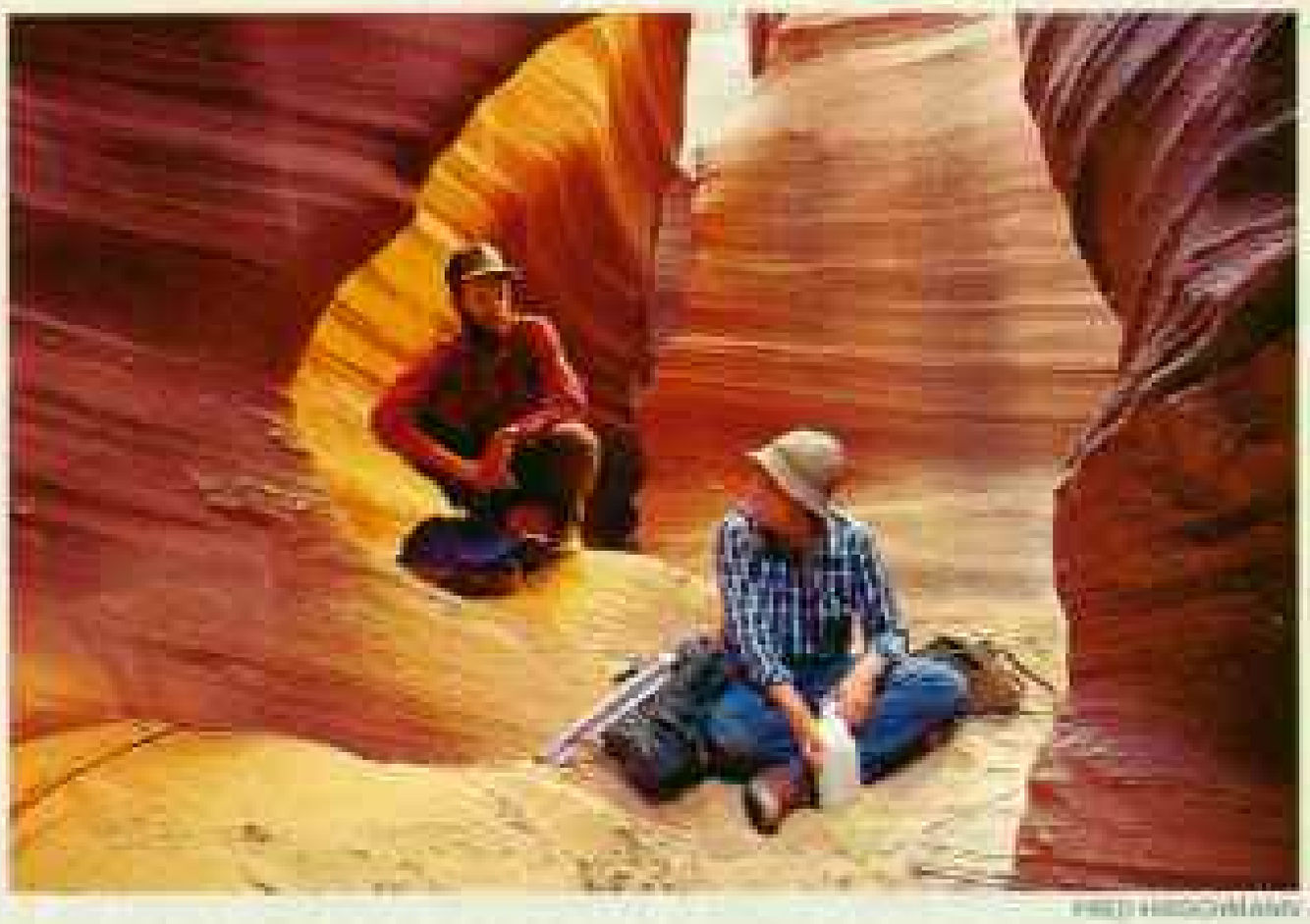
Priit interviewed dozens of GEOGRAPHIC writers and photographers to get their best stories behind the stories we've published about the United States over the years.

Priit has his own tradition while out on assignment. He keeps in touch with his family by sending home a postcard almost every day he's gone. The Vesilinds have amassed quite a collection (top right). Writing from Egypt to Sri Lanka to New Orleans, Priit always embellishes his notes with geographically appropriate drawings of an adventurous duck, because Vesilind means "waterbird" in Priit's native language, Estonian.

TEXT BY MAGGIE ZACKOWITZ

Rick Hutchinson, Remembered

"Some people whose names never appear in the magazine make our stories possible," says photographer Lou Mazzatenta of Rick Hutchinson, a Yellowstone National Park geologist. An unsung hero who helped many staffers over the years, Rick was killed on March 3 in an avalanche while studying changes in geyser behavior. "He was a real mountain man," says Lou. "He appreciated nature." And we appreciated Rick, at left, who explored this Arizona slot canyon with his wife, Jennifer, in 1981.



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Forum

Our June 1997 issue drew numerous comments about our coverage of the political status of far-flung French Polynesia. Many readers found the restoration of Old Ironsides to be particularly fascinating.

French Polynesia

French Polynesia has been self-governing since 1984 with its own flag, president, national assembly, and ministers, all of whom are freely elected Tahitians. France provides currency and national defense. Oscar Temaru represents the poorest constituents of Papeete, who have nothing to lose. He can offer no realistic plans for a self-sustaining economy. This is why the majority of French Polynesians have not voted themselves into independence, as they are free to do any time.

CYNTHIA HELD
Los Angeles, California

I am from Tahiti and hold strong patriotic feelings. The article was a great one. The author thoroughly embraced the culture, life, and people in a racially mixed society. However, the people he interviewed about independence were strongly opinionated. How about asking the new generation? Any educated young fellow would tell you that we could probably do without the French authority, but for how long before we ask for help? I think that Tahiti without a financial ally would hardly survive independence.

HINARAI WALL
Willow Spring, North Carolina

The author states that feats of open-ocean navigation by the early Polynesians have never been duplicated and are "still not fully understood." Since 1975 the Polynesian Voyaging Society in Hawaii has duplicated, documented, and reenacted open-sea navigation among Polynesian peoples. The tales were proved real by the canoe *Hokule'a*.

RENO KAPO VILLAREN
Honolulu, Hawaii

The author was referring to the Polynesians' earliest migrations, from Southeast Asia. Readers can learn more about the Hawaii to Tahiti voyage of Hokule'a *in the October 1976 issue.*

As an American who has been going each year for 17 years to French Polynesia, I am cognizant of the subtle twists and turns the tropical jewel has weathered. Peter Benchley captured this little wrestling match very well. There is an inexplicable charm that eludes other paradisiacal spots, which I believe is due to the local people. This and the sheer beauty. I often find myself with a little smile, thinking about the ocean there with its blues and greens and every subtle combination in between.

KEVIN KEYS
Cayucos, California

Black Pearls

The freshwater mussel shells (page 35) placed in the oysters come from rivers and streams in the Ohio River Basin. Tennessee streams have been depleted of commercial-size mussels by legal collecting and by poaching. Poachers now work the Ohio, the Muskingum, and rivers in West Virginia. They can make up to $20 for one mussel. We are paying for their profit.

RUTH G. VARNER
Yellow Springs, Ohio

Cats

I can't believe you chose a "dog person" to write on cats. If Cathy Newman had ever owned a cat, she would know that they are just as loving as dogs. However, I still liked the piece. Karen Kuehn's photographs were marvelous.

LEE M. WRENN
Eastsound, Washington

I don't care for the staged photographs. They tell more about the perceptions of the photographer than about cats.

JEFFREY LEE
Lakewood, Ohio

You remark on the Hindu god Siva's riding a tiger. Actually he is shown riding an ox or bull. He sits on a tiger skin. Every god in Hindu mythology has a vehicle. Siva's wife, Durga, often rides a lion. Another version of Durga has the tiger as her vehicle.

ARNAB BHATTACHARYYA
Mentor-on-the-Lake, Ohio

I have been a birder for almost 60 years, and I was absolutely sickened when a cat owner spoke of his "pleasure" in seeing his cat stalk a bird. I can attest to the fact that some species of thrushes, flycatchers, and sparrows are down in numbers from when I started birding. Of course, cats are not 100 percent responsible, but they are one cause. Cannot cat owners at the very least keep their cats indoors at the time of year when young birds are mainly on the ground?

HENRY T. WIGGIN
Brookline, Massachusetts

The statement on page 71 that "cats cloak themselves to blend into their surroundings" gives the impression that coloration is a matter of intention instead of natural selection. Natural selection has refined and continues to refine the predatory habits of all cats. If a trait confers success on its holders, the trait will tend to be passed to succeeding

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generations. Cats with coloration that provided better camouflage were more successful hunters and had a higher survival rate, and their coloration was passed along. The initial color range is simply a matter of genetics. The cats have nothing to do with it. Please do not sacrifice substance for style.

JOHN F. GEARING
Clifton Park, New York

My dog Beauregard ate your June issue. Take that, cats!

JAMES W. CARTER
Bryan, Texas

Old Ironsides

In the opening sentence of the splendid article about the history and restoration of U.S.S. *Constitution*, the London *Times* is quoted as stating that "Never before in the history of the world did an English frigate strike to an American." The *Times* historian must have overlooked the fact that on September 23, 1779, the frigate H.M.S. *Serapis* surrendered to John Paul Jones's *Bonhomme Richard*.

JOSEPH W. ZUGGI
Lincoln, Nebraska

If Old Ironsides sailed in July for the first time in 116 years (page 51), then what was here in our California port in 1933? What drew hundreds of thousands along the way from the East Coast through New Orleans and Houston to Los Angeles harbor in 1933? We contributed pennies and learned Holmes's "Old Ironsides" poem. We were dismissed from school to visit the ship, and I toured the decks. I have in hand my copy of the San Pedro *News-Pilot* for February 27, 1933, and I'm sure it's the same U.S.S. *Constitution*.

RAYMOND V. LOPEZ
South Pasadena, California

It is. Constitution *took a grand tour of East and West Coast ports via the Panama Canal from 1931 to 1934. However, the ship was towed; her sails were never set. A working replica did sail off Catalina Island during the filming of* Old Ironsides, *released in 1926.*

The story of *Constitution* calls to mind the poem written in 1830 by Oliver Wendell Holmes, age 21. At the time, the frigate lay rotting in the Boston Navy Yard, occupying valuable space. A rumor went out that she would be destroyed. Then Holmes composed the inspiring verses beginning:

Ay, tear her tattered ensign down!
Long has it waved on high,
And many an eye has danced to see
That banner in the sky. . . .

The poem swept the nation, the government responded to the popular outcry, and *Constitution* was saved. Sixty years ago we memorized this poem and talked about what it meant to the country. Perhaps that would be good for students today.

WILFRED L. FREYBERGER
Houghton, Michigan

Central Africa

After the Tutsi slaughter, in a fall 1994 CNN interview, the commander of the UN "peacekeeping force" in Rwanda stated that he and Western diplomats had been warned of the slaughter months in advance by moderate Hutu and did nothing about it. His observations were confirmed by an international study initiated by the Danish UN Mission and released on March 12, 1996. This raises questions about partial Western responsibility for the 1994 slaughter of more than 500,000 Rwandans.

HARALD R. MARWITZ
Etobicoke, Ontario

Your concise article helped me at last begin to comprehend the seemingly incomprehensible. Imagine a writer having the guts to come right out and say, "The recent genocide in Rwanda wasn't about ancient tribal hatreds but about power."

JANE KEPP
Santa Fe, New Mexico

Fox River

As a fisherman's daughter I was surprised at the author's explanation of why Hemingway chose "Big Two-Hearted River" as the title of his short story instead of the Fox River, which he actually fished. Like any other self-respecting fisherman, Hemingway was protecting "his spot" with a clever device that fooled even his own son Jack.

ANNA KINGSBURY
Washington, Connecticut

Hemingway named and described the town of Seney, which is on the Fox, suggesting that he was not trying to disguise the river.

Hemingway once compared his work to an iceberg with only 10 percent of the content visible. Literature holds multiple meanings based on the reader's experience and interpretation. "Big Two-Hearted River" is a beautiful fishing story, but then there is the other 90 percent. Like Hemingway in 1918, Vietnam veterans survived in a land decimated by bombs and blistered by chemical agents. For some veterans the "tragic swamp" remains.

EUGENE B. PHILLIPS
Decatur, Georgia

Letters for FORUM *should be sent to National Geographic Magazine, Box 98198, Washington, D.C. 20090-8198, 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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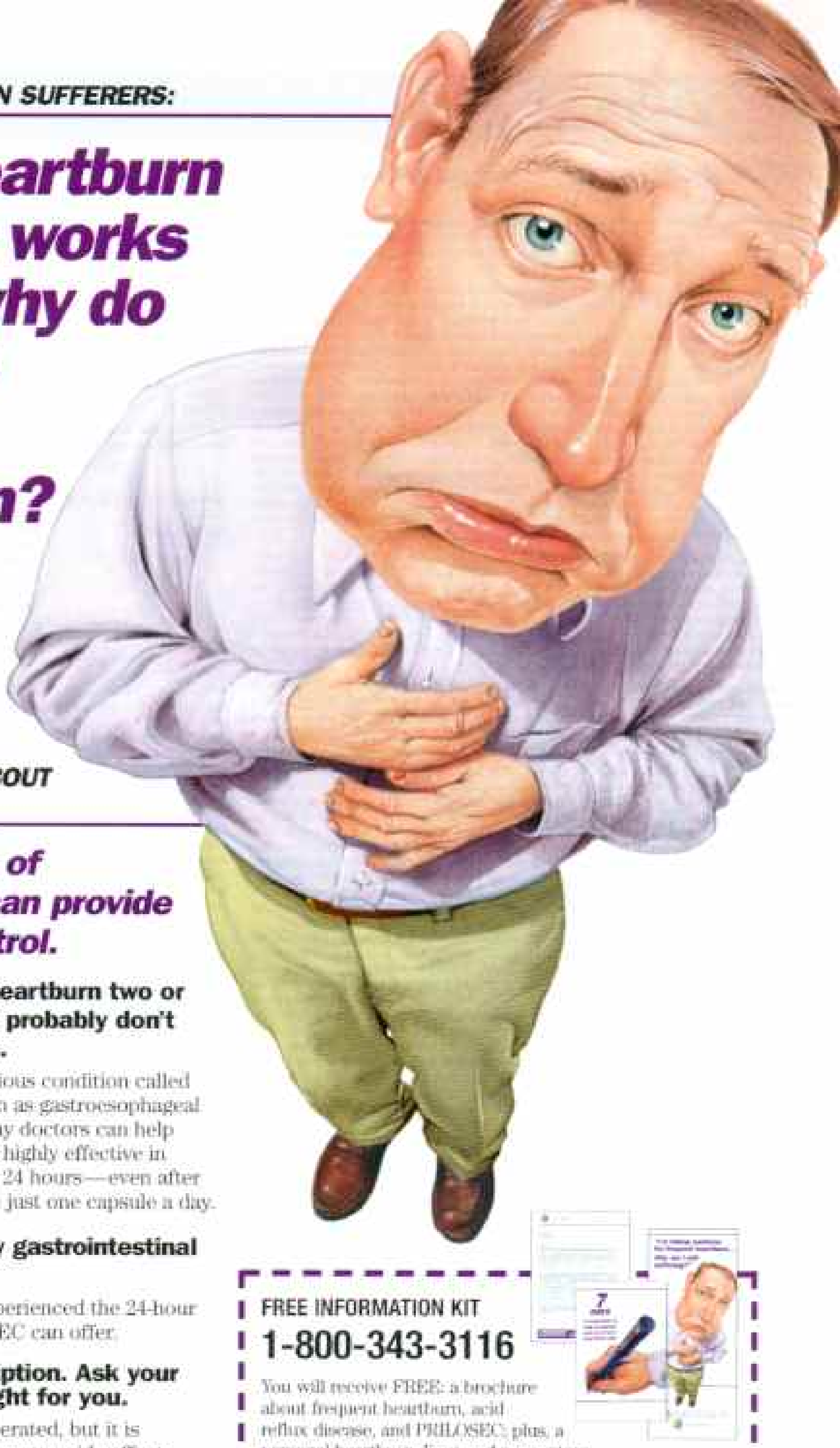

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BRIEF SUMMARY

CLINICAL PHARMACOLOGY *Pharmacokinetics and Metabolism:* **Omeprazole** – In pharmacokinetic studies of single 20 mg omeprazole doses, an increase in AUC of approximately two-fold was noted in Asian subjects compared to Caucasians. Dose adjustment, particularly where maintenance of healing of erosive esophagitis is indicated, for the hepatically impaired and Asian subjects should be considered.

INDICATIONS AND USAGE *Duodenal Ulcer:* PRILOSEC is indicated for short-term treatment of active duodenal ulcer. Most patients heal within 4 weeks. Some patients may require an additional 4 weeks of therapy. PRILOSEC, in combination with clarithromycin, is also indicated for treatment of patients with *H. pylori* infection and active duodenal ulcer to eradicate *H. pylori*. Eradication of *H. pylori* has been shown to reduce the risk of duodenal ulcer recurrence. In patients who fail therapy, susceptibility testing should be done. If resistance to clarithromycin is demonstrated or susceptibility testing is not possible, alternative antimicrobial therapy should be instituted. [See the clarithromycin package insert, MICROBIOLOGY section.] **Gastric Ulcer:** PRILOSEC is indicated for short-term treatment (4-8 weeks) of active benign gastric ulcer. **Treatment of *Gastroesophageal Reflux Disease (GERD)*: Symptomatic GERD** – PRILOSEC is indicated for the treatment of heartburn and other symptoms associated with GERD. **Erosive Esophagitis** – PRILOSEC is indicated for the short-term treatment (4-8 weeks) of erosive esophagitis which has been diagnosed by endoscopy. The healing of EROSIVE ESOPHAGITIS and the relief of associated symptoms of GERD have been demonstrated in controlled trials. In the rare instance of a patient not responding to 8 weeks of treatment, it may be helpful to give up to an additional 4 weeks of treatment. If there is recurrence of erosive esophagitis or GERD symptoms (e.g., heartburn), additional 4-8 week courses of omeprazole may be considered. **Maintenance of Healing of Erosive Esophagitis:** PRILOSEC is indicated to maintain healing of erosive esophagitis. Controlled studies do not extend beyond 12 months. **Pathological Hypersecretory Conditions:** PRILOSEC is indicated for the long-term treatment of pathological hypersecretory conditions (e.g., Zollinger-Ellison syndrome, multiple endocrine adenomas and systemic mastocytosis).

CONTRAINDICATIONS *Omeprazole:* PRILOSEC Delayed-Release Capsules are contraindicated in patients with known hypersensitivity to any component of the formulation. **Clarithromycin:** Clarithromycin is contraindicated in patients with a known hypersensitivity to any macrolide antibiotic. Concomitant administration of clarithromycin with cisapride, pimozide, or terfenadine is contraindicated. There have been post-marketing reports of drug interactions when clarithromycin and/or erythromycin are co-administered with cisapride, pimozide, or terfenadine resulting in cardiac arrhythmias (QT prolongation, ventricular tachycardia, ventricular fibrillation, and torsades de pointes) most likely due to inhibition of hepatic metabolism of these drugs by erythromycin and clarithromycin. Fatalities have been reported. [Please refer to full prescribing information for clarithromycin before prescribing.]

WARNING: *Clarithromycin:* **CLARITHROMYCIN SHOULD NOT BE USED IN PREGNANT WOMEN EXCEPT IN CLINICAL CIRCUMSTANCES WHERE NO ALTERNATIVE THERAPY IS APPROPRIATE. IF PREGNANCY OCCURS WHILE TAKING CLARITHROMYCIN, THE PATIENT SHOULD BE APPRISED OF THE POTENTIAL HAZARD TO THE FETUS. [See WARNINGS in prescribing information for clarithromycin.]**

PRECAUTIONS *General:* Symptomatic response to therapy with omeprazole does not preclude the presence of gastric malignancy. Atrophic gastritis has been noted occasionally in gastric corpus biopsies from patients treated long-term with omeprazole. ***Information for Patients:*** PRILOSEC Delayed-Release Capsules should be taken before eating. Patients should be cautioned that the PRILOSEC Delayed-Release Capsule should not be opened, chewed or crushed, and should be swallowed whole. ***Drug Interactions: Other*** – Omeprazole can prolong the elimination of diazepam, warfarin and phenytoin, drugs that are metabolized by oxidation in the liver. Although in normal subjects no interaction with theophylline or propranolol was found, there have been clinical reports of interaction with other drugs metabolized via the cytochrome P-450 system (e.g., cyclosporine, disulfiram, benzodiazepines). Patients should be monitored to determine if it is necessary to adjust the dosage of these drugs when taken concomitantly with PRILOSEC. Because of its effect on intragastric pH, omeprazole may affect the absorption of drugs where gastric pH is an important determinant of their bioavailability (e.g., ketoconazole, ampicillin esters, and iron salts). In the clinical trials, antacids were used concomitantly with the administration of PRILOSEC. **Combination Therapy with Clarithromycin** – Co-administration of omeprazole and clarithromycin may result in increased in plasma levels of omeprazole, clarithromycin, and 14-hydroxy clarithromycin. [See CLINICAL PHARMACOLOGY, *Pharmacokinetics*. *Combination Therapy with Clarithromycin* in full Prescribing Information.] Concomitant administration of clarithromycin with cisapride, pimozide, or terfenadine is contraindicated. There have been reports of an interaction between erythromycin and astemizole resulting in QT prolongation and torsades de pointes. Concomitant administration of erythromycin and astemizole is contraindicated. Because clarithromycin is also metabolized by cytochrome P450, concomitant administration of clarithromycin with astemizole is not recommended. [See also CONTRAINDICATIONS, *Clarithromycin*, above. Please refer to full prescribing information for clarithromycin before prescribing.] **Carcinogenesis, Mutagenesis, Impairment of Fertility:** In two 24-month carcinogenicity studies in rats, omeprazole at daily doses of 1.7, 3.4, 13.8, 44.0 and 140.8 mg/kg/day (approximately 1 to 30 times the human dose, based on a patient weight of 50 kg and a human dose of 20 mg) produced gastric ECL cell carcinoids in a dose-related manner in both male and female rats; the incidence of this effect was markedly higher in female rats, which had higher blood levels of omeprazole. Gastric carcinoids seldom occur in the untreated rat. In addition, ECL cell hyperplasia was present in all treated groups of both sexes. In one of these studies, female rats were treated with 13.8 mg/kg/day omeprazole (approximately 3/4 times the human dose) for 1 year, then followed for an additional year without the drug. No carcinoids were seen in these rats. An increased incidence of treatment-related ECL cell hyperplasia was observed at the end of 1 year (94% treated vs. 10% controls). By the second year the difference between treated and control rats was much smaller (49% vs. 29%) but still showed more hyperplasia in the treated group. An unusual primary malignant tumor in the stomach was seen in one rat (2%). No similar tumor was seen in male or female rats treated for 2 years. For this strain of rat, no similar tumor has been noted historically, but a finding involving only one tumor is difficult to interpret. A 78-week mouse carcinogenicity study of omeprazole did not show increased tumor occurrence, but the study was not conclusive. Omeprazole was not mutagenic in an *in vitro* Ames Salmonella (with/without) assay, an *in vitro* mouse lymphoma cell assay, and an *in vivo* rat liver DNA damage assay. A mouse micronucleus test at 101 and 822 times the human dose gave a borderline result, as did an *in vivo* bone marrow chromosome aberration test. A second mouse micronucleus study at 2000 times the human dose, but with different (suboptimal) sampling times, was negative. **Pregnancy: Omeprazole: Pregnancy Category C** – In rabbits, omeprazole in a dose range of 6.9 to 69.1 mg/kg/day (approximately 17 to 172 times the human dose) produced dose-related increases in embryo lethality, fetal resorptions and pregnancy disruptions. In rats, dose-related embryofetal toxicity and postnatal developmental toxicity were observed in offspring resulting from parents treated with omeprazole (13.8 to 138.0 mg/kg/day, approximately 35 to 345 times the human dose). There are no adequate or well-controlled studies in pregnant women. Sporadic reports have been received of congenital abnormalities occurring in infants born to women who have received omeprazole during pregnancy. Omeprazole should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. **Clarithromycin: Pregnancy Category C** – [See WARNING (above) and full prescribing information for clarithromycin before using in pregnant women.] **Nursing Mothers:** It is not known whether omeprazole is excreted in human milk. In rats, omeprazole administration during late gestation and lactation at doses of 13.8 to 138 mg/kg/day (35 to 345 times the human dose) resulted in decreased weight gain in pups. Because many drugs are excreted in human milk, because of the potential for serious adverse reactions in nursing infants from omeprazole, and because of the potential for tumorigenicity shown for omeprazole in rat carcinogenicity studies, a decision should be made whether to discontinue nursing or discontinue the drug, taking into account the importance of the drug to the mother. **Pediatric Use:** Safety and effectiveness in children have not been established.

ADVERSE REACTIONS: In the U.S. clinical trial population of 1815 patients (including duodenal ulcer, Zollinger-Ellison syndrome and resistant ulcer patients), the following adverse experiences were reported to occur in 1% or more of patients on therapy with PRILOSEC. Numbers in parentheses indicate percentages of the adverse experiences considered by investigators as possibly, probably, or definitely related to the drug.

	Omeprazole (n=462)	Placebo (n=relevant)	Ranitidine (n=[illegible])
Headache	8.9 (7.4)	6.5	7.7 (2.9)
Diarrhea	3.0 (1.9)	3.1 (1.8)	2.1 (0.5)
Abdominal Pain	2.4 (1.4)	3.1	2.1
Nausea	2.2 (0.9)	3.1	4.1 (0.5)
URI	1.9	1.8	3.6
Dizziness	1.5 (0.6)	0.0	2.6 (1.0)
Vomiting	1.5 (0.9)	4.7	1.5 (0.5)
Rash	1.5 (1.1)	0.0	0.0
Constipation	1.1 (0.9)	0.0	0.0
Cough	1.1	0.0	1.5
Asthenia	1.1 (0.2)	1.5 (1.8)	1.5 (1.0)
Back Pain	1.1	0.0	0.5

The following adverse reactions which occurred in 1% or more of omeprazole-treated patients have been reported in international double-blind, and open-label clinical trials in which 2,651 patients were treated with omeprazole.

Incidence of Adverse Experiences ≥ 1% Causal Relationship Not Assessed

		Omeprazole (n=2651)	Placebo (n=120)
Body as a Whole, site unspecified	Abdominal pain	5.2	3.3
	Asthenia	1.9	0.8
Digestive System	Constipation	1.5	0.8
	Diarrhea	3.7	2.5
	Flatulence	2.7	5.8
	Nausea	4.0	8.7
	Vomiting	3.2	10.0
	Acid regurgitation	1.9	3.3
Nervous System/Psychiatric	Headache	2.9	2.5

Additional adverse experiences occurring in < 1% of patients or subjects in domestic and/or international trials, or occurring since the drug was marketed, are shown below within each body system. In many instances, the relationship to PRILOSEC® (omeprazole) was unclear. *Body As a Whole:* Pain, fatigue, malaise, abscess, swelling. *Cardiovascular:* Chest pain or angina, tachycardia, bradycardia, palpitation, elevated blood pressure, peripheral edema. *Gastrointestinal:* Pancreatitis (some fatal), anorexia, irritable colon, flatulence, fecal discoloration, esophageal candidiasis, mucosal atrophy of the tongue, dry mouth. During treatment with omeprazole, gastric fundic gland polyps have been noted rarely. These polyps are benign and appear to be reversible when treatment is discontinued. Gastric duodenal carcinoids have been reported in patients with ZE syndrome on long-term treatment with PRILOSEC. The finding is believed to be a manifestation of the underlying condition, which is known to be associated with such tumors. *Hepatic:* Mild and, rarely, marked elevations of liver function tests [ALT (SGPT), AST (SGOT), γ-glutamyl transpeptidase, alkaline phosphatase, and bilirubin (jaundice)]; in rare instances, overt liver disease has occurred, including hepatocellular, cholestatic, or mixed hepatitis, liver necrosis (some fatal), hepatic failure (some fatal), and hepatic encephalopathy. *Metabolic/Nutritional:* Hyponatremia, hypoglycemia, weight gain. *Musculoskeletal:* Muscle cramps, myalgia, muscle weakness, joint pain, leg pain. *Nervous System/Psychiatric:* Psychic disturbances including depression, aggression, hallucinations, confusion, insomnia, nervousness, tremors, apathy, somnolence, anxiety, dream abnormalities, vertigo, paresthesia, hemifacial hypoesthesia. *Respiratory:* Epistaxis, pharyngeal pain. *Skin:* Rash and, very rarely, cases of severe generalized skin reactions including toxic epidermal necrolysis (TEN), some fatal, Stevens-Johnson syndrome, and erythema multiforme, some severe; skin inflammation, alopecia, angioedema, pruritus, alopecia, dry skin, hyperhidrosis. *Special Senses:* Tinnitus, taste perversion. *Urogenital:* Interstitial nephritis (some with positive rechallenge), urinary tract infection, microscopic pyuria, urinary frequency, elevated serum creatinine, proteinuria, hematuria, glycosuria, testicular pain, gynecomastia, hematologic: Rare instances of pancytopenia, agranulocytosis (some fatal), thrombocytopenia, neutropenia, anemia, leucopenia, and hemolytic anemia have been reported. **Combination Therapy with Clarithromycin:** In clinical trials using combination therapy with PRILOSEC and clarithromycin, no adverse experiences peculiar to this drug combination have been observed. Adverse experiences that have occurred have been limited to those that have been previously reported with omeprazole or clarithromycin. Adverse experiences observed in controlled clinical trials using combination therapy with PRILOSEC and clarithromycin (n=839) which differed from those previously described for omeprazole alone were: Taste perversion (15%), tongue discoloration (2%), rhinitis (2%), pharyngitis (1%), and flu syndrome (1%). For more information on clarithromycin, refer to the clarithromycin package insert. ADVERSE REACTIONS section.

OVERDOSAGE: There reports have been received of overdosage with omeprazole. Doses ranged from 320 mg to 1600 mg (16-80 times the usual recommended clinical dose). Manifestations were variable, but included confusion, drowsiness, blurred vision, tachycardia, nausea, diaphoresis, flushing, headache, and dry mouth. Symptoms were transient, and no serious clinical outcome has been reported. No specific antidote for omeprazole overdosage is known. Omeprazole is extensively protein bound and is, therefore, not readily dialyzable. In the event of overdosage, treatment should be symptomatic and supportive.

DOSAGE AND ADMINISTRATION *Duodenal Ulcer:* (Short-Term Treatment of Active Duodenal Ulcer) The recommended adult oral dose of PRILOSEC is 20 mg once daily. Most patients heal within 4 weeks. Some patients may require an additional 4 weeks of therapy. [See INDICATIONS AND USAGE.]

Reduction of the Risk of Duodenal Ulcer Recurrence: Combination Therapy with Clarithromycin

Days 1-14	Days 15-28
PRILOSEC 40 mg q.d. (in the morning plus clarithromycin 500 mg t.i.d.	PRILOSEC 20 mg q.d.

Please refer to clarithromycin full prescribing information for CONTRAINDICATIONS and WARNING, and for information regarding dosing in elderly and renally impaired patients. [PRECAUTIONS, General; PRECAUTIONS, Geriatric Use and PRECAUTIONS, Drug Interactions]. **Gastric Ulcer:** The recommended adult oral dose is 40 mg once a day for 4 to 8 weeks. [See INDICATIONS AND USAGE, Gastric Ulcer.] **Gastroesophageal Reflux Disease (GERD):** The recommended adult oral dose for the treatment of patients with symptomatic GERD and no esophageal lesions is 20 mg daily for up to 4 weeks. The recommended adult oral dose for the treatment of patients with erosive esophagitis and accompanying symptoms due to GERD is 20 mg daily for 4 to 8 weeks. [See INDICATIONS AND USAGE.] **Maintenance of Healing of Erosive Esophagitis:** The recommended adult oral dose is 20 mg daily. **Pathological Hypersecretory Conditions:** The dosage of PRILOSEC in patients with pathological hypersecretory conditions varies with the individual patient. The recommended adult oral starting dose is 60 mg once a day. Doses should be adjusted to individual patient needs, and should continue for as long as clinically indicated. Doses up to 120 mg t.i.d. have been administered. Daily dosages of greater than 80 mg should be administered in divided doses. No dosage adjustment is necessary for patients with renal impairment, hepatic dysfunction or for the elderly.

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February 1997 PRC-4[illegible]97 PRO4

NOTE: This summary provides important information about PRILOSEC. If you would like more information, ask your doctor or pharmacist to let you read the professional labeling and then discuss it with them.

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My Pentax IQZoom 160

My Photo

My portrait of Sophie. (Showing off the grace she must have inherited from me.)

This is the five-point passive autofocus system that measured how far away Sophie was, chose the optimum setting, and kept my focus sharp.

This is the six-segment metering that measured lighting, compensated for background sunlight, and kept Sophie's performance unclouded.

This is the fail-safe loading technology that let me slip in a new roll of film between "Dance of the Butterflies" and "Sophie's Solo."

This is the power zoom lens that went from 38mm to 160mm so I could capture Sophie's pirouette from Row 10 and stay out of the way of the proud parents in Row 2.

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Face-to-Face With Slavery's Victims

Howard University anthropologist Michael Blakey confronts the skull of an African man exhumed from the 18th-century African Burial Ground, found during construction of a federal building in lower Manhattan. Blakey's five-year study of the remains of 427 people shows that nearly half died by age 12. All lived hard lives; 75 percent of the men and 65 percent of the women had telltale evidence of torn muscles or fractures caused by carrying heavy loads. One child had two such fractures, dental defects indicating malnutrition or disease, and signs of anemia. "We wondered how this child made it to the age of six," he says.

Many graves held signs of African origin: filed teeth, a woman with 111 glass waist beads, and a coffin with tacks outlining a heart-shaped design, identified as the Ashanti symbol *sankofa*, meaning loosely, "Look to the past to inform the future."

BOTH BY BILL DENNISON

New Spans to Cross the Chesapeake Bay

In the early 1960s in a feat hailed as a modern engineering wonder, a 17.6-mile two-lane combination of bridges and tunnels spanned the mouth of the Chesapeake Bay to link Virginia's mainland to the Eastern Shore.

Now, to accommodate traffic growth and increase safety by reducing the possibility of head-on collisions, parallel bridge sections are being built. Barges are again hauling huge precast pilings and sections of roadway out into the bay, where gigantic cranes (right) "fit them together like Tinkertoys," says James K. Brookshire, Jr., executive director of the Chesapeake Bay Bridge and Tunnel District. But no new tunnels will be built soon: "We can't afford them," Brookshire says. Instead, traffic on the parallel one-way bridge spans will funnel into the existing two interspersed tunnels.

On summer weekends some 15,000 vehicles cross the bay on U.S. 13; the year-round average is 7,500 a day. The new bridge is scheduled to open in 1999.

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Why Does the Newt Cross the Road?

Like the proverbial chicken, to get to the other side. Why is the road in Tilden Regional Park in Berkeley, California, closed to traffic? To help newts complete the trip alive.

When the fall rainy season begins, California newts emerge from summer hiding places and head for the creeks and ponds where they hatched in order to mate. That means they must cross a two-lane road, South Park Drive. Bay area motorists often use the road to shave their commute. The result: flattened newts, up to a record of 188 in one day. In 1988 the park closed the road on rainy days to let newts cross; since 1993 it's been closed full-time November to March. Newt-squashing has dropped sharply.

NATHAN D. JOHNSON, ORION PHOTOS (BOTH)

Spring in Las Vegas—A View From the Past

Ah, Las Vegas: the glitter, the glamour, the excitement, the pulsating nonstop frenzy featured in the December 1996 GEOGRAPHIC. But as this gelatin-silver-print postcard (below) of a Las Vegas street in 1905 vividly demonstrates, it wasn't always that way.

When the scene was captured by an unknown photographer, Las Vegas was less than a year old and had only a few hundred residents. It had been a watering hole along the Spanish Trail, a Mormon mission, and a thriving ranch; the coming of the railroads led to a land boom and the town's founding. Even in 1905, it appears, saloons outnumbered other businesses.

A "New" Virgin Island: A Speck of Paradise

Grand visions of tourist facilities dance in the minds of U.S. Virgin Islands officials as they stare at tiny Water Island just off St. Thomas. They are taking over the 490-acre island under an agreement with the Department of the Interior.

BOB COATES

The U.S. Army acquired Water Island for defense during World War II. In 1952 Interior assumed control, leasing land to a couple who turned the Army barracks into a small hotel. Later a developer built a resort complex. Hurricane Hugo in 1989 and two other storms reduced it to a pile of debris too large for the 110 or so islanders to remove. Under the transfer agreement the territory will clean up the debris, repair the public ferry dock, and develop a new hotel. One Water Island resident, Alex Randall, likens the islet to "the moon of Pluto, one step removed from the edge of the universe. It has no business, no store, no cops, no robbers, no anything." Why live there? "It's paradise!" he replies.

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Biblical Map Written in Stones

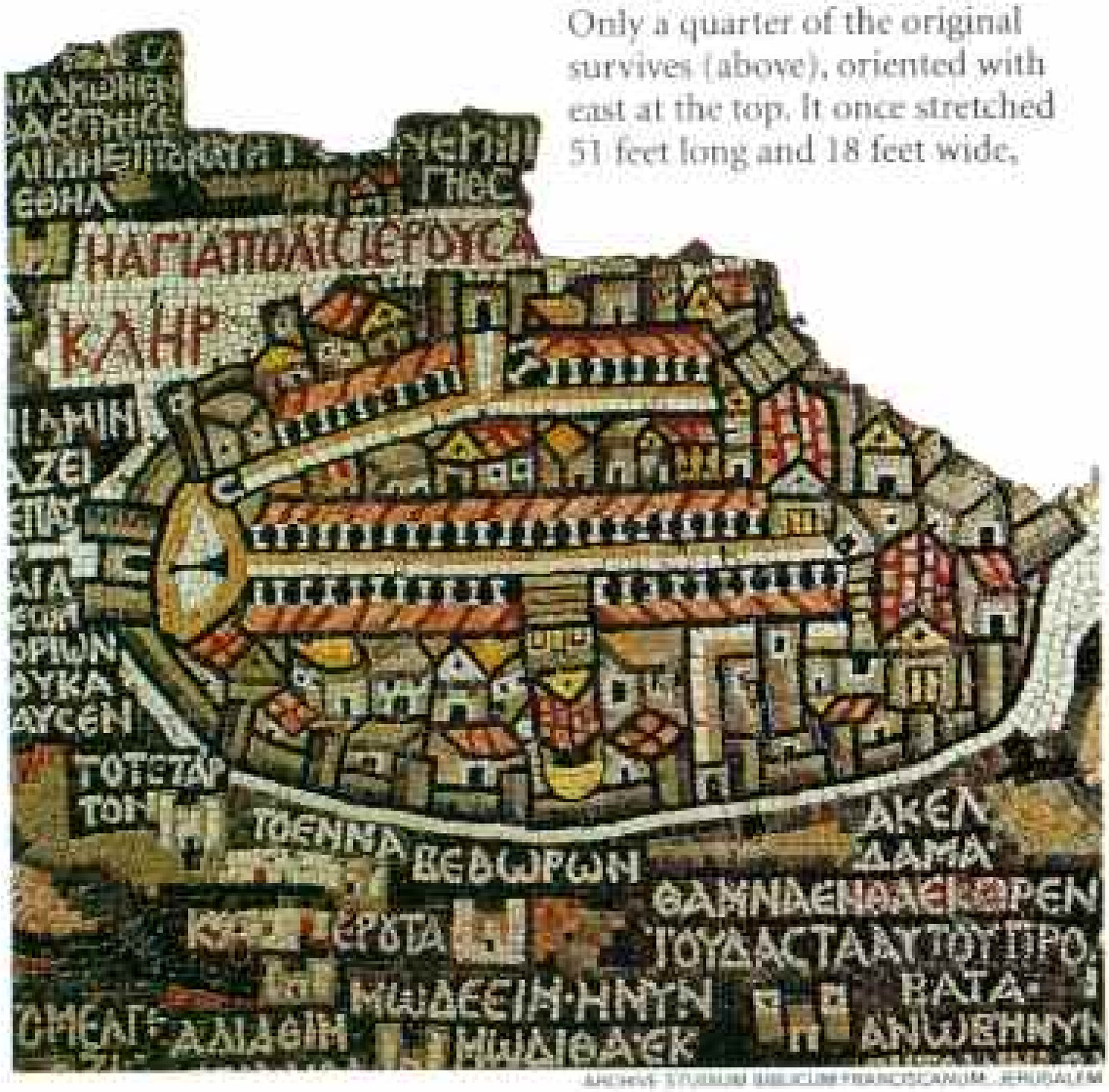
Created by expert hands with millions of colored stones, the mosaic floor of a sixth-century Byzantine church in Jordan is practical as well as lovely: It is the oldest known map of the biblical world, a boon to scholars seeking sites mentioned in the Bible—and a tourist attraction.

Uncovered late in 1896 when workers in the town of Madaba tore away rubble to build a new church, the Madaba Map contains 157 Greek inscriptions, mostly of biblical place-names. Only a quarter of the original survives (above), oriented with east at the top. It once stretched 51 feet long and 18 feet wide, ranging from Tyre and Sidon in the north to the Nile Delta in the south, and from the Mediterranean to the Syrian Desert.

At the map's heart is Jerusalem (below). "The city is depicted enclosed within its walls with gates and buildings around its two main columned streets dominated by the Holy Sepulchre complex," Father Michele Piccirillo told an April colloquium in nearby Amman.

For two decades Father Piccirillo has been studying the map and other mosaics created in Madaba between the fourth century and the eighth century A.D. He has determined that this map's place-names are based on a fourth-century book of biblical geography. The map's maker is unknown; "I call him the Master of the Map," he says.

On the map, boats appear in the Dead Sea, fish and ferries fill the Jordan River, palm trees grow at Jericho. Five years ago, Father Piccirillo notes, the map guided archaeologists to a previously unknown Byzantine sanctuary near the Dead Sea.



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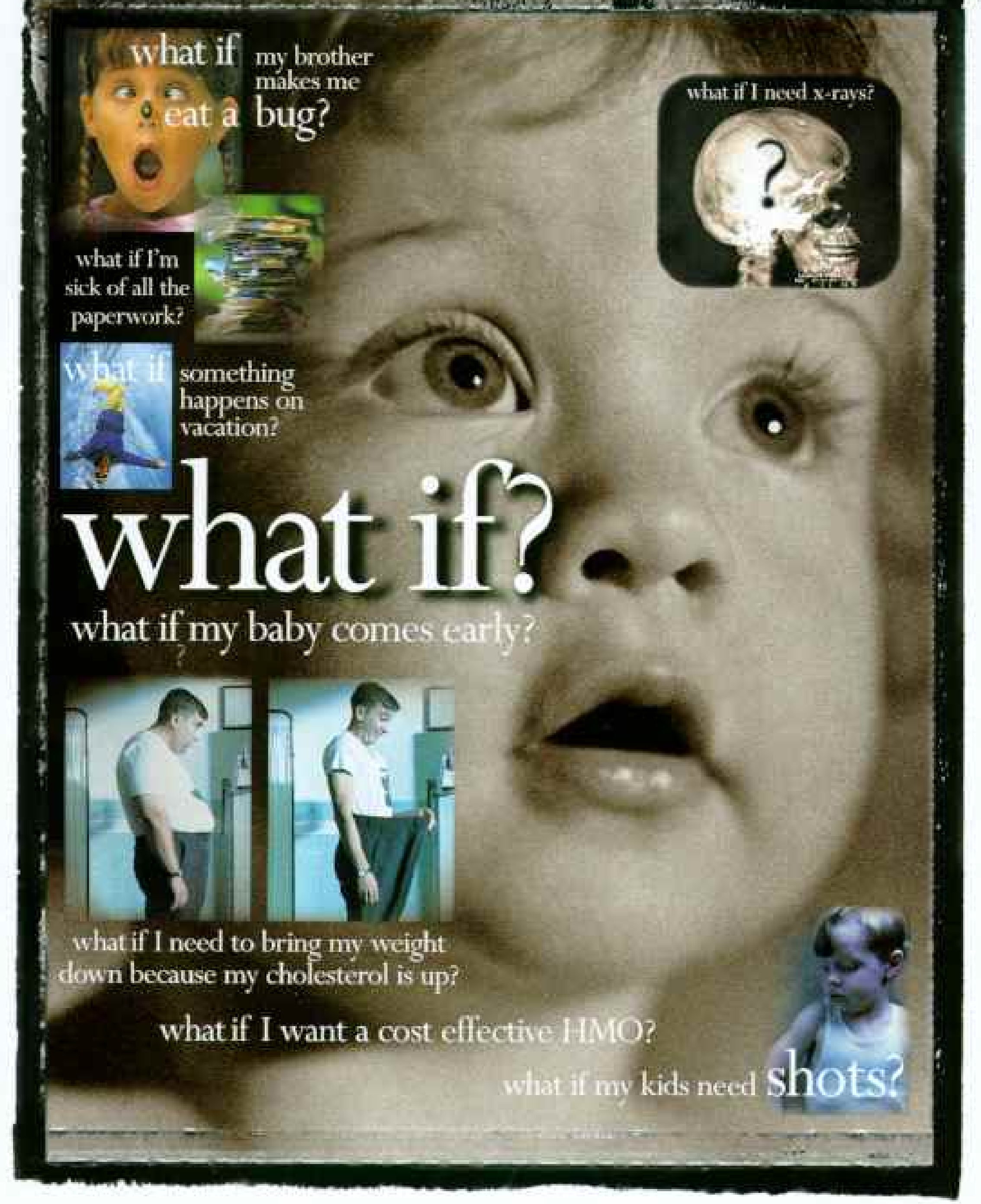

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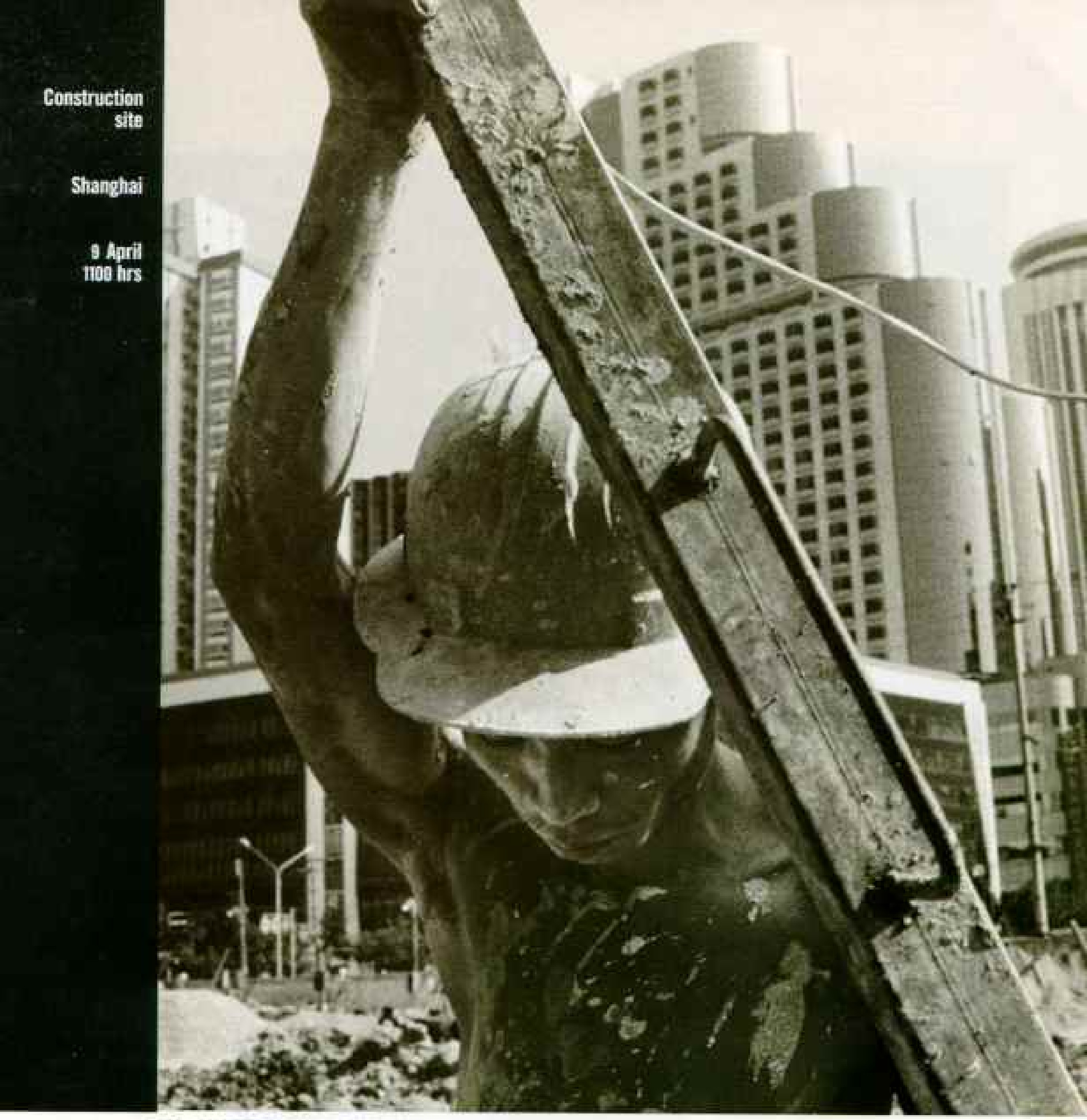

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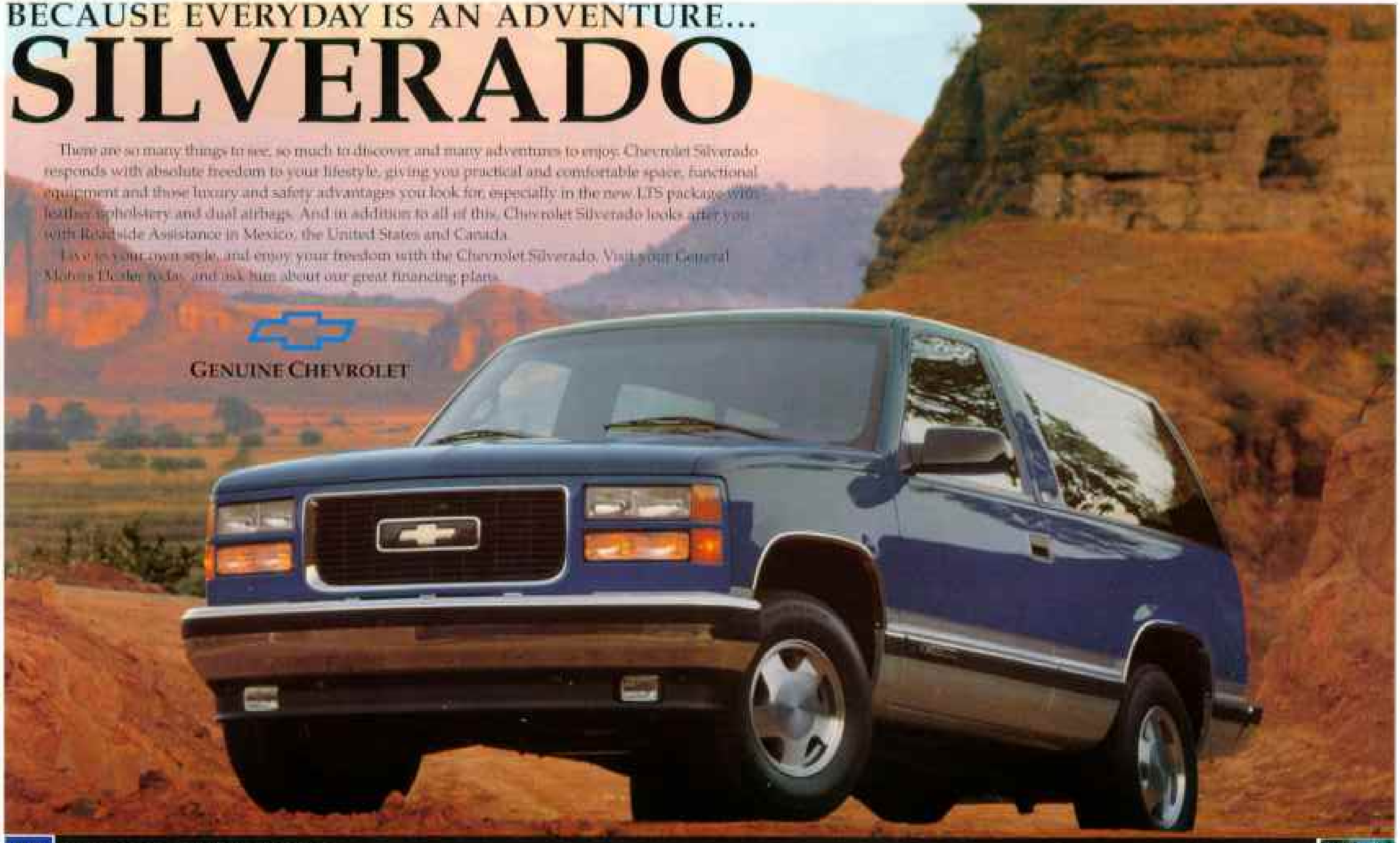

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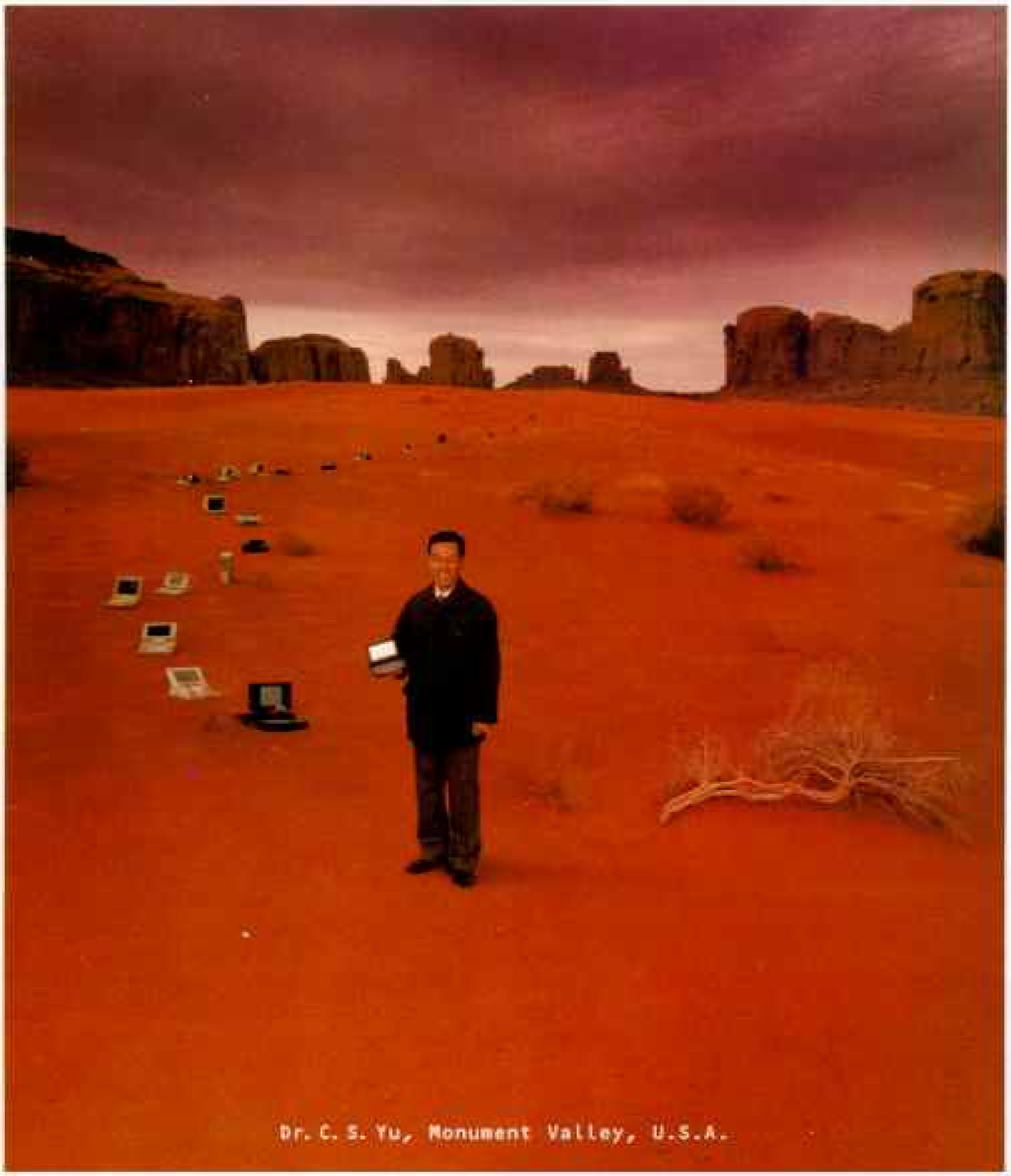

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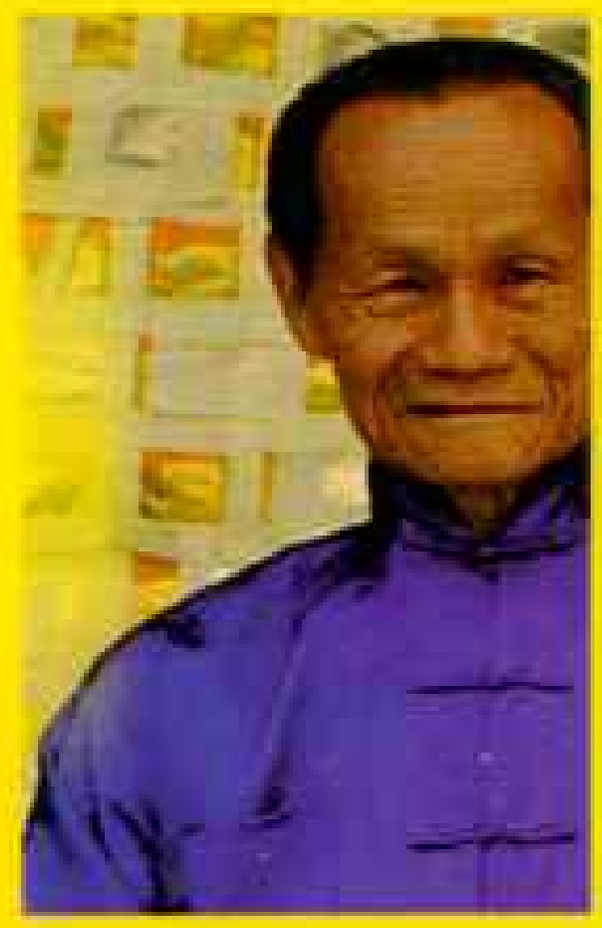

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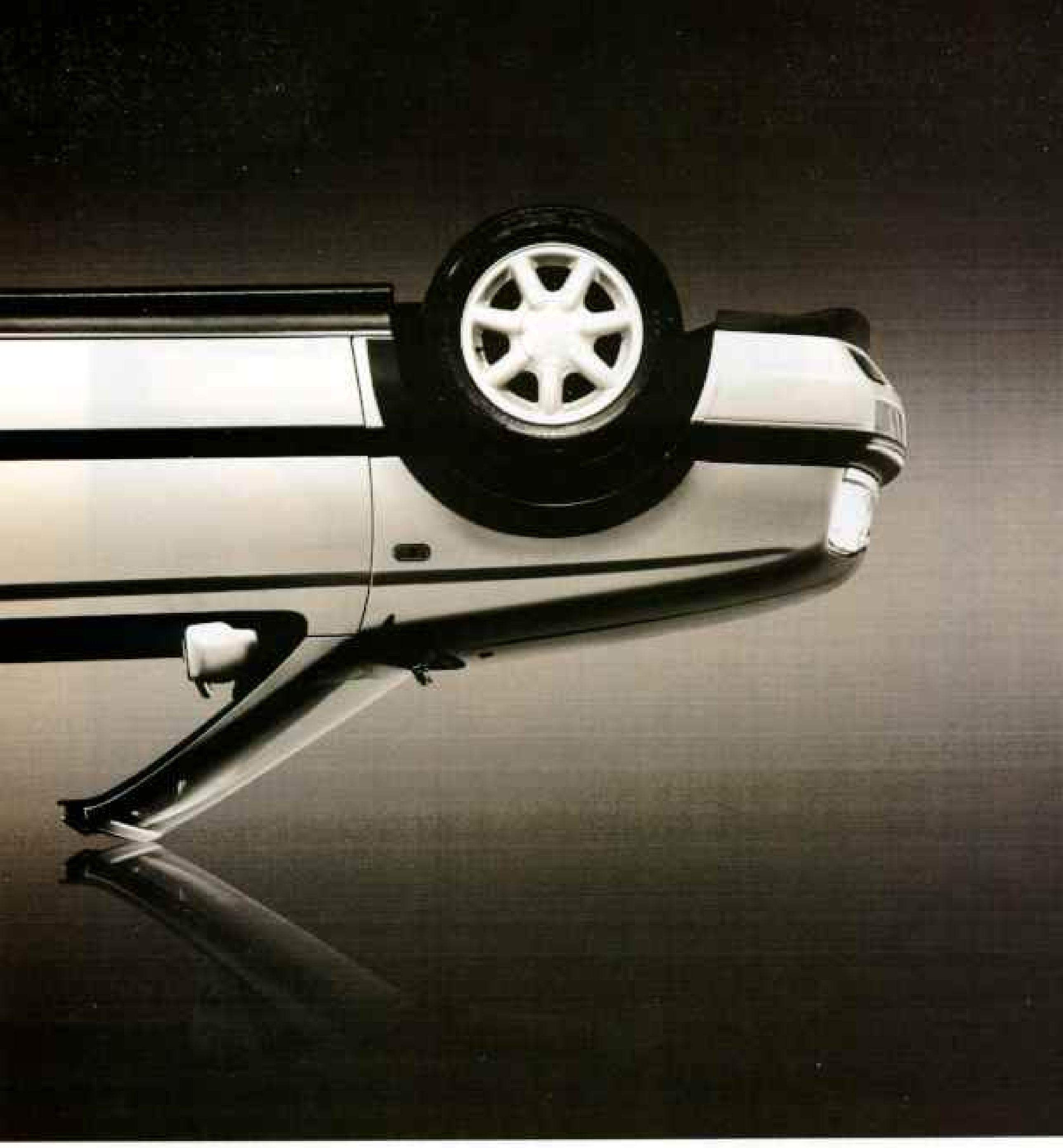

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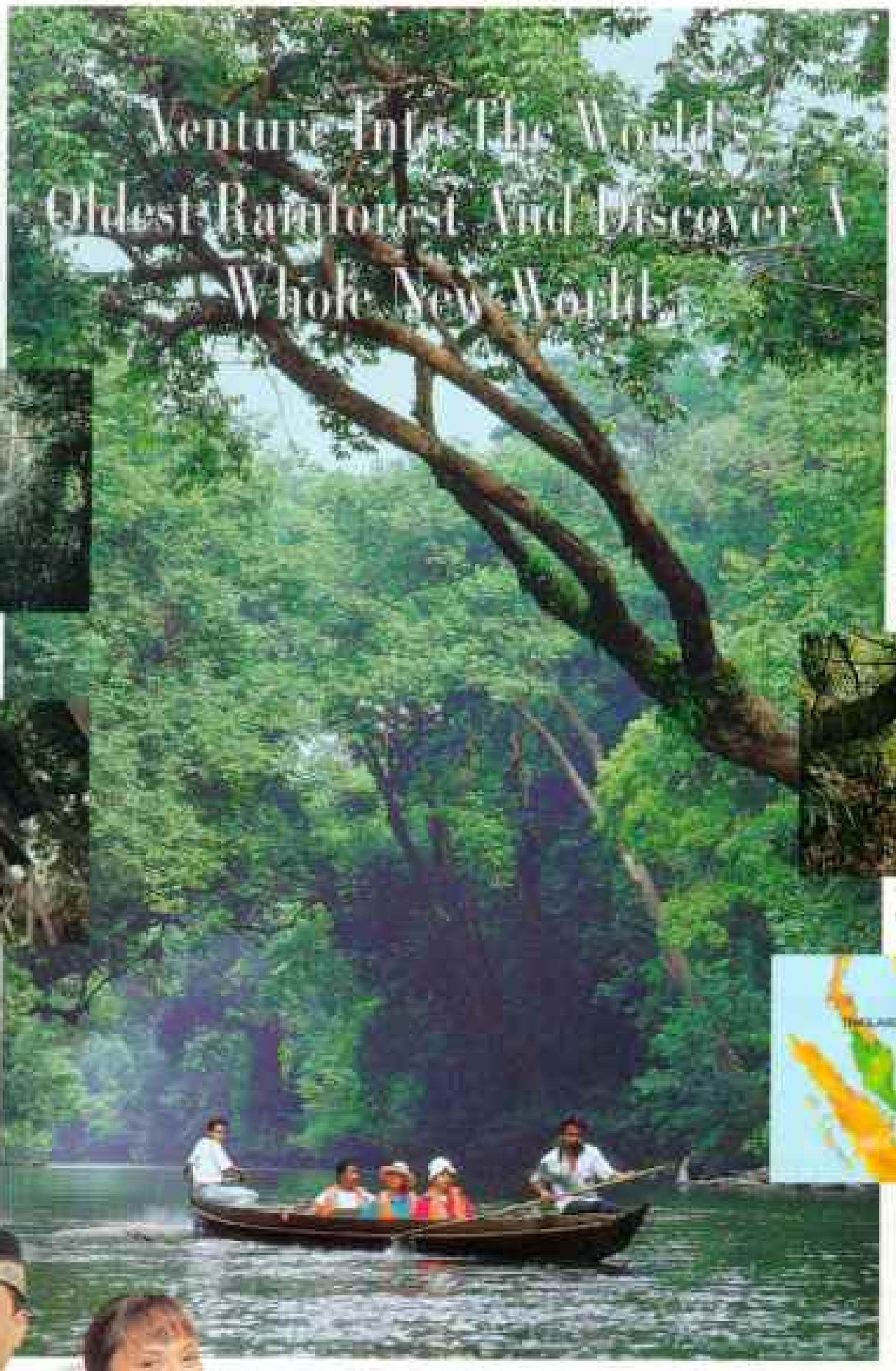

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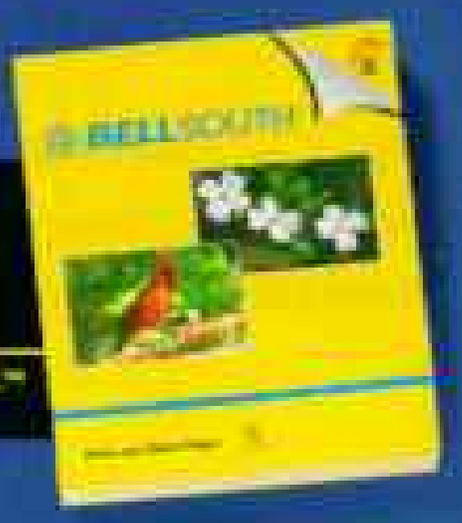

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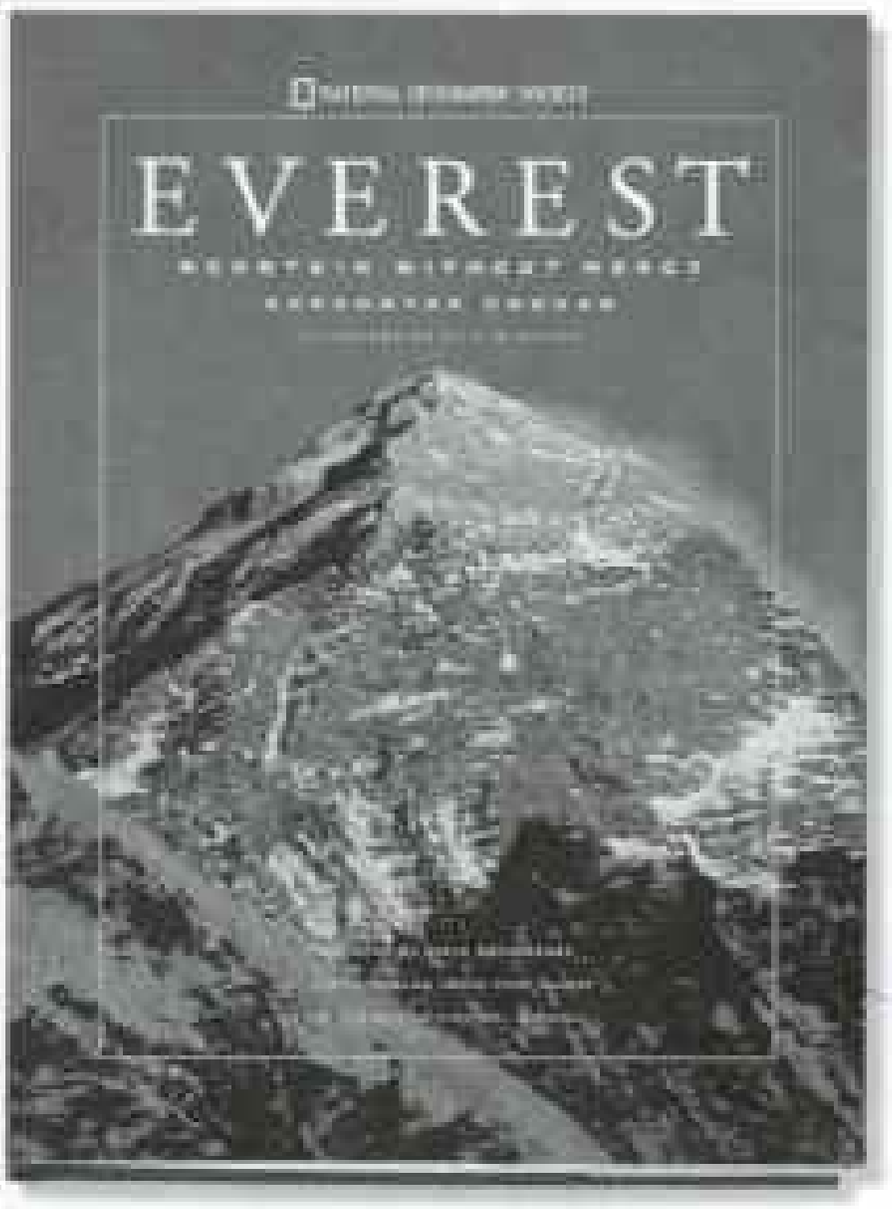

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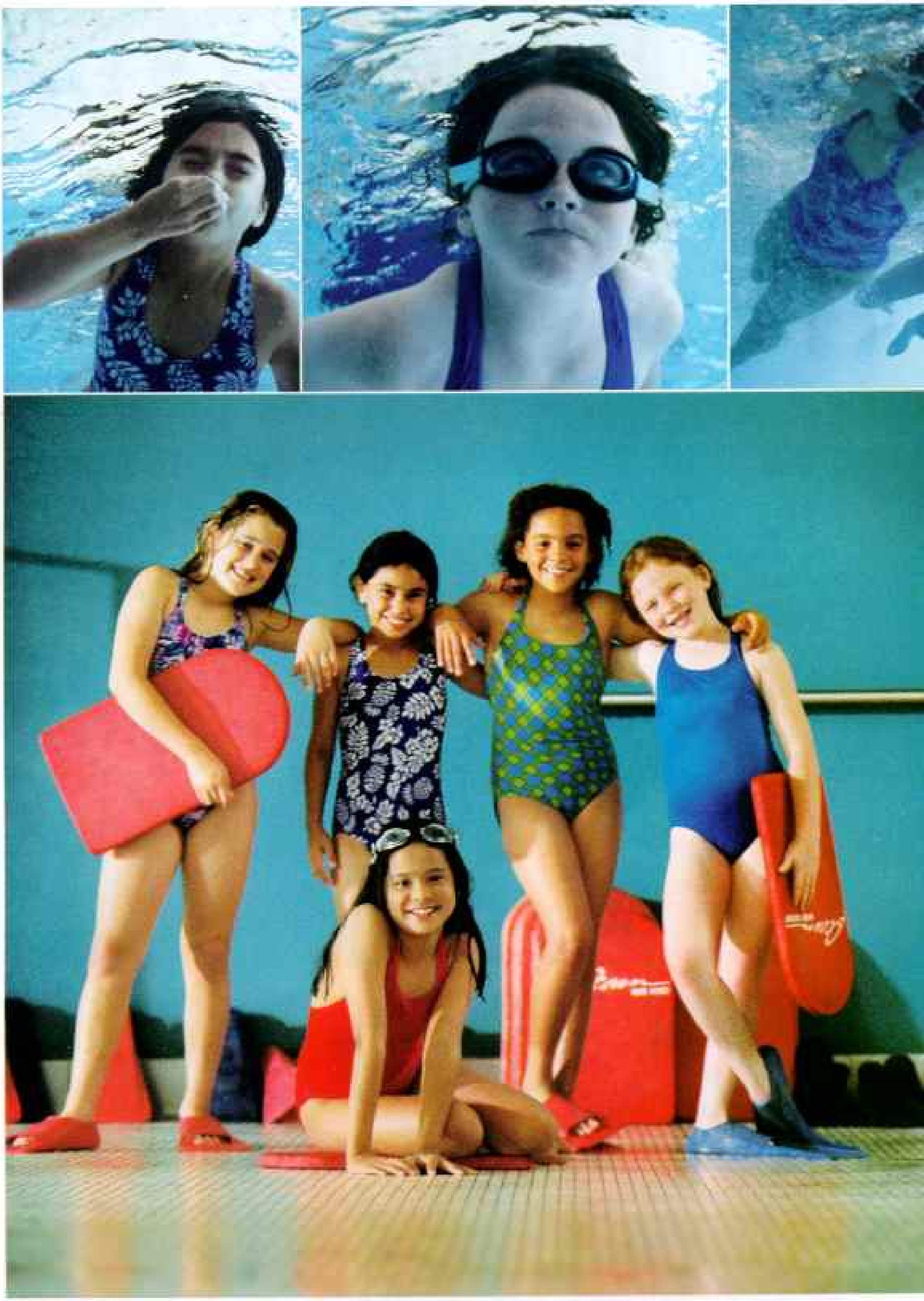

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■ FROM THE GEOGRAPHIC ARCHIVES

Reinventing the Ferris Wheel

A splintery spin on this "pleasure wheel" was a fair bit of fun in Elbasan, Albania, in 1924. Such amusements may have originated from working waterwheels centuries ago; the earliest written description, of a Bulgarian ride, dates from 1620. American engineer George Ferris, Jr., constructed the first modern Ferris wheel for the World's Columbian Exposition in Chicago in 1893. His 264-foot-high marvel was powered by a thousand-horsepower engine and supported 36 wooden cars, each holding 60 people. More than one million visitors paid 50 cents a ride.

This photograph was published in our February 1931 article about Albania, "Europe's Newest Kingdom."

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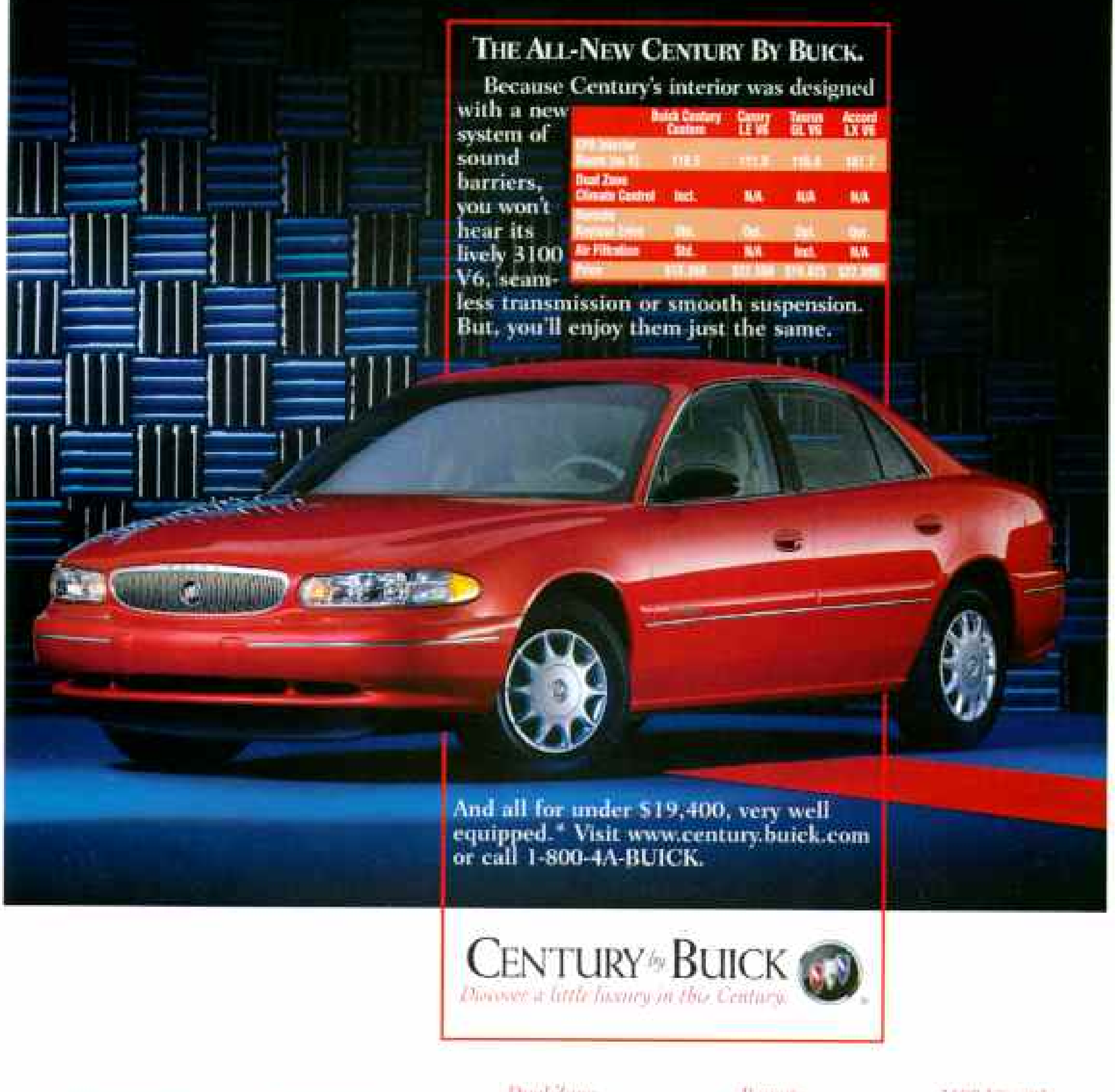

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NATIONAL GEOGRAPHIC PHOTOGRAPHER CHRIS JOHNS, A 15-MINUTE EXPOSURE AT F/4.8 ON FUJICHROME VELVIA FILM, WITH A 28-MM F/1.4 NIKON LENS

"The Smoke That Thunders"

Mosi-oa-Tunya, that's what locals call Victoria Falls, and when I first saw it during full flood in April, I knew they had the name right. Nothing I had read or seen prepared me for its power. The roar was deafening, swirling winds engulfed me in mist, and the rocks actually vibrated under my feet. The high volume of water spilling over the falls created the mist, impairing visibility. An ordinary photograph would not do justice to one of the most awesome sights I have ever seen. So I returned, exploring the area for the best angle, visibility, and time, taking compass readings and recording moonrises. I finally picked Livingstone Island as my vantage point. I camped and waited. Finally at 1 a.m. on July 30 the full moon and the mist were right. I stood on the very edge of Victoria Falls and shot a hundred frames to get this view (above and pages 12-13) to convey what I felt—the power and dreamlike beauty of Mosi-oa-Tunya.

—CHRIS JOHNS

■ "TIGERS OF THE SNOW" HOME VIDEO

On the Prowl With the Big Cats

With regal composure a young Siberian tiger named Niurka contemplates her new realm, a three-acre enclosure near the town of Gayvoron in far eastern Russia. Raised by Russian biologist Victor Yudin, Niurka and her mate, Koucher, help scientists learn about the elusive Siberian tiger, the world's largest cat, weighing up to 800 pounds.

"Tigers of the Snow," a National Geographic Special now available on home video, chronicles the efforts of joint teams of Russian and American scientists to safeguard these splendid cats, of which only about 350 adults remain in the wild. Produced and directed by Mark Stouffer, the film includes unprecedented footage of this highly endangered, highly dangerous animal in its free state.

Stouffer (who is himself the subject of the Warner Bros. feature film *Wild America*) says getting pictures of a wild Siberian tiger cub ranks among his most hair-raising moments. Signals from the mother's radio collar warned of her imminent return as Stouffer, after days of tracking and camping in remote terrain, shot the most difficult and dangerous baby pictures on earth.

MARC MOFFITT

■ EXPLORER, OCTOBER 12

Thieves Beware

Navajo historic preservation officers Jon Dover and Charles Chia patrol the Four Corners region of Arizona, New Mexico, Colorado, and Utah. Their job: to stop grave robbers from plundering the region's past. EXPLORER's "Looters!" throws a searchlight into the dark underworld of trade in Native American artifacts, such as this 12th-century Kayenta bowl, from the hills of the high desert to the walls and mantels of illicit collectors.

■ PROGRAM GUIDE

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NATIONAL GEOGRAPHIC

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■ NGS RESEARCH GRANT

Dolphins: Great Communicators

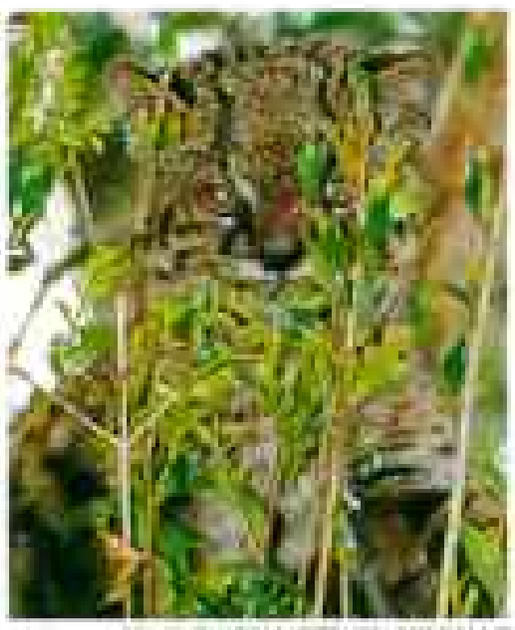
Sending a message, an Atlantic spotted dolphin calf, at right, presses its back against its mother's side. "This contact behavior may be a mutual signal that everything is OK," says Kathleen Dudzinski, who began studying a dolphin population in the Bahamas as a doctoral student at Texas A&M University in 1992.

She examines how dolphins communicate using body language and whistles, squawks, clicks, and other vocalizations. To record their signals and identify which individuals made them, Dudzinski built a special housing for a video camera with stereo hydrophones that she uses while snorkeling.

STENELLA FRONTALIS: KATHLEEN DUDZINSKI

Rare Cat Caught on Chilean Isle

One of the smallest cats in the world, a guigna peers through the dense forest of Chiloé Island off Chile. Weighing about five pounds each, the animals had been studied only from museum specimens collected 70 years ago, until University of Florida ecologist Jim Sanderson managed to trap and measure this male; the photograph was taken after release. "It climbs trees to eat nestlings," says Sanderson. "It also lives in temperate forests on mainland Chile and Argentina. We need to know how it's reacting to forest fragmentation from logging and how much territory it requires."



FELIS GUIGNA: STEVEN MORELLO

GLAUCOMYS SABRINUS COLOMATUS: KEN TAYLOR

Roadblock for Flying Squirrels

Graceful glides of Carolina northern flying squirrels won't carry them across Cherohala Skyway, a new scenic highway in Tennessee and North Carolina. Peter Weigl, a Wake Forest University biologist, says trees should be planted to form a canopy that the squirrels can leap across. The road has bisected their territory and marooned many squirrels.

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XAVIER DESMIER, RAPHO/LIAISON

"Ice Conditioning": Still a Cool Idea

The iceman was a neighborhood fixture, circa 1900. His truck left blocks of ice to cool food and the sweltering summer populace, who relaxed as fans blew over the ice. Now the same idea is cooling skyscrapers.

The making of chlorofluorocarbons (CFCs), used in air conditioners, was halted last year because CFCs harm the atmosphere. Instead, utility subsidiaries in Chicago and other cities are using ice. At night, when electricity is cheaper, a plant makes millions of pounds of ice. By day it is allowed to melt, and 34°F water is piped into office buildings. It circulates through heat exchangers, which absorb heat from the structure.

Chicago's ice plants serve more than 40 buildings, and Boston's first is under way.

An Unsullied Corner of the Mediterranean

Beset for decades by pollution, overfishing, and other environmental malaise, the Mediterranean still has natural nooks that are protected from abuse. One is Scandola Nature Reserve, established by France in 1975 on the west side of Corsica. It was made a world heritage site in 1983.

PELAGIA ROCTELLICA, XAVIER DESMIER

The reserve's 4,700 acres cover both sea and land. Ashore, a 20-year effort has sought to restore ospreys, once common on the island. A park guard sets up this plastic osprey decoy near an artificial nest to encourage breeding ospreys to expand their range. More than 30 pairs now soar over the island, as do peregrine falcons.

Offshore, a pink jellyfish pulsates through the sanctuary's waters. Rare corals grow off the steep coast in rocky caves, some the lairs of dusky groupers and other large fish that have become scarce elsewhere in the Mediterranean. These waters are rich in spiny lobsters, but diving and fishing are prohibited, as is the collecting of marine life. The spirit of Scandola echoes in an international effort to create a whale and dolphin sanctuary between Scandola and mainland France, Monaco, and Italy.

TEXT BY JOHN L. ELIOT

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Verreaux's Sifaka *(Propithecus verreauxi verreauxi)* **Size:** Head and body length, approx. 43 cm; tail, 53 cm **Weight:** Average 3.4 kg **Habitat:** Semi-arid spiny vegetation and deciduous forests in south and southwestern Madagascar **Surviving number:** Unknown
Photographed by Michel Loup

WILDLIFE AS CANON SEES IT

In a series of unique bipedal hops and bounds, a Verreaux's sifaka traverses a stretch of open ground, with her infant riding on her back. Powerful hind legs also enable sifakas to take enormous leaps from tree to tree, often landing on cactus-like plants amazingly unhindered by the sharp spines. Sifakas do not need to drink standing water, and can endure droughts by obtaining moisture from eating vegetation or licking dew. Verreaux's sifakas are the most widespread subspecies of sifaka, yet they are increasingly vulnerable as the forests on which they depend are cut. 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.

NATIONAL GEOGRAPHIC

On Assignment

ED KASHI

■ PAKISTAN

Joining In, a Photojournalist's Goal

"Access is everything," says photographer Ed Kashi (above), inside a government school in Pakistan's Hunza region. "Pakistan can be an extremely closed society. It can also be a hard place to photograph if you don't know anyone, and for the first few weeks I didn't. Every night I'd come back to my room frustrated." Then Ed met some kindred souls at the Karachi Photographic Society. "They took me around and introduced me to the right people, which revealed the human side of the story. I left thinking, I hope I have a chance to come back."

A native New Yorker, Ed now resides in San Francisco.

LYNN JOHNSON

■ VINCENT VAN GOGH

The Artist in View

"I tried to capture van Gogh's spirit, not just the places he'd been," says photographer Lynn Johnson, center, shooting sculptures in progress at Antwerp's art academy, where the painter studied. Helping her was interpreter Merel van Neerbos, at right, herself an artist. "We were collaborators," says Lynn. "We'd walk down the street, and Merel would find something wonderful with her painterly eye. So I'd go back and try to see it as a photograph."

Lynn graduated from the Rochester Institute of Technology with a degree in photo illustration. As a girl in Pittsburgh, she says, she saw Dorothea Lange's work and realized "photography was all I ever wanted to do."

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NATIONAL GEOGRAPHIC
Geoguide

Down the Zambezi

■ The hippopotamus peeking through water hyacinths on the Zambezi River (above) is one of many hippos in Lower Zambezi National Park. Can you locate the park on the map on page 11? You'll note that it lies between two reservoirs. If the map showed just the two reservoirs and the river between them, what man-made feature on each reservoir would let you know in which direction the river flows?

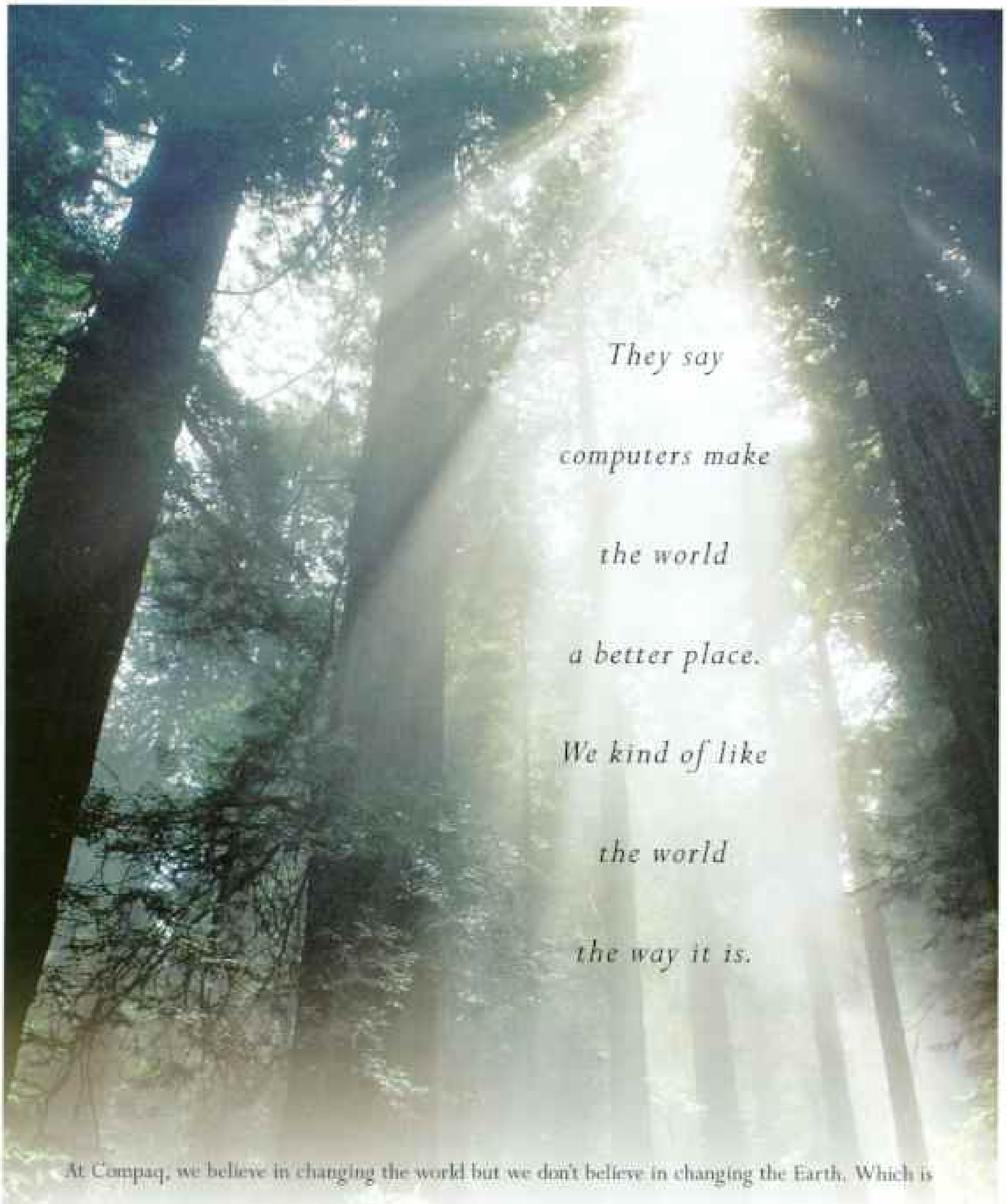
■ On its more than 1,600-mile journey to the Indian Ocean, the Zambezi flows north, west, south, and east. It moves through or along six countries. As you follow the river's course, can you find those countries on the map and list them? Most of the countries shown on the map have changed names within the past 40 years—one as recently as spring 1997. Why have so many African nations changed names in this time period? (An almanac or historical atlas will help you find the older names of the countries.)

■ On page 14 a Zambian man measures the distance to a town, Mongu, by the amount of time it takes to walk there—ten hours. What places could you reach from home by walking ten hours, assuming a rate of three miles an hour? If walking were your only means of getting places, how long would it take you to get to school? To the grocery store? To your best friend's? What is the farthest place you think you could reach in one day? If you had to walk everywhere instead of relying on motorized vehicles, how would your knowledge of the world differ from what it is?

■ Reading through the article, can you list at least 25 kinds of animals the author encounters? Which of those are facing the greatest threats from humans to their survival? Why are they especially vulnerable? What local measures are nations taking to protect these animals?

All ears and eyes, a Zambezi River hippo ignores a hitchhiker (top). The long-toed bird—a jacana, or lily trotter—can walk atop floating plants, as the half-hidden jacana next to the hippo is doing. A paddler on the Zambezi (left) depends on his dugout canoe for transport.

BOTH BY NATIONAL GEOGRAPHIC PHOTOGRAPHER CHRIS JOHNS



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