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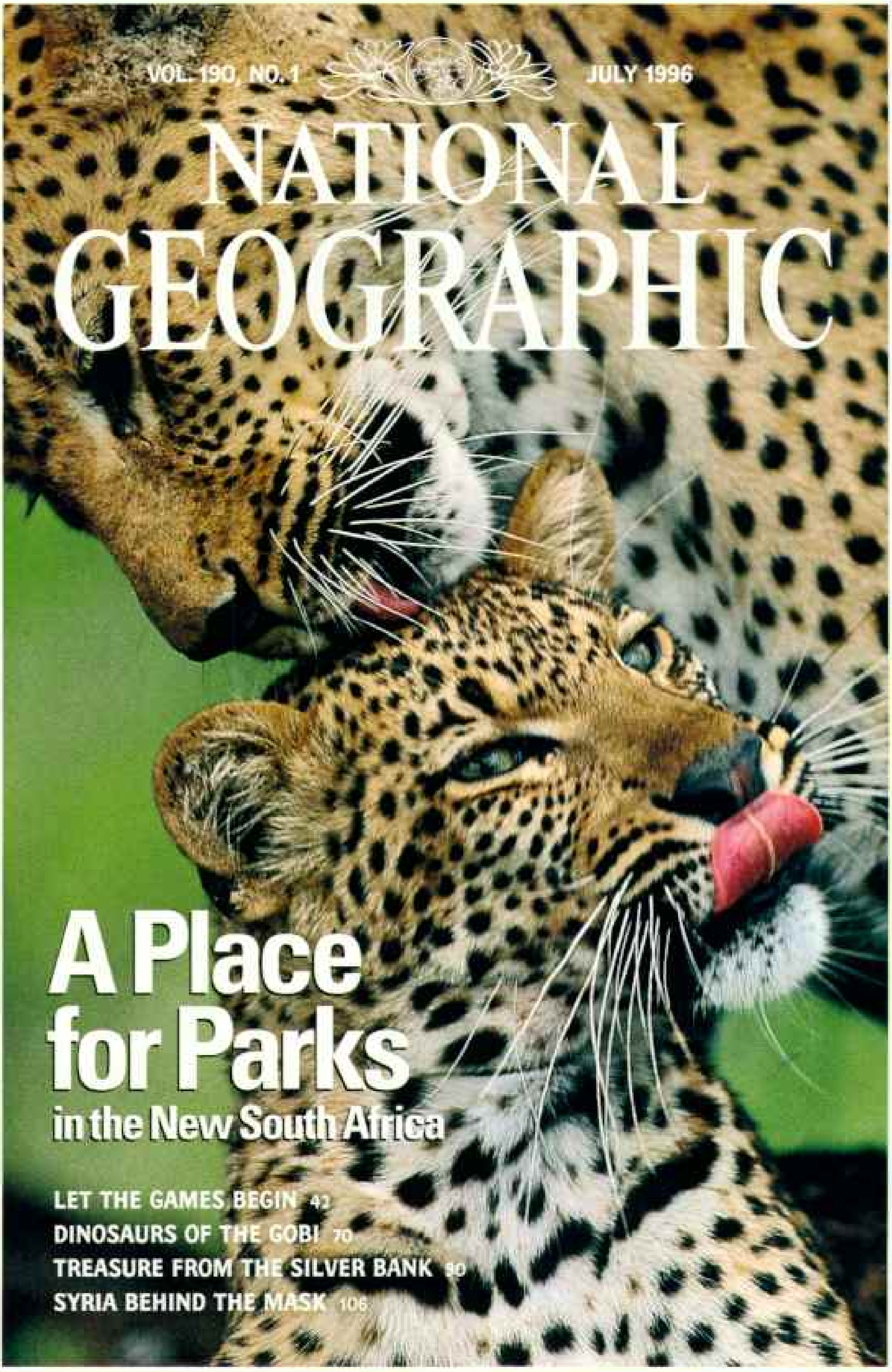

A Place for Parks
in the New South Africa

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NATIONAL GEOGRAPHIC MAGAZINE

A Place for Parks

in the New South Africa

By Douglas H. Chadwick

Photographs by Chris Johns
NATIONAL GEOGRAPHIC PHOTOGRAPHER

Anointed by the summer rains that blow in each year from the Indian Ocean, the normally dry Drakensberg Mountains once again exude the green breath of life. Rainfall caught here, in Natal-Drakensberg Park, supplies much of the water for South Africa's KwaZulu-Natal Province.

Embracing deserts and jungles and everything in between, South Africa harbors a biodiversity incredible for a nation its size. Still in the process of reinventing itself after the long struggle against apartheid, it now faces the challenge of balancing the needs of a park system that is the envy of the world with those of a poor and land-hungry people. As economic chaos spells ecological catastrophe elsewhere, South Africa may be the continent's best hope for preserving wildlife in a wild land.

On the windswept frontier between two nations, a lion patrols the dry Nossob riverbed, center of a vast refuge for big game. Here South Africa's Kalahari Gemsbok National Park is joined by a fenceless border with Botswana's larger Gemsbok National Park. Encompassing an area larger than Vermont, they represent an African trend toward transnational parks, allowing wildlife free rein in their natural ecosystems.

Lions and many other large species had all but disappeared from South Africa by the turn of the century because of unbridled hunting by white settlers. But the seeds of a remarkable comeback were planted in the 1890s with the country's first game reserves, including Umfolozi in Natal and Sabie in Transvaal. From the latter sprang Kruger National Park in 1926.

Cresting a summit in Itala Game Reserve, an African hawk eagle searches for small game. Hundreds of avian species have put South Africa on the international birder's map. A 1972 acquisition of the Natal Parks Board, Itala comprises 74,000 acres of

mountains and valleys in KwaZulu-Natal Province, renamed in 1994 in recognition of its Zulu and English populations. The province runs its own system of parks—one so well managed that it has become an international model for conservation.

EVERYTHING feels like a fresh start. It is early September, the onset of spring in a brand-new democracy, the Republic of South Africa. The country's far southern edge is in flower, and my boots are pointed down the Otter Trail, which leads for five days through the untamed terrain of Tsitsikamma National Park.

The route becomes a forest tunnel. The air is close and humid and netted with monkey-rope vines. My footsteps are the only sound. Where a pool shimmers within a bower of yellowwood and white pear trees, otter tracks pattern the mud. The path makes a turn. Suddenly the world is all sun glare, wind, plunging headlands, and detonating waves. I can't hear my footsteps anymore. But I can see whale spouts and the earth's curve in the sea.

Southern right whales and humpbacks migrate around this time of year. African penguins sometimes stop in from breeding colonies farther west, and bottlenose dolphins ride the breakers rolling toward the cliffs.

I had come to South Africa to learn how its wildlife reserves were faring under the country's first truly representative government. In 1994 a largely peaceful revolution ended the racist system of apartheid. Nelson Mandela, who had been imprisoned for 27 years, was elected president. His administration inherited a park system long regarded as among the best in the world. It contains 17 established national parks and five more in the process of formation, scores of provincial parks, other public lands such as scenic and recreational areas, and a network of private game reserves.

But Mandela also inherited a fledgling democracy in which medical care, reliable water, schools, and housing remain in short supply for many, especially in rural areas. Estimates of unemployment rates range as high as 40 percent, and the population of 43 million is exploding.

Where will nature fit into the balance? That depends largely on the future of the parks. South Africa is well aware of their value in luring tourist dollars into the country. But parks also cost money to run and, as in the United States, they are being asked to pay more of their own way. Increasingly, they have to prove their worth to a land-hungry populace with pressing social concerns.

Before I visited South Africa, I thought I understood what that worth was, but I am just now beginning to grasp the scope of what is being conserved here.

Even when I put on a face mask and dive beneath the waves to watch angelfish dart among anemones, I'm within the sanctuary system, because Tsitsikamma's boundaries extend three miles out to sea. Created in 1964 with a narrower strip of ocean acreage, it was the first of several marine reserves. Besides sheltering sea life, such refuges help replenish fish stocks that commercial and sport fishermen rely on elsewhere along the coast.

On land Tsitsikamma is thinner. Though some 45 miles long, it averages only half a mile wide. But the staff works with neighboring private landowners to control alien plants and soil runoff. It also helps manage conservation on large, government-owned tracts farther inland. Bending in that direction, the Otter Trail crosses a terrace burned by past wildfire. There I find myself walking in chest-high *fynbos,* a community of thick, aromatic shrubs and wildflowers, many unique to this region. The proteas and aloes hold forth petal supernovas so huge that the sunbirds feeding on them seem like insects on ordinary blossoms.

Rain squalls put the sun out. The onshore wind turns bitter. Heavy swells roll against me as I cross the mouth of the Bloukrans River to heave my pack onto the far cliff wall. Well, I think, as I crab sideways along a slippery ledge, it never was my destiny to explore how much luxury a human can absorb. More rainy miles bring one of the huts that await the Otter Trail wayfarer. Stars emerge. So does a pair of eyes lit by flames from my campfire. Leopard? There are a few around. But no, my flashlight finds a smaller night hunter with ties to both the cat and mongoose family—a small-spotted genet. I wonder what its destiny is.

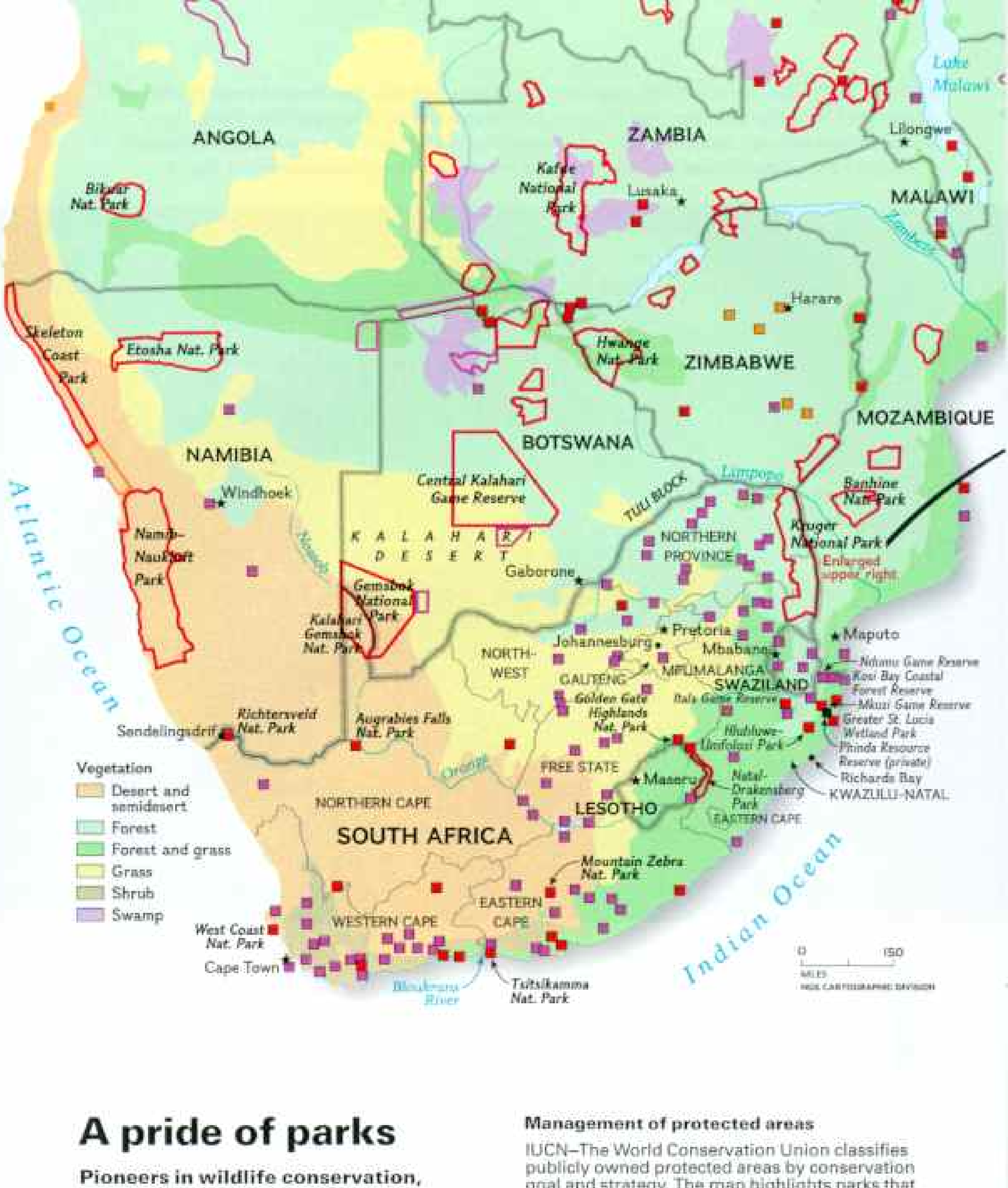
Wildlife biologist DOUG CHADWICK is the author of four books, including *The Fate of the Elephant,* and 16 GEOGRAPHIC articles. He lives in Whitefish, Montana, and keeps a log cabin next to Glacier National Park.

A Zulu *sangoma,* or medicine woman, performs a thank-you dance near Hluhluwe-Umfolozi Park for the new wildebeest tail given her by a ranger from her clan. In this rural nation, spirit diviners and traditional healers are a part of the human landscape that parks are trying to incorporate into their management plans.

TO PROSPER, every creature requires a measure of safety from its enemies, ample food and water, and a place within a healthy community. A deceptively simple list. Our own species' struggles to achieve these things have shaped much of history. Conservation has broadened the challenge by trying to ensure room and resources for wildlife as well. But strands of life are vanishing from our intricate web at a faster rate each year.

What's the solution? Should we be saving nature or helping people first? That's how the debate is usually framed, but both sides may be missing the point. Wildlife has little chance of enduring in countries where too many people are poor and disenfranchised. Nor can any nation long nurture progress and freedom in an impoverished environment. So instead of treating human needs as separate from the ground rules of ecology, world leaders are starting to consider ways to blend these forces for a better quality of life. South Africa has become a crucial proving ground for coexistence.

High in Mountain Zebra National Park black-and-white-striped horses came galloping out of a cloud to graze among dark cliffs, their hoofs disappearing into fresh, drifting snow. Among the red dunes of a desert that hadn't felt real rain for more than a year, I met a creature whose hoofs never touched the ground at all, the way the heat made things look. It too had a horselike shape and a long plume of a tail. Yet from its head arose a single, straight horn four feet long and sharp as a lance. Yes, a unicorn. As real as unicorns ever get. Grudgingly I admitted that it could be an oryx, or a gemsbok, seen from the side and



A pride of parks

Pioneers in wildlife conservation, South Africans have forged a network of public parks and reserves unrivaled outside North America. Models of conservation management for the country's northern neighbors, they now occupy nearly 6 percent of South Africa's land. Private reserves and game farms, whose numbers have exploded in the past 15 years, occupy a near-equal area and provide a valuable, if luxury-oriented, buttress to the park system.

Management of protected areas

IUCN–The World Conservation Union classifies publicly owned protected areas by conservation goal and strategy. The map highlights parks that fall within the three categories predominant in southern Africa. Official park names do not always accurately reflect the management category.

■ — National parks

Managed for public education and recreation, each of these parks preserves one or more ecosystems.

■ — Habitat/species management areas

These reserves protect species and their habitats and facilitate scientific research and environmental monitoring. Public education is secondary.

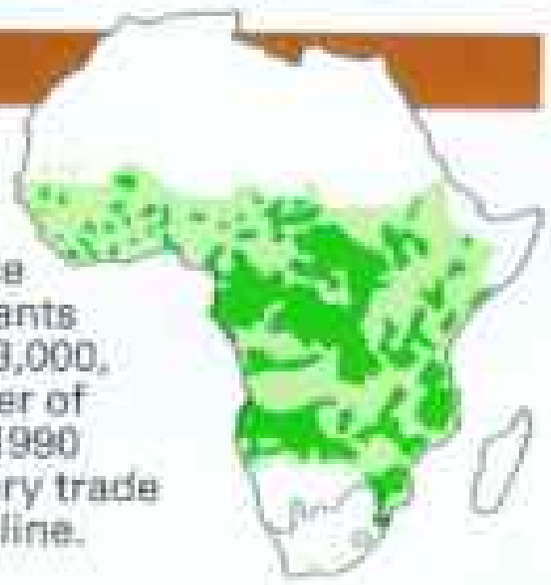
■ — Protected landscapes/seascapes

Aesthetically pleasing land and water settings, they are managed mainly for human enjoyment.

Threatened African wildlife
Distribution and status of four species

Present range Range 200-300 years ago

Elephant



Poached out of existence in places, African elephants now number a mere 543,000, less than half the number of only 20 years ago. The 1990 international ban on ivory trade has helped curb the decline.

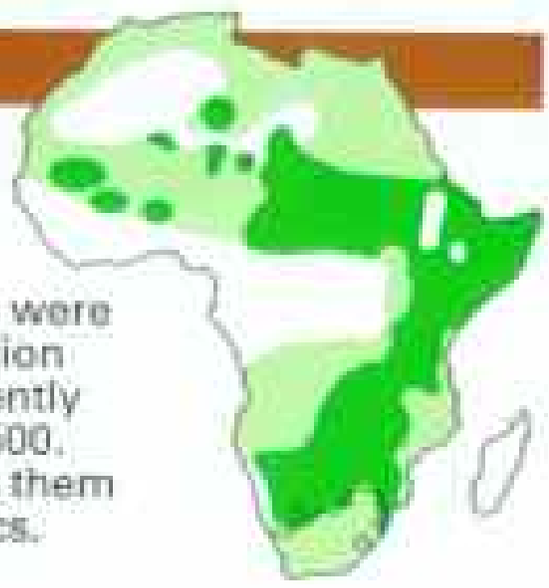
Wild dog

Among Africa's most threatened large carnivores, the wild dog was once hunted as vermin by farmers. Large parks in South Africa and Tanzania are now its prime sanctuaries. Even there, however, it is stalked by lions.

Black rhino

Once more plentiful than the larger white rhino, this is now the endangered one, numbering about 2,400 continent-wide. Hluhluwe-Umfolozi Park contains approximately 400, perhaps the largest single population.

Cheetah



Capable of running 70 miles an hour, cheetahs were on a fast track to extinction until their numbers recently leveled off at about 12,500. Genetic uniformity puts them at high risk for epidemics.

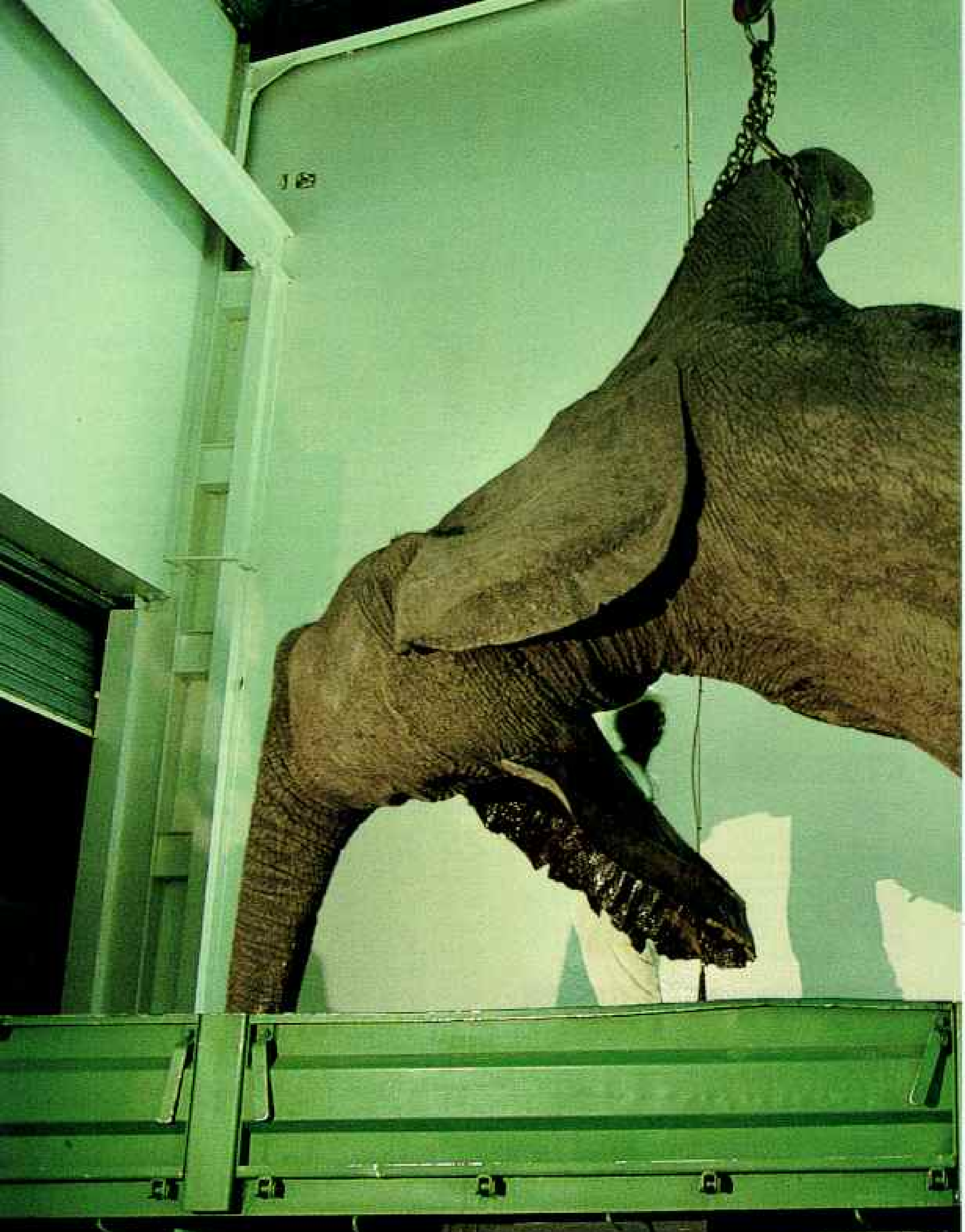
missing one horn. I was, after all, in Kalahari Gemsbok National Park, a huge reserve linked to still larger Gemsbok National Park in the neighboring country of Botswana. En route, I had stopped at Augrabies Falls National Park, where the Orange River goes airborne 220 feet, spraying thunder and mist, and the granite rim is divided into territories by skirmishing lizards colored like pieces of rainbow splashed up out of the gorge.

THE NORTHEASTERN REGION of South Africa harbors the flagship: Kruger National Park, 35 to 40 miles wide on average and 230 miles long. On a hot afternoon I linger along the Sabie River, one of several waterways that give life to this arid domain. The Sabie is running low right now. Big, rounded rocks show above the surface. The current forms gentle rapids around them, full of murmurs and braided light. Abruptly, one of the mounds rears up in a spray of droplets and splits open. It is a hippo head, yawning. The animal's back has birds walking all over it. They are oxpeckers, gleaning insects and parasites off the hide. Terrapins do the same underwater.

Along the shore crocodiles sprawl with their ragged mouths open to help shed the afternoon heat. Gray herons and a saddle-billed stork stalk fish in stilt-legged slow motion until a herd of Cape buffalo comes churning through the shallows to drink. Waterbuck and bushbuck burst from among the reeds to look on. Large bunches of impalas appear everywhere in the riverside shade, twitching at flies, new scents, and suspect shadows. Only one, draped high in a jackal berry tree, is still; the leopard that put the body there will be back as sunset turns the Sabie crimson and lion roars transform the growing darkness beyond into arenas of hunger and stealth.

Now that South Africa is no longer being boycotted by other nations, word of its natural treasures is spreading fast. "Last year 730,000 people came through Kruger's gates," I learn from Piet du Plessis, chief of tourism. "About 77,000 were from overseas, compared with 56,000 prior to independence. This year we are up another 20 percent and climbing." Nationwide, the number of overseas visitors jumped 52 percent from 1994 to 1995. Overall, tourism is expected to pump 40 billion dollars into the economy over the next five years.

Kruger is among *(Continued on page 29)*



Cull of the wild *Sacrificed so others might live, an elephant is winched into the abattoir at Kruger Park, where it will be butchered for canned meat. A traditional park-management tool, culling*

is opposed by animal rights groups as a method for controlling elephant populations. Park officials defend the practice, though they have suspended it awaiting review.

Breaking out, reaching out

Perfect candidates for culling, a gang of young rogue elephants rampage along Kruger Park's southern border, where they had been bashing through fences all night to forage on private farmland. Pursued by helicopter, they were soon dispatched with rifles and hauled to the slaughterhouse.

Though the elephant carrying capacity of Kruger is a matter of debate, officials have tried to limit the population to 7,500 animals. Eating

constantly, a mature bull consumes about 400 pounds of leaves and other roughage a day. Too many such appetites in a limited environment will devastate the ecosystem. Some relief is provided by a group of private game reserves along a fenceless section of the park's western border, giving elephants more space to range. At Londolozi Game Reserve, schoolchildren are given first-hand elephant experience as part of a community outreach program.

African dilemma

Headed for greener stomping grounds, two heavily drugged Kruger Park elephants are prepared for translocation to Swaziland, while a biologist takes blood samples to measure their stress. An alternative to culling, translocation is a risky business. One angry matriarch nearly pulled a hovering helicopter out of the air as rangers tried to dart her with tranquilizers.

Despite all best efforts, families are sometimes broken apart, causing acute stress for both the leavers and the stayers. Moving elephants is also expensive. Were it not for the ban on ivory trading, say officials, the park's rapidly accumulating hoard of ivory (above) could pay for translocations well into the future.

Meanwhile, animal rights groups, anxious to stop culling altogether, have raised millions of dollars to support alternatives, including birth control. Park management, leery of surrendering its culling option, warns that an exploding population of elephants would exhaust available habitat.

(Continued from page 13) the heavily visited parks that not only pay for themselves but have enough left over to finance others that are not as well-known but that conserve vital elements of biological diversity. Another is Golden Gate Highlands National Park, which holds some of the last native highveld—South Africa's rich upper elevation prairie, now mostly farmland—along with the imperiled sungazer, or giant girdled lizard. Such popular parks are the reason the national park system is already 76 percent self-supporting.

Part of Kruger's attraction has to do with the quality of the facilities. The main roads are paved. More than two dozen immaculately tended rest camps offer accommodations from bungalows to tent sites. Stop at a picnic site in between, and you'll find boiling water in case you want tea. Meanwhile, reservations required for overnight stays help keep visitors spread out so the only crowds they experience are likely to have hoofs or paws.

Driving back to camp in the evening via a dirt road, I pull over as a pickup truck skids to a stop beside me. A man leans out the window and shouts, "Did you just pass a cheetah by any chance?" This is no curious tourist but Douw Grobler, a strapping, sun-and-dust-tanned ranger from park headquarters. He is following up a report of a cheetah with a hurt leg. I hop into his truck to lend a pair of eyes.

"What a day," he mutters as we jolt down the road, racing against nightfall. "Not an ordinary day but typical of some days, I'm afraid." In the back of his truck is an impala, struck and killed by a visitor's car. In the cab is a rifle intended for a big male baboon I saw earlier at a nearby picnic site. Tourists ignoring "Please Do Not Feed the Animals" signs had turned him into a dangerous panhandler. He went on to break into the park shop and started hurling wine bottles around. By the time Douw arrived, he found only broken glass and dung. The vandal had fled.

And now we're searching for a cheetah doomed to starve if its leg is too damaged to run on. "There!" Douw exclaims. The cat is like a slender patch of sunlight left behind in the brush. It struggles to rise. One forepaw hangs at an awful angle. "Broken," the ranger pronounces with a shake of his head as the world's fastest land animal limps a few yards, then turns to face us. "The injury appears to be natural, so he'll just have to suffer it out on his own. In cases like this, we're supposed to let nature take its course." Which meant we couldn't even leave the cheetah a bit of impala meat. So, if a hindquarter just happened to fall off the truck and end up near the cat before we left, I would never mention it.

FOR ALL ITS VASTNESS, Kruger is only a fragment of the wildlands its inhabitants once depended on. The boundaries are arbitrary, and the park is increasingly surrounded by human activity. This separateness—this ecological apartheid—is reinforced by a fence enclosing the park. The stout wires are intended to keep wildlife safe from people while protecting humans from predators and diseases that game animals can transmit to livestock. But the barrier raises the question: What exactly is nature's course here anymore?

I literally bite into the most emotional issue when I order a meat pie for lunch at the park. Some of that meat, I discover, may be elephant. Foraging for as many as 20 of every 24 hours, the world's largest land animals can seriously harm plant communities, along with the creatures tied to them. As long as elephants are free to wander, they only stir the habitats they use. But they can hammer an environment when confined.

A principal stronghold of crocodiles and endangered wild dogs in South Africa, Kruger also holds 80 percent of the nation's elephants. To maintain the park population at around 7,500, rangers have culled 300 to 400 each year and hauled the bodies to the park slaughterhouse, where they become canned meat, fresh food for the staff, and restaurant fare.

Among the animals killed are big males caught raiding irrigated fields just across the southern boundary. (Yes, a game-proof fence stands in the way. No, they haven't invented one that is feasible to build and will stop a determined bull elephant.) Ironically, Kruger is renowned for protecting big tuskers. The

On morning reconnaissance, a trio of suricates scope the landscape around their burrows in Kalahari Gemsbok Park. A type of mongoose adapted to open and arid regions, the gregarious creatures—also known as meerkats—thrive in the desert park and elsewhere in South Africa's dry western provinces.

Homo sapiens **flood the beach on New Year's Day at Greater St. Lucia Wetland Park, where – thanks to the Natal Parks Board's good neighbor policy – admission is free for local residents. South Africa's torrid zone, northern KwaZulu-Natal teems with tropical life. Along its normally empty beaches sea turtles are making a comeback.**

60-year-old Shawu, who died in 1986, for example, had ivories ten feet long and was shadowed constantly by rangers determined to keep poachers at bay. Notices in visitor centers ask tourists to contribute photographs that might help park biologists identify the current champion tuskers and their ranges.

"Not a day goes by that we don't hear complaints about our elephant culling program," a harried-looking Christo van der Linde, Kruger's public relations manager, sighs as he puts down the telephone. "Please, I ask our critics, tell us where is the money to translocate the elephants instead? Then tell me where is there room to put them? Contraception? Fine. Lovely. Just let us know who is going to pay to track down elephants all over the park and put them on birth-control drugs?"

Fair questions. Here are some recent answers: Funds for preliminary trials of contraception in Kruger have been promised by animal rights organizations. Encouraged by private conservation groups, the park plans to find homes for surplus elephants in neighboring Mozambique, whose reserves were emptied by years of civil war. Ideally, remaining wildlands throughout the region could be connected by corridors, allowing the elephants to relocate on their own. The fence separating Kruger from several private reserves on its western border has come down, increasing the size of the park by 15 percent.

Should current negotiations prove successful, fences will also fall between Kruger and a possible new park of equal size in Mozambique. I hear talk of linking Kruger to other protected wildlands in Zimbabwe. The result would be one of the world's largest reserves.

Mental fences are beginning to come down too. "A few years ago if a poacher was caught, he was put away for years or maybe shot," Gideon Nkuna, spokesman for the tribal

No longer working for a pittance, local craftsmen near the gate to Kruger Park put finishing touches on carvings that now earn them a living wage. Tutored by park consultants, they are learning to set prices in line with their labor. Large craft items may fetch several hundred dollars in park curio shops.

council in a neighboring village, tells me. "To us, this said that the lives of animals were more important than those of people."

I'm at park headquarters, at one of the forums where community leaders and Kruger's staff meet to discuss common concerns. "Back then, you and I could not even be sitting together in this park," adds Isaiah Mathebula, a local Shangaan chief, from across a table. "Blacks were not allowed in except as laborers. Later they could not afford the price at the gate. People who lived next to Kruger all their lives had never come here. Now with a new government we have developed the idea that Kruger belongs to everyone in South Africa."

This new way of thinking is also why people who were removed from their homelands to make room for white landowners anytime after 1913 are now able to seek restitution through a special land-claims court. Portions of three national parks, Kruger among them, and many provincial parks are in dispute.

Chris Marais, a park employee and part-time pastor, was asked to foster communication about such issues. "The old idea of how to run a park was: Put up a BIG fence, get BIG guns, and keep the neighbors and their cattle OUT," he tells me. "The new idea is to build support by making sure those neighbors benefit as much as possible from being next door."

To begin with, most of Kruger's 2,700-person staff is from the immediate area. Reaching farther across the fence, the staff has established medical clinics, assisted with irrigation projects, and arranged to purchase local crafts and produce to sell in park stores. Neighbors pay only a nominal entrance fee now, and drivers of local bush taxis have been trained as tour guides.

A lot of programs are moving more quickly on paper than in practice, though, just as some forums turn into *(Continued on page 30)*

Night stalker

A leopard prepares to haul an impala carcass heavier than itself up a tree, where it will be safe from competing meat-eaters. Big cats thrive along the Limpopo River, where

Botswana, South Africa, and Zimbabwe meet in a region called the Tuli Block—a thousand square miles of bushveld being considered for a transnational park.

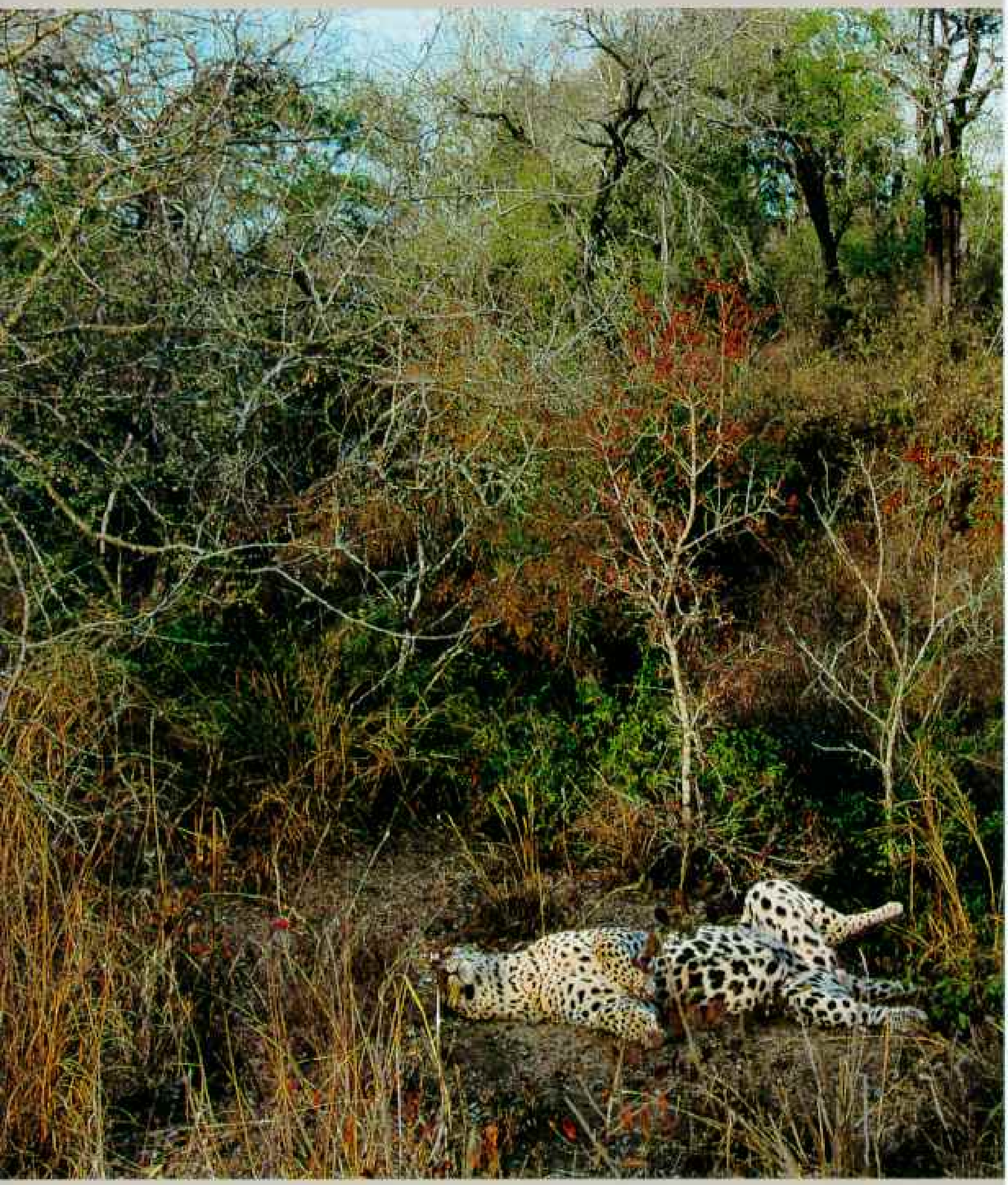
Territorial cat

Stalking the stalker, Erence Nyati of the local Shangaan tribe leads a Land Rover full of tourists on an evening hunt for leopards and other nocturnal beasts at Londolozi Reserve. Gifted trackers, the Shangaan fill many such jobs in the private reserves clustered on the western edge of Kruger.

Dung, paw prints, and other markings are clues leading to the leopards that often come prowling

around the camps. Deep in the night, when all the guests at the Mala Mala Game Reserve are sound asleep, a large male comes for a drink at the pool and to sniff at the bedrooms.

"These are territorial animals," says reserve owner Michael Rattray, "and this camp is in his territory." For up-close contact with Africa's "big five"—leopards, lions, elephants, Cape buffalo, and rhinos—guests pay as much as $600 a night.



Cat nap

Belly full from the night's hunt, a young leopard grabs a feline snooze in a wooded ravine in the Mala Mala Reserve. Not dependent on big game, a leopard has far more entrées on its menu than does the choosier lion. Even birds, fish, and insects will do.

Solitary beasts, leopards mark off fiercely defended territories with urine, feces, and claw marks. While female ranges may overlap, males rarely share space with one another. Still relatively common throughout southern Africa, leopards face extinction in much of Asia.

Threatened with an oily demise, the 70,000 Cape gannets of Malgas Island share their waters with scores of tankers—a situation bound to worsen if plans materialize for the storage of Iranian oil at a nearby depot. Not only the gannets are at risk but also penguins, pelicans, and a host of other birdlife in West Coast National Park.

(Continued from page 23) squabbles between traditional chiefs and young activists. And despite talk of cooperation to protect Kruger's rivers, they are polluted, silt laden, and all but sucked dry by upstream farming, commercial forestry, and mining. The Luvuvhu and Letaba have already ceased flowing in dry years, and in 1995 the Sabie nearly did as well.

It isn't just the animals that find life thirstier as a result. Frank Mhlongo farms in the Belfast area near the park boundary. While a small gas-powered pump chugs away on the hillside below, he digs a trench to direct water from the shrinking Sabie down to his tomato plants. "I should give them water three times a week," he tells me, wiping sweat from his temples. "But I am allowed to pump only once a week, so the tomatoes will not grow as big. The park says it will buy our vegetables. I inform the park: My tomatoes are ripe. They did not come. They are saying, but we do not see."

A CENTURY AGO conservation was simpler. The main issue was whether or not wildlife could survive commercial and trophy hunting. Farsighted people set aside three game reserves in what is now the province of KwaZulu-Natal: Hluhluwe, along the river of that name; Umfolozi, across a corridor of state land to the south; and St. Lucia, about 30 miles east. They are the longest standing reserves in Africa. In 1949 other farsighted people built a fence around Hluhluwe and Umfolozi, creating a joint park of nearly a quarter million acres.

Near Hilltop Camp, the highest point of Hluhluwe, I rendezvous with section ranger Warrick Armstrong and a field crew of about a dozen whites and Zulus in the chill, predawn air. Rumpled terrain of chest-high grasses and young acacia trees falls away on all sides; eagles and the day's first vultures patrol overhead. Warrick is bouncing around like a

In the shallows of Kosi Bay estuary, men compete with flocks of flamingos for the sea's bounty, using fish traps to sieve the tides. Accepted as part of the environment, the ama-Thonga fishermen were allowed to continue this ancient tradition in 1992 when the area was incorporated into the Kosi Bay Coastal Forest Reserve.

well-rested antelope, explaining the morning plan. It is to go out on foot and get close to as many rhinos as possible, the goal being to identify individuals by ear notches and horn shapes. Biologists think this yields the best population estimate. I think sneaking up on the huge, armored beasts is about the hairiest way to start a morning that I've ever heard of.

I remind myself that white, or square-lipped, rhinos tend to stay out in the open, cropping grass. Then I learn that we're going after black rhinos. These are semi-solitary browsers that stick to thick brush, where about the only thing you would be worse off meeting is a Cape buffalo. Come to think of it, there are plenty of buffalo on the hillsides too. "One of our guys came back the other day with the epaulet torn off his uniform by a black rhino," Warrick says. "Another busted his rifle over one's head at the last moment."

Trying to maintain my composure after this, I notice a young woman joking with the game guards. Although I met two black executives at the National Parks Board head office, I've been searching for nonwhite field managers in vain. It takes the sight of Tracey Abell with a rifle slung over her shoulder to make me realize that I have not met a woman—of any race—in a management role, until now.

"I've got a passion for big animals, and I can't stand being cooped up in an office," Tracey tells me. "All my training was for a field ranger job." That clashes with the Afrikaner mind-set, which has typically been as conservative in regard to women's roles as it has in the status of nonwhites. "If a man messes up or lacks a certain skill, his superiors say, 'Ah, give him a chance; he's just learning.' But with women it's been an excuse to turn you aside. I made history when I became a relief trails ranger at a nearby park," she adds. Then, calling out in Zulu, Tracey hurries to

catch up with the rest of her patrol, vanishing among the buffalo thorn in search of giants.

Now it's my turn. Warrick spies his quarry and races off for a close-up look. He gets a good one—seconds before he has to dive behind a boulder to keep from being gored. We try to scout up more, following the three-toed tracks and heaps of dung that mark their territory. We pass fallen tree limbs grown shiny from itchy rhinos rubbing against them. In a grove of Natal mahogany along a valley bottom, Warrick signals a halt. Straining, all I hear is the duet of a female black-collared barbet and her feathered mate sifting down through the leaves. Then, something else. Crack! Something big. Whooom! Something elephantine.

Hluhluwe-Umfolozi Park's elephants came from Kruger as orphans in the aftermath of culls. Whether from early trauma or the absence of elders, they have become a notoriously moody bunch given to charging visitors. We race through barbed tangles but not very far before we bump into another elephant, turning our way and filling the space in front of us, then a third as we backpedal. Even Warrick starts looking around for the stoutest tree to climb, but we finally scuttle to safer ground.

BY NOON THE NEXT DAY I've not only seen rhinos nose to nose but leaned up against their titanic butts to shove them through the veld toward a waiting truck: three white and one black, all drugged. As of 1890 the world had perhaps 50 southern white rhinos left, all in Umfolozi. Today there are around 8,200, the result of KwaZulu-Natal's translocating more than 3,700 over the decades in what became known as Operation Rhino.

South Africa became a primary refuge for black rhinos as well. In 1970 they numbered around 65,000. Poaching for their horn—used to treat pain and fever in the Far East and to a lesser extent for ceremonial dagger handles in the Middle East—has since dropped them to fewer than 2,500. Hluhluwe-Umfolozi supports 350 to 400 black rhinos, among the largest populations anywhere, along with the second largest population of white rhinos—some 2,400—within its fenced boundaries. To maintain a balance with their food supply, the park removes up to 5 percent of each group every year for sale.

"Several just went to Namibia," says Dave Cooper, a veterinarian, as we stroll past the complex of pens in Umfolozi where rhinos adjust to captivity before being transported long distances. While new arrivals bash the bars surrounding them, a black rhino mother who has been here for weeks lets me reach in and pet her calf. "Six others are en route to Britain. Ten are to be shipped to Bangkok and two to Israel," Dave continues. "Some won't live long after they leave, since their destinations are private hunting reserves." A white rhino sells for $15,000 on average, a black rhino for about $42,000. A game-farm owner can turn around the next day and charge someone almost double that amount to shoot one—a white one, that is, since it is illegal everywhere to shoot a black rhino.

The problem with selling off such wildlife is that once animals have dollar values, they start to get swapped like commodities: Trade you two trophy sable antelope for a rhino, deal? And reserves end up with a fauna skewed toward species that are the easiest to manage or prized above all others by shooters.

The advantage is that once big game animals become big business, there is an incentive to keep their habitat intact. Since 1979 South Africa's network of private reserves and game farms has grown in area from less than 2 million to more than 16 million acres. That acreage can nurture other life from eagle owls to monitor lizards and pepperbark trees at no extra cost. By contrast, certain plants have become so scarce in many settled areas that traditional healers, or *nyangas*, can no longer find the roots and leaves for their medicines and are making arrangements with reserves to gather ingredients.

A fraction of the income from KwaZulu-Natal parks is distributed to neighboring communities. Villagers have begun to think about establishing their own wildlife reserves. One has been formed next to Mkuzi Game Reserve, a provincial park, and Phinda Resource Reserve, a luxurious wildlife resort. Hluhluwe-Umfolozi's fence may soon reach out to enclose a 25,000-acre community reserve being considered at the park's southern edge. These new areas can offer game viewing for tourists, selective trophy hunting, and a regulated harvest of wild meat—a combination many private reserves and some provincial parks profitably pursue—while creating bridges between other wildlife habitats.

But not everyone is happy about the increasing acreage of parks. In the shade of a fruiting

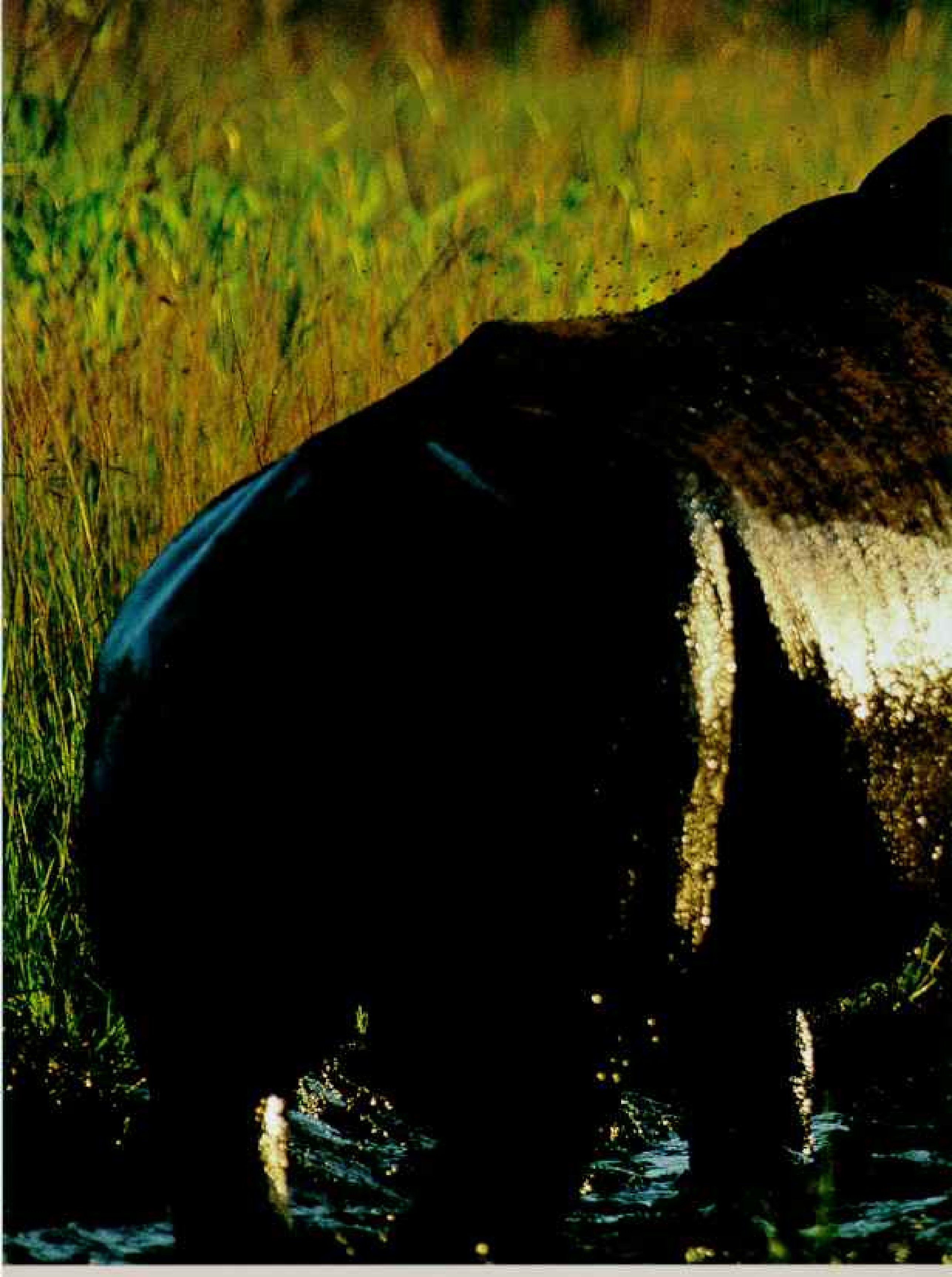
Landlords of Richtersveld National Park, the Nama people collect rent from the parks board for use of their desert homeland. Found here is the world's richest diversity of succulent plants, including the aloe trees surrounding Nama herder Joseph Links, whose goats enjoy limited grazing rights.

sausage tree, V. N. Mthembu, a laborer at Ndumu Game Reserve in northern KwaZulu-Natal, tells me, "My family lived in Ndumu until around 1960. They were moved outside when the park brought in rhinos. There is not enough land for everyone outside now and not enough water, especially in droughts. But the park has plenty of water and game. Why can't we come back inside to build homes and live?"

To the east of Ndumu, at Kosi Bay, people have less need to live within the boundaries of protected land. They already possess the right to gather reeds for their houses, harvest palm hearts and fruits, and fish with spears, traps, and a controlled number of nets, all within an existing provincial park. As a result they have focused their energies on developing camping facilities and guided tours in conjunction with a new resort planned for the mouth of the bay.

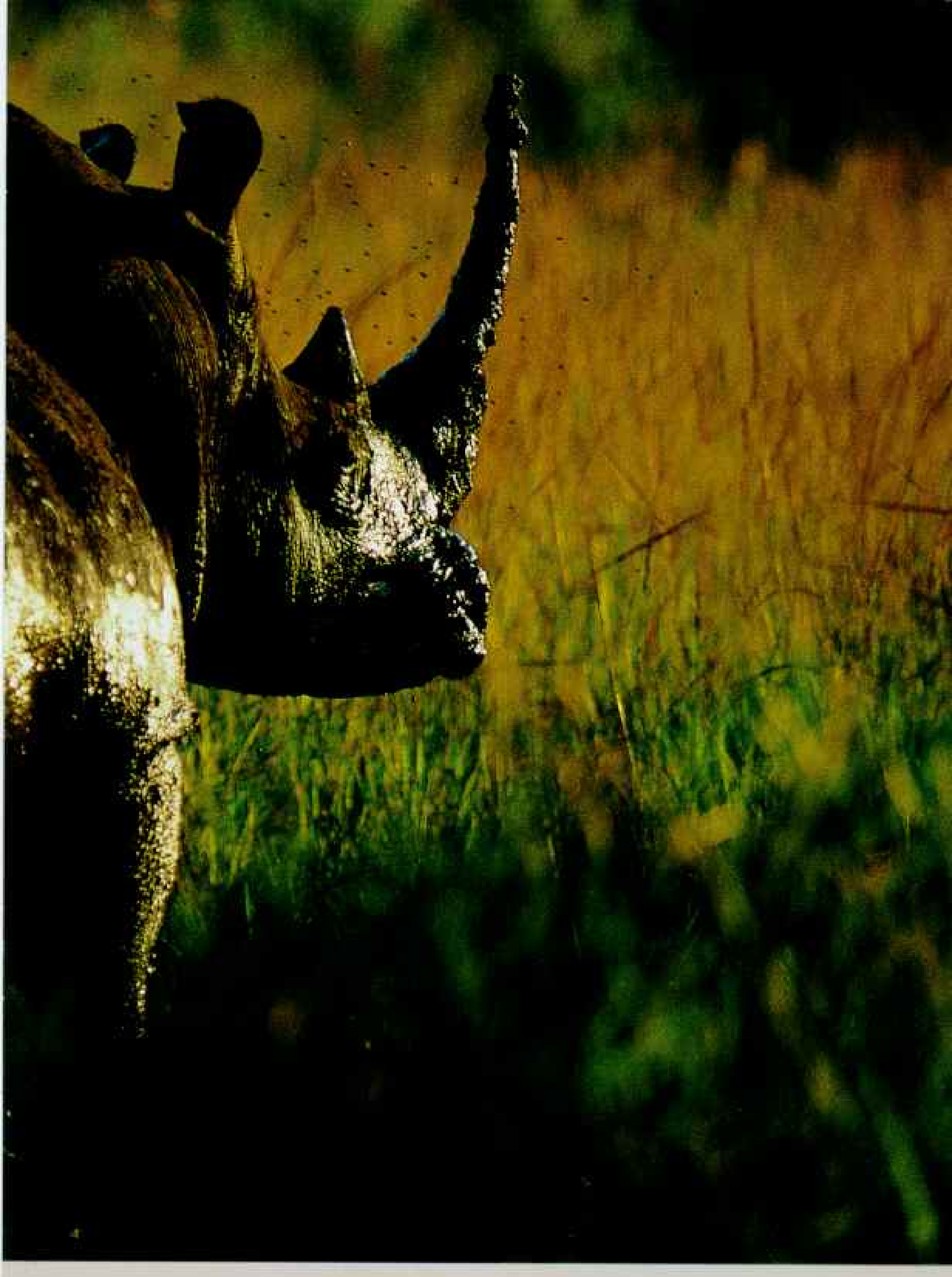
Sitting outside a small, flower-draped building at Kosi Bay Coastal Forest Reserve are several young black men wearing hopeful expressions and their newest clothes. One rises, straightens his collar, and introduces himself as Yusie Mhlongo. He tells me that his group has just completed training as trail guides in a course sponsored by the reserve.

"If we did well, we will be called again for an advanced course," Yusie says. "I have had no job for five years. Only fishing. You must go far from here to find work. But if I can work in tourism, I will not only have a job near home but I can also teach people how to live hand in hand with our environment." I leave heartened by Yusie's enthusiasm but wondering if I will ever meet a nonwhite South African in a field management role. *(Continued on page 38)*



Rhino land

Glistening with mud, a white rhino bull cools himself at Hluhluwe-Umfolozi. Unlike the endangered and similarly colored black rhino, this larger species is well represented



in South Africa's parks. Once hunted for their hides, which made good horsewhips, white rhinos are still hunted as trophy game on private reserves and poached for their horns.

Rhino rescue

Time and chemistry are of the essence as rangers from Kruger rescue a black rhinoceros that strayed into neighboring Mozambique, where poachers would likely kill it by sunset.

Darted with a tranquilizer from a helicopter, the animal was unconscious when Douw Grobler, at right, and Don English arrived to administer just enough antidote to induce a state of semiconsciousness. Jolted awake with a nostril shock from a cattle prod, the animal lurches to its feet. "At this stage it's hypersensitive to sight and sound," says Grobler, who stuffed rags in its ears and covered its eyes.

Thus kept in a harmless stupor, the normally dangerous animal is led back to the park, where about 300 are protected from poachers by well-armed rangers on bikes.

A THOUSAND MILES to the west, in Richtersveld National Park, I pull into the diamond-mining town of Sendelingsdrif after dark and knock at what I take to be the superintendent's house. A man with olive-black skin opens the door.

"I'm looking for a Mr. Paddy Gordon," I say.

"Yes, I'm Paddy," he replies.

"Something tells me you're not as Irish as the name sounds."

Roaming the 400,000-acre park with Paddy over the next few days, I learn that he is descended from French Huguenots, Malayans brought to South Africa as slaves, and possibly Col. Robert Gordon, who was among the first Europeans to explore the western coast. By sheer coincidence it was that Dutchman who in the 1770s named the Orange River, which now defines the northern and eastern boundaries of the park Paddy oversees.

Paddy's father often took him to parks near their home. As he grew older, he found great satisfaction in roaming the out-of-doors and decided on a career in conservation. People say the reason whites get hired for upper echelon park jobs is that they have the best qualifications. That may be true, but the apartheid system spent at least three times as much money to educate a white student as a nonwhite one. And, as Paddy discovered, colleges specializing in wildlife management did not let people his color in.

Paddy took courses in environmental education instead, graduated with honors, and was selected as the National Parks Board's first nonwhite professional conservation officer. But, stationed in Cape Town, he grew restless amid the smog and commuter crowds. "You end up with a headache, feeling like you've done a whole day's work, and you've only driven to the office," he says. "I asked to be stationed somewhere in the wilderness. I got my wish. Between Richtersveld's remoteness and temperatures that reach 127 degrees, we see fewer than 2,000 visitors a year."

Those temperatures, combined with rainfall of two inches or less a year in some parts, make for landscapes so stark they might be from a planet closer to the sun. But the cold Benguela Current running along the nearby Atlantic coast forms fogs that wash over the mountains through winter. That sheen of precious moisture gives life to the slopes. It just doesn't look quite like life anywhere else.

As we clamber up a dry wash, Paddy shows me *halfmens*, plants that do look half human with their unbranched bodies and flowering heads silhouetted against the sky, and scores of different euphorbias, the African equivalent of cactuses. At our feet are tiny globular succulents. Some grow mainly among quartz crystals that, being white, reflect sunlight and are cooler than the surrounding rock. Others resemble rocks themselves.

On the yellow petals of a daisy are black markings thought to mimic pollen-thief beetles. "If the flower appears to have some of the robbers on it, others will avoid landing, since this beetle aggressively defends food," Paddy explains. By necessity every plant here is a genius inventor, especially of ways to store water or produce seeds that can withstand months of baking until passing storms unleash the miracle of a desert in bloom. What I first thought were bands of iron-rich rock are orange and red wildflowers running across the terrain like a flash flood.

Richtersveld was set aside principally to protect this unique flora, though the place grows equally intriguing animals—coal black, hairy scorpions capable of shooting their venom three feet away, for example, and rare mountain ground squirrels. Steenbok, gray rhebok, a few klipspringers, and the occasional gemsbok make a home here, subsisting on water from plants. For at least 2,000 years domestic sheep and goats and their herders, the Nama tribe, have managed to live in this desert as well.

The National Parks Board began eyeing the area as a potential reserve in 1972. Planners kept trying to persuade the Nama to leave with offers of other grazing lands. The Nama balked. Diamond-mining operations along the Orange River were another snag. Richtersveld wasn't born until 1991. By then it had taken on a character all its own, as a park based on contracts between groups with different interests.

The diamond companies stayed, with the understanding that the land being mined will revert to the park when the gems play out. The Nama stayed too. In fact they became the proprietors of Richtersveld, leasing their land to the parks board for 24 years while reserving the right to terminate the contract with a six-year notice. The lease money goes into a community trust fund to be distributed as the Nama see fit. Park-management decisions are

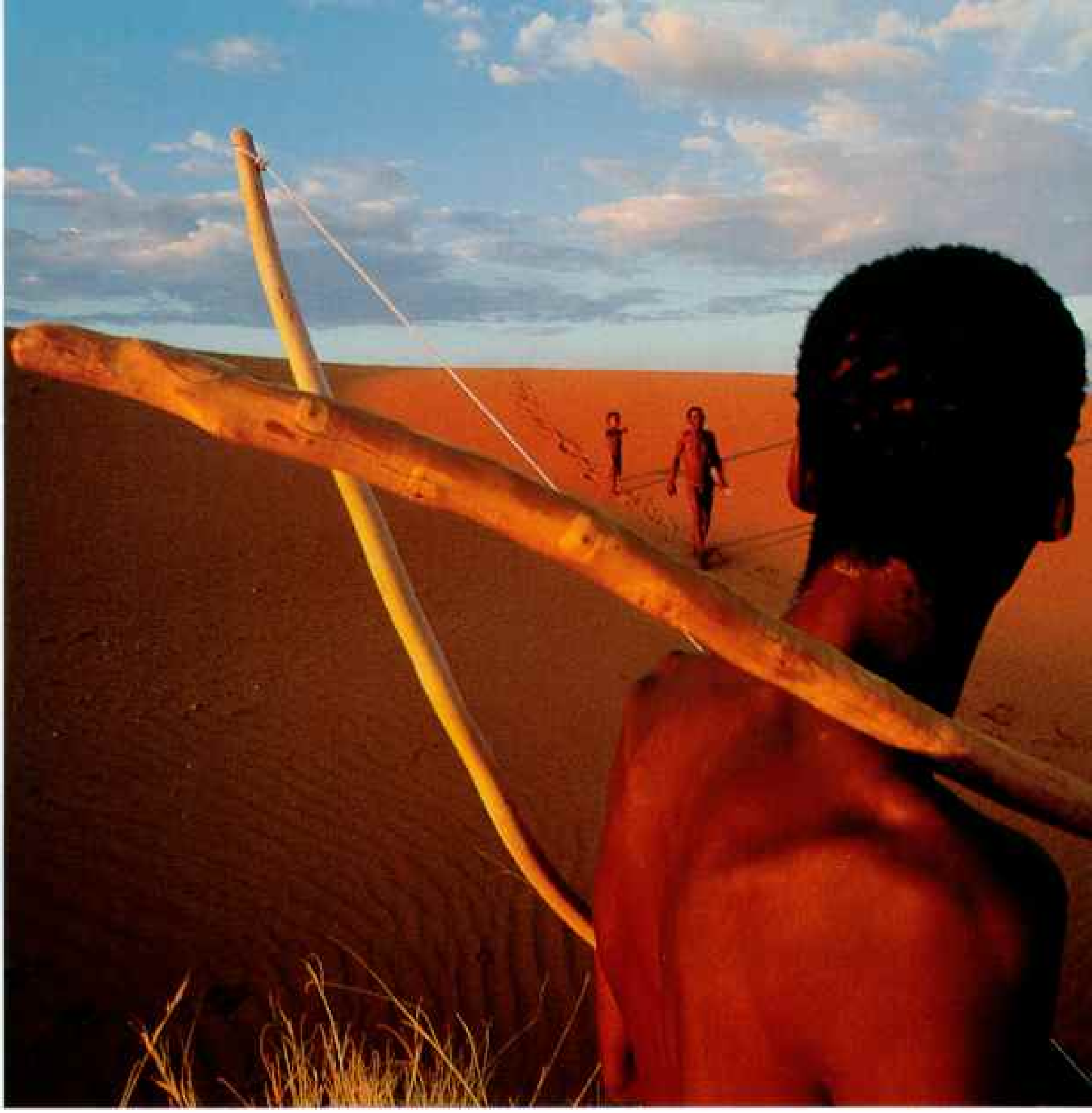
On the lonely bushveld of Northern Cape Province, two San tribesmen tend their ailing father, Regopstaan. Patriarch of South Africa's last Bushmen, as they are often called, the now deceased 95-year-old hoped to see the resolution of a lawsuit to allow his people access to their old hunting grounds in Kalahari Gemsbok Park.

reviewed by a committee consisting of four park employees, four representatives from Nama villages, and one Nama who speaks specifically for the herders. By mutual agreement the Nama limit the size of their herds to avoid overgrazing, but they are compensated with additional range near the park.

OUT NEAR RICHTERSVELD'S HEART a Nama named Frikkie Smith is preparing to move a flock of 230 goats to the edge of a wash where a few trees offer thorny umbrellas of shade. Two boys who help with herding crack a goatskin bullwhip near a small brush corral. "Our herd has two owners," Frikkie tells me. "Sometimes four or five owners will run their animals together. But the first warden told us the big herds make too many dead, trampled areas around camps. We agreed it was a problem. Besides discussions like that, I don't notice much difference before the park and now."

I ask how he feels about tourists coming through, and he answers, "Good. I like to see them enjoying themselves. They often stop to talk with us, and they say they will be back." Then he asks me, "How does our park compare with parks in your country?"

Uncertain where to begin, I say that reserves in both countries protect life that may be of great importance to people everywhere. Almost one-third of Richtersveld's 650 plant species are found only here or in the immediate vicinity. And just yesterday at headquarters ethnobotanist Fiona Archer told me that the Nama have specific uses for 150 of them. Many are medicinal, enlisted to treat ailments from flu to burns. Several have commercial



potential as cosmetics. Several more, such as a native sumac, have high nutritional value and might one day be used as a crop for droughty regions. But Fiona was reluctant to give more details until the Nama have established rights to the products they discovered.

FRIKKIE'S QUESTION stays with me. My memory drifts to a lakeshore in KwaZulu-Natal's Greater St. Lucia Wetland Park, where I watched hippos after a storm. Behind them rose enormous coastal dunes—a range of hills, really, cloaked by dense subtropical forest and a soft, rainbow-lit fog. At times the wind carried the sound of the Indian Ocean crashing against beaches on the opposite side. Reedbuck grazed the slopes close by, while a dikkop, or stone curlew, probed the lake's edge for insects. Beside me, Ian Player, South Africa's leading conservationist, said, "You see why people speak of a special sense of place here."

A field ranger who became chief warden at Umfolozi Game Reserve, Ian was the driving force behind Operation Rhino. Inspired by the U.S.'s wilderness ethic—and by the philosophy and bush lore he absorbed from a Zulu mentor named Magqubu Ntombela—Ian also

Better hunter than ranger, Klaas Kruiper left his job with Kalahari Gemsbok Park. Able to track game for days across the red Kalahari dunes, the San tribesman plans to resume a traditional way of life. If well managed, say the San, there will be plenty of animals to go around.

set aside South Africa's first wilderness area. Placing nearly a third of Umfolozi off-limits to roads and permanent structures, he organized a guided-trails program that encouraged small groups of people to hike and camp there. At last visitors otherwise restricted to cars could experience Africa as humans did from the beginning: afoot, vulnerable yet self-sufficient, alert to each track and scent, embraced by the ancient rhythms of the world. "It is a place for gaining insight into one's self," Ian told me, "like going on a vision quest."

The wilderness concept spread to other reserves, just as the U.S. has designated portions of many of its parks and refuges as wilderness areas over the years. But as Ian spoke on the lakeshore, he was telling me of a different sort of similarity between our nations' parks. In a classic conflict between industrial development and nature preservation, a conglomerate known as Richards Bay Minerals (RBM) wanted to extract titanium, rutile, and zircon from the coastal dunes of St. Lucia.

"In St. Lucia we're looking at a deposit worth more than three billion dollars," said Barry Clements, head of public relations at RBM. "Plus at least 2,500 high-paying jobs. We'll be gone in 20 years after putting those hills back into something close to their original shape and replanting them."

"RBM can replant a cover of fast-growing trees," Ian agreed. "But that is an altogether different thing from the complex native dune forest you see here today." By disrupting water flows, Ian insisted, mining could kill Lake St. Lucia and its surroundings—the largest estuarine lake system in Africa. "These things are simply not negotiable," he said.

St. Lucia is one of the country's most popular parks—used by hundreds of thousands of fishermen, beachcombers, and birders and other watchers of wildlife. The clash over strip mining began in 1989 and led to South Africa's first major environmental review of a development project. Citizens were allowed a direct say in public hearings—a common practice in the U.S. but another first for South Africa.

This spring, after I returned from South Africa, the government ruled against the mining at St. Lucia, deciding instead to promote park preservation and ecotourism. RBM has announced that it accepts the decision. That in itself is a measure of how deeply this country is committed to its reserves and to a new view of what good living standards truly are.

The path ahead will not be easy. But everything around me still feels like a fresh start, because this is the path of freedom, which nature and the human spirit were meant to travel together. □

Sport, like all life, is about taking risks. ROGER BANNISTER

LET THE GAMES BEGIN

From the balancing act of British hurdler Percy Hodge to the athletic rituals of ancient Greece (below), humanity's penchant for play has been expressed in every society in every age. For the centennial of the modern Olympics, we deployed photographers, dug through picture archives, and commissioned a veteran sportswriter to get at the cultural roots of the games we play. THE EDITOR

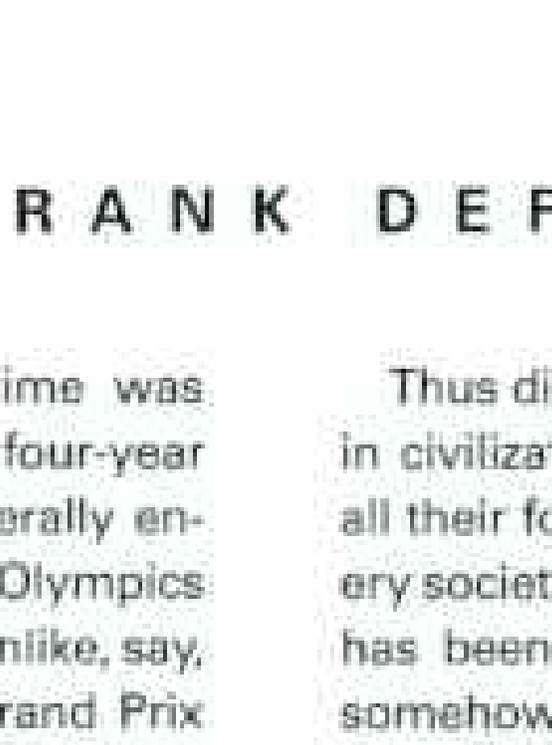
BY **FRANK DEFORD**

In the Greece of 2,300 years ago, time was already measured in olympiads—four-year periods—and the country was so generally engaged by sporting competition that the Olympics were actually only part of a circuit not unlike, say, the Grand Slam of tennis today or Grand Prix auto racing. There were also the Pythian Games and the Isthmian and the Nemean.

In Athens a sturdy wrestler, good enough to compete in the Isthmian Games, enjoyed remaining in the gymnasium after practice, there to chew the fat, to ponder life. It might very well have been right there where he first inquired: "What, then, will be the right way to live?" Anyway, eventually, the wrestler would answer his own question: "A man should spend his whole life at 'play.' "

Thus did Plato assess the grand place of sport in civilization. More often—although games, in all their forms, have been played in virtually every society since the beginning of humankind—it has been the fate of play to be dismissed as somehow inconsequential to our existence. "Really," says Drew Hyland, a philosophy professor at Trinity College in Hartford, Connecticut, who is past president of the international Philosophic Society for the Study of Sport, "after Plato and Aristotle no major philosopher seems to have seriously considered the implications of sport until Nietzsche in the 19th century."

To be sure, sport appears more evident in our lives today, but that is simply because we possess greater leisure time and the technology to allow us the greater opportunity to



UPI, CORBIS-BETTMANN (LEFT); REZA, MUSÉE ANTOINE VIVENEL, COMPIÈGNE

Launching arrows from a charging horse, a Japanese bowman keeps alive the samurai art of *yabusame,* or mounted archery. As originally practiced in the sixth century, archers had stern incentive to hit their marks: He who missed was obliged to take his own life.

PETER ESSICK

4000 B.C.
Hieroglyphs record the spread of boxing throughout the Nile Valley.

3400-1500
Tomb paintings in Egypt portray running, swimming, rowing, archery, and wrestling.

ca 1800
The Tailtenn Games, oldest organized sports competition on record, held in Ireland until about A.D. 180.

ca 1000
In Mexico the Olmec play a soccer-like game on courts with rubber balls.

776
First recorded athletic competition at Olympia.

490
A Greek soldier-legend rushes 22 miles to Athens with news of victory over the Persians at Marathon—giving name to the long-distance race, set at 26 miles 385 yards for the 1924 Olympics.

396
Princess Kyniska of Sparta becomes first woman to own a victorious Olympic team.

ca 25
Reference to rowing as a sport made by Roman poet Virgil in his *Aeneid*.

A.D. 210
Earliest record of horse racing in England.

393
Olympics abolished by Christian Roman Emperor Theodosius.

THE SAGA OF SPORT

ART RESOURCE

Chariots driven into battle by Hittite warriors in the ninth century B.C. were also popularly raced.

watch or participate in sport; intrinsically, sport is no more a part of us than ever it was. The "official" Olympics are dated from 776 B.C., but more informal games had been held at Olympia for several centuries, and athletic displays of even more ancient vintage took place in Egypt and China and the Americas. Johan Huizinga, the Dutch historian whose 1938 work, *Homo Ludens: A Study of the Play Element in Culture*, remains the classic in the field, pointed out that, after all, animals not only play but play "just like men." It amused Huizinga how there was forever a tendency amongst psychologists to conclude that playing games must have what we would call today some *hidden agenda*. But why? Why can't we play in order to play no less than we eat in order to eat?

Of course, this is not to suggest that play has not often been associated with other important elements of life. The first teamwork came, surely, on the hunt, and all sorts of sport derived naturally from the military—archery, chariot racing, the javelin. There is evidence of fencing for fun portrayed on the walls near Luxor as early as the 12th century B.C., and Assyrian warriors appear to have raced with what Olympic swimmers call the crawl stroke. (Sparta had no swanky gyms at all; we don't need any of those sissy civilian divertissements around here.) Likewise, from early on and everywhere, major sporting events were linked to religious ceremony, if only because fun and games—and, all too often, the ugliest blood sport—could attract worshipers to the duller prayer world. At Olympia it was the huge statue of Zeus, not the stadium, that was one of the Seven Wonders of the World. Early Mesoamericans saw in their ball games reenactments of conflicts between the sun and moon. And not all that much changes, does it? Baron Pierre de Coubertin, who inspired the re-creation of the Olympics in 1896, declared: "For me, sport is a religion with church, dogma, ritual."

Broadly, the kinds of games we play also appear indigenous to the whole human race. How else to explain that an activity like bowling evidently grew up in such disparate locales as Egypt, Polynesia, and Germany? Ball games, which originally were rock or skull games and later animal bladder games, also trace to antiquity all over the world. It is, as well, a constant that competitions with horses have invariably been for the royal and the rich, every king's sport, everywhere. Even in the Olympics, a remarkably democratic affair for the time, it was the owner of the chariot team, not the driver, who was honored in victory.

Withal, sport is inherently contradictory, for while it is fun and liberating, it is also one of the most regulated parts of life. Inevitably the question any child asks when coming to a new game is: *What are the rules?* One can visualize our primitive ancestors, relaxing after some kind of tribal melee, extrapolating from that game how

FRANK DEFORD, chosen by readers of *American Journalism Review* as the nation's best sportswriter in 1993, is also a radio and television commentator and the author of 11 books, including *Love and Infamy*, a historical novel set in Japan. This is his first article for NATIONAL GEOGRAPHIC.

11th century
Beginning of Scottish competitions that include putting the stone, tossing the caber, tug-of-war, and the hammer throw, revived in the early 19th as the Highland games.

14th century
Forcing for sport is found in Italy and Germany.

1363
Football (soccer), hockey, and cockfight. Ing—playing more popular than archery.

1365
Edward III prohibits golf as a distraction from archery practice.

15th century
Indoor court tennis becomes popular in France and England.

1474
Archery and harquebus (early musket) shooting contests held in Geneva.

1477
First recorded shooting match in Germany using blunderbusses.

17th century
Competitive rowing from Dordrecht—the start/finish point—to Rotterdam in the Netherlands.

1638
A French missionary observes Huron Indians playing a ball game using a bat with a flat paddle like a bishop's crook and calls the game *la crosse*.

1715
Organized sculling races begin on the Thames.

PUBLIFOTO

Acrobats toss a ball in a 1,600-year-old mosaic discovered at a Roman villa in Sicily.

the rest of their chaotic lives might be better prescribed.

Certainly sports do shape our values—all the more so today when so many children watch famous millionaire stars in action. (One is reminded of historian Daniel Boorstin's prescient observation from 35 years ago that, soon enough, the only real things left in a world of "pseudo-events" would be crime and sports.) The ancient Greeks, as is well known, were a society where homosexuality was tolerated, even stylish. As sport is employed today to sell products or to give otherwise humdrum cities and colleges identity and glitter, so did the Greeks use sports as an opportunity for men to meet boys. It is instructive that the root word for "gymnasium," *gymnos,* has nothing to do with sports, but means "nude." And, of course, the Olympians competed buck naked before an audience limited to males, though the priestess of Demeter was permitted to attend.

It is also true that while sport may be universal, our particular choice of game reveals a great deal about ourselves. As a case in point, *Albion's Seed,* David Hackett Fischer's brilliant study of the migration from the British Isles to the American Colonies, demonstrates how countrymen from proximate regions introduced entirely different sports to the new land.

The Puritans, who hailed from the east of England, clustered in New England villages, where they introduced the forerunners of baseball (town ball) and football (the Boston game)—activities that required community coordination. Indeed, as early as 1639 the militia in Massachusetts had to devote time, regularly, to sports together.

Meanwhile, the Cavaliers of Virginia and their servants emigrated largely from the southwest of England—Thomas Hardy territory—and favored all types of blood sport; depending on your station, you hunted down everything from bucks to birds. The gentlemen also were fond of horse racing, especially as it lent itself to gambling. It was not unusual for huge sums to be won or lost at these early match races.

Yet a third large migratory cohort, the North Britons, brought with them to the Appalachian spine athletic manifestations of their "warrior ethic"—coming, as they did, from borderlands where war was mean and incessant. These immigrants preferred individual competitions that tested a man's ability to run, jump, and throw, as well as horribly savage wrestling matches and the even more sanguinary rough-and-tumbles—brawls that positively appalled visitors from the more genteel coast. It was not uncommon for these scraps to result in maiming—even blinding and castration.

It is, then, hardly any accident that American football, the most obvious modern war game, would become favored in the South by descendants of these bloodthirsty people—but would find no place in Baron de Coubertin's classical theater of sport. Ironically, football had at first been the property of American de Coubertin types—effete Ivy League aristocrats who used the rough game to show the hoi polloi their own

1719
James Figg proclaims himself England's first boxing champion and opens a boxing school.

1743
Rules for boxing in England forbid hitting a man when he is down.

1766
Site of ancient Olympia excavated.

1793
First indoor track of cinders paved in Germany.

Early 1800s
"Ready, aye ready" is motto of Rugby School, England's public school where gymnastics are formalized.

1830s
Rugby football evolves at Rugby School, England.

1851
Colonia purchases worth about $50 open the yacht America wins England's Hundred Guinea Cup race, later renamed the America's Cup.

1858
Queensberry rules limit boxing matches to 24 rounds and require gloves.

1864
First recorded horse show/running contest held in Ireland.

1865
First canoeing club founded in England.

1867
Chemsbury Rules for British boxing prescribe the use of gloves.

brimming masculinity. But then, attitudes about athletes have always ricocheted between two poles. On the one hand there has been the image of the dumb jock, while on the other we celebrate the heroic all-American (really: all-*ours*), a Renaissance man prized for being sound of Platonic mind and body alike.

COLLECTION OF ALBERT AND MADELEINE RITZENBERG

Chic sport of Renaissance France, court tennis gave rise to numerous modern court games.

Surely, though, it was the Greeks who invested the most of themselves in sport, so it is appropriate that their Olympics were the games that de Coubertin revived exactly a century ago, their idealized sportsmen evoked. The Olympics were genuine too; they grew naturally out of a society that was at once competitive—the Greeks had drinking contests, singing contests, even beauty pageants, male division—and aesthetic. Socrates held that the twin keys to a person's development were the fine arts and sports, which are precisely the two disciplines first cut whenever American school districts run short of funds.

Yet we must be careful not to romanticize those original games indiscriminately. For openers, where they were held at the end of every fourth summer—in stifling Atlanta-like heat in the Peloponnesian boondocks, a river valley packed with freemen, their slaves, and whores—must have produced an effluvium from the vacationing humanity and their sizzling animal sacrifices that was overwhelming. Also, the myths notwithstanding, the Greeks really did *not* call off wars for the games; and the competitors were *not* a bunch of giddy amateurs, running and scrapping in the buff just for the fun of it.

That latter preposterous concept, foisted on us by the baron, terribly distorted the way we came to think about sport. In fact, nowhere in human nature has victory in competition ever been incidental, and amongst the very professional athletes at Olympia there was actually an expression: "the wreath or death." (The Aztec and Maya treated this somewhat more literally, making human sacrifices out of the losers in their big games.) De Coubertin, though, wistfully proclaimed the Olympic motto to be: "The most important thing in the Olympic Games is not to win but to take part."

The Olympics caused more practical problems by trying to ban professionals. The road to purity is paved with hypocrisy. De Coubertin was a Frenchman, but he was an Anglophile, imbued with the spirit of English aristocratic sport. He made pilgrimages to Rugby and Eton, rather than Olympia. More to the point, he needed British support if ever he was to re-create the games. So de Coubertin went along with the professed English amateur ideal, even though it was, in fact, only some sanctimonious cant that the upper classes employed to keep the poor folk from being able to compete fairly with the gentry.

In few other disciplines has it ever been suggested that performers are somehow less sullied for failing to profit by their talent. Yet the idea of the struggling artist persists with sport, and it remains "Olympian" in the public mind even as the Olympics are finally returning to the way they really were, with payment allowed for the athletes. In Greece Olympic winners were richly rewarded and presented with everything from cash

1868
World's first organized bicycle race held in Paris.

1873
With origins in European and Asian paddle games, badminton is named in England for the estate of the Duke of Beaufort.

1875
Matthew Webb becomes first person to swim the English Channel.

1877
First lawn-tennis championship at Wimbledon.

1882
Bare-knuckle boxer John L. Sullivan wins American heavyweight title.

1891
Modern basketball invented at a Massachusetts YMCA.

1893
Competition diving begins in Great Britain.

1896
Olympic Games revived in Athens.

1903
First Tour de France cycling race.

1903
First modern World Series of baseball. Boston's Pilgrims 5, Pittsburgh 3.

1911
First Indianapolis 500, averaged 74.59 mph.

1922
Johnny Weissmuller (U.S.) becomes first to swim 100 meters in under one minute.

1924
France hosts the first Winter Olympic Games at Chamonix.

BRIDGEMAN ART LIBRARY

British private schools such as Rugby became seedbeds of team sports in the 19th century.

on the barrelhead to tax exemptions and draft deferments. Moreover, while the competitors were obliged to swear to Zeus that they would play fair, the manic press for victory was such that this sacred oath was more often honored in a breach that would do the National Hockey League proud.

It is all terribly romantic to believe that just playing for fun without caring about victory is the goal of sport, but that's rather like the old troubadours suggesting that true love appears only without lust. The reality is that, at all times, sport at the highest level has been desperately fought by those who are the best at it and who are compensated for their effort. Forever inherent to play have also been gambling and cheating and ungrateful fans, booing, and all the other unattractive flaws and foibles of humankind—how well I recall a sign in the *Sports Illustrated* art department that read: LIFE IS A MICROCOSM OF SPORT—and we can never return to those good old days of pure fun and games because there just never were any. Ever. Anywhere.

Indeed, I would suggest that the obsessive attempt to force the Olympics to be an unnatural athletic beast encouraged the kind of cynicism and hypocrisy that allowed more honestly professional competitions to advance in popularity and prosper. Certainly the Olympics have grown throughout this century, and they have come to constitute the greatest *festival* in the world today, but ironically—and however much the games mean to the competitors—the Olympics, I believe, have meant little to the advance of sport itself. Original modern events, such as the World Cup, the American World Series and Super Bowl, and various European and Asian team championships have superseded the Olympics in passion, as truly *pure* competitions. As sport, it is the Olympics that have ended up more sideshow; the most important Olympic competition now is between cities fighting to host future games.

Primitive sport emphasized *mano a mano*, and while various ball games—with hands, feet, or sticks—do date from antiquity, they were viewed less heroically in the classical world. In more than a millennium's worth of ancient Olympics, the Greeks never included any ball games on the program, dismissing them, literally, as child's play. The Romans set aside space for ball-playing next to their public baths but constructed gargantuan arenas for chariot races and gladiatorial duels. In medieval times, when martial games were especially prized, several British monarchs periodically banned all football in England, lest it divert the yeomen from practicing with their bows and arrows. (Still, say what you will, the three best sports stories of all time may yet be Odysseus's marksmanship with a bow, winning his love, Penelope; William Tell's marksmanship with a bow, saving his son; and Robin Hood's marksmanship with a bow, showing up the bad guys.)

The prejudice against ball games persisted into modern times. Even as his predatory neighbors rode to the hounds, Thomas Jefferson

1930
Bobby Jones wins the only Grand Slam in the history of golf: the U.S. and British Opens and the U.S. and British Amateurs. Later creates the Masters at a golf course of his own design in Augusta, Georgia.

1930
Uruguay defeats Argentina in soccer's first World Cup.

1954
British runner Roger Bannister breaks the four-minute mile.

1967
Green Bay Packers beat the Kansas City Chiefs in the first Super Bowl.

1968
Dick Fosbury revolutionizes high jumping with his Fosbury Flop.

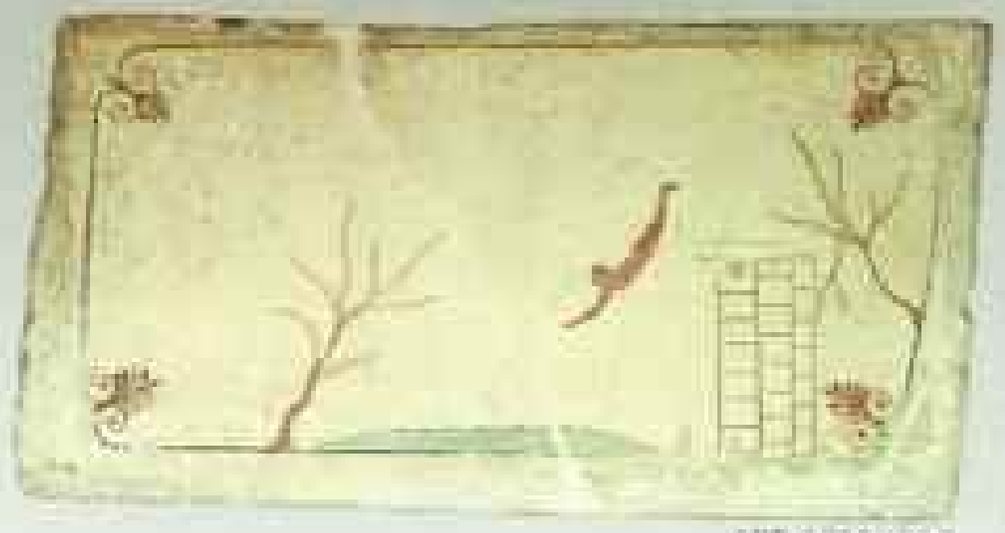
1972
Swimmer Mark Spitz (U.S.) wins a record seven gold medals at the Munich Olympics.

1976
Romanian gymnast Nadia Comaneci scores seven perfect 10s at the Montreal Olympics.

1991
Soviet pole-vaulter Sergei Bubka becomes first to clear 20 feet.

1996
Centennial of the modern Olympic Games celebrated in Atlanta.

snorted: "Games played with the ball . . . are too violent for the body and stamp no character on the mind." Yet with the growth of the industrial/urban world in the 19th century, it was the various British ball games, the art of team play, that caught on and captivated the rest of the world. Especially, too, as our culture grew more heterogeneous, the town team bound us all, and, more than symbolically, the ball connected the different players. For all the fuss made over the Olympics as a grand production, the 20th century does not, at the last, end up Olympian. Instead, our time is more the triumph, in play, of the team and the ball over the individual and his body.



ART RESOURCE

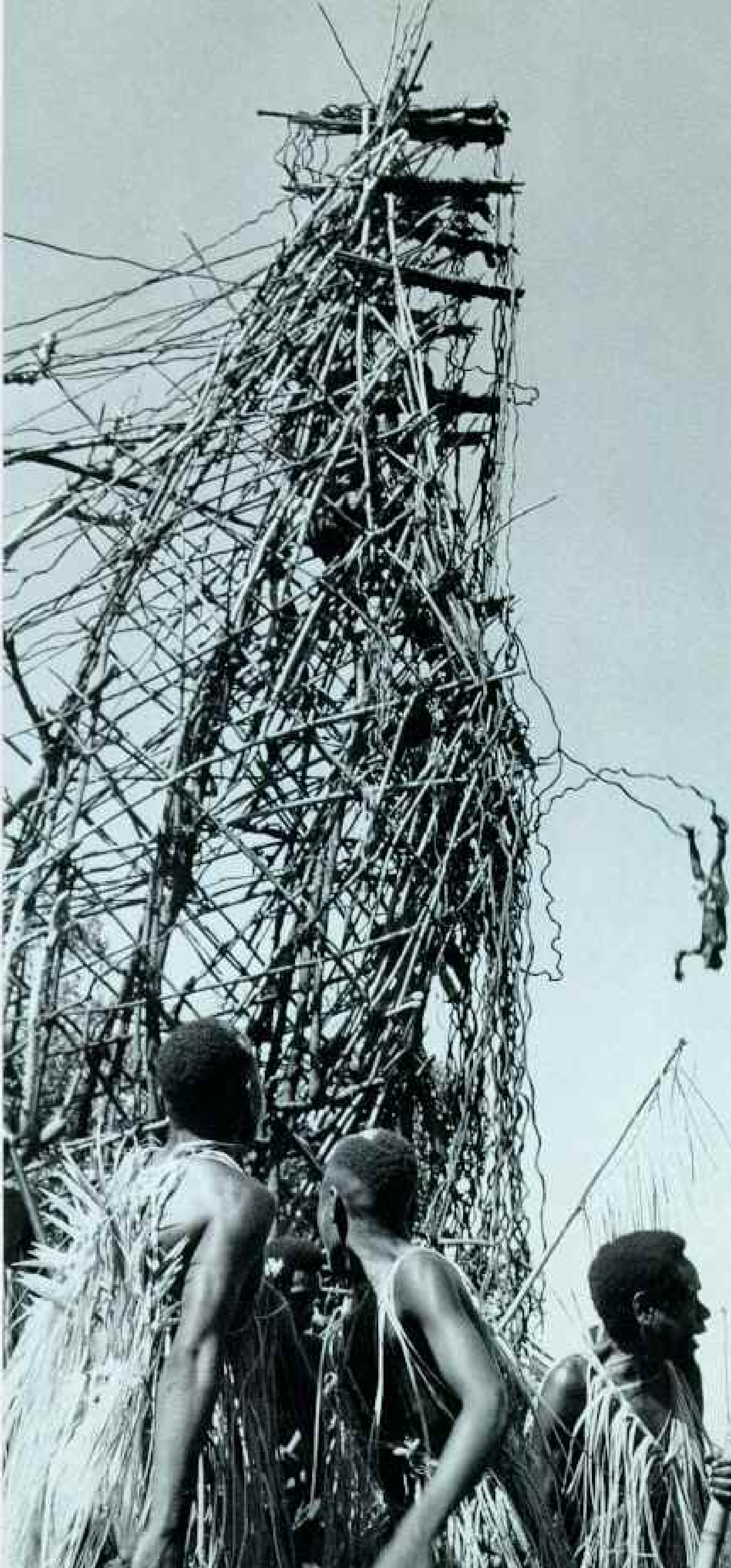
On a tomb painting from the fifth century B.C., a Greek athlete dives from this world to the next.

Notwithstanding this change in sporting taste, the larger question is whether sport will ever be accepted as something more than a popular, but vulgar, cultural cousin. There are, I believe, two good and obvious reasons why the coming millennium presages change. First of all, the next century will be the first ever when females will enjoy a reasonably coordinate position in athletics with males. Inevitably women have been the cheerleaders more than the fans, the prizes more than the players. The Greeks did present the Heraean Games at Olympia for females, but key to them were the accompanying fertility rites. For the modern Olympics, only grudgingly did de Coubertin allow female participation. One could argue yet, I think, that the most important woman ever involved with the Olympic movement was the controversial German filmmaker Leni Riefenstahl, whose epic work, *Olympia*, primarily celebrated the male body. For so long as sport was assumed to be largely masculine, it could not claim the universality of other human endeavors.

Certainly it is instructive that while the Greek influence continued on in so many areas—in art, philosophy, drama—sport was unable to travel with the same esteem down through time. Yet this accustomed dismissal of sport may have much to do with the simple fact that even the most brilliant and beautiful sporting achievement is transitory. The statue of the discus thrower remains, revered, but the performance of the man who actually threw the discus is lost. That of art which is most prized is that which has been saved—can be saved—whether it is the written word, the constructed edifice, the painting, the sculpture, the recorded song.

Now that we possess the technology to retain glorious athletic performance on film, sport should, logically, gain in stature with the other preserved arts. It is especially revealing that the sport of basketball has ascended so in popularity largely for reasons of the aesthetic. Basketball has sold itself as a visual art far more than any other sport, and with the new century ahead it is poised to replace soccer as prime upon the globe and to supplant the Greeks' own track-and-field as the premier Olympic game. The appreciation of sport is everywhere expanding, its greater value accepted; the play activity—the play instinct—that has been forever with us should henceforth enjoy a more acclaimed status. That seems only fair play.

* * *



Plunging from a 65-foot tower, a Melanesian proves his manhood in the early 1950s. Bungee jumping, the westernized version of this South Pacific rite, appeared in 1979 when members of the Oxford University Dangerous Sports Club leaped from a bridge in Bristol.

ROGER BELLINGER

GAMES FROM LIFE

Many sports are outgrowths of daily tasks. In the Basque region of Spain and France the chore of clearing rocks from farmland led to stone-lifting competitions called *harrijasotzaileak*. Hoisting a 350-pound boulder, champion lifter Goenatxo II – a furniture mover by trade – rises to the challenge of the time-honored test of strength.

LYNN JOHNSON

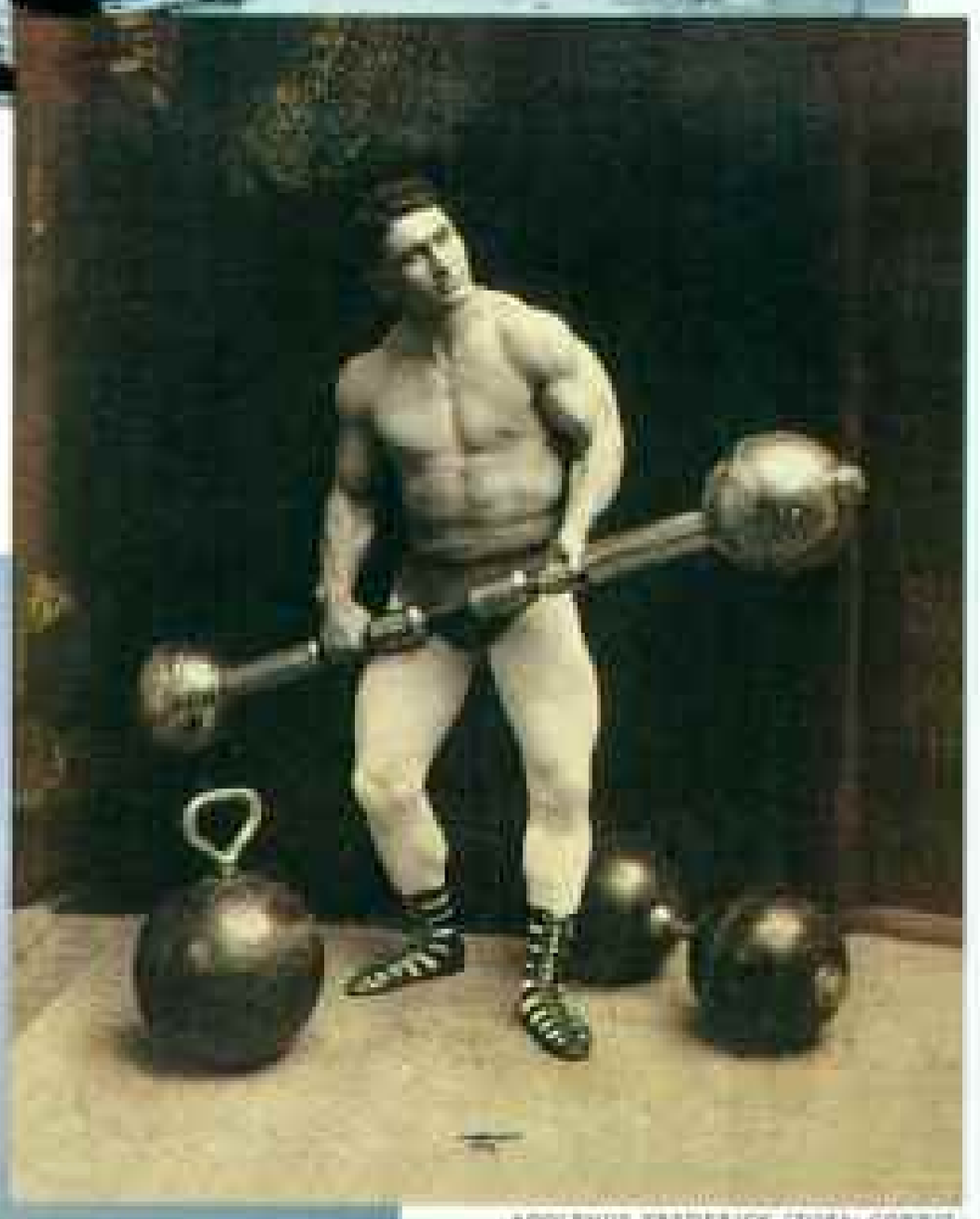
THE PERFORMANCE

DIVING "Fancy diving" evolved in the 19th century when gymnasts in Europe began performing aerial acrobatics over water. Exhibitions early in this century were staged at harbors, lakes, and other ad hoc venues.

HIGH JUMP A champion jumper goes heels over heads for visitors to Rwanda in 1907. Innovative jumping styles—such as the so-called Fosbury Flop—have raised the Olympic record 22 1/8 inches since 1896.

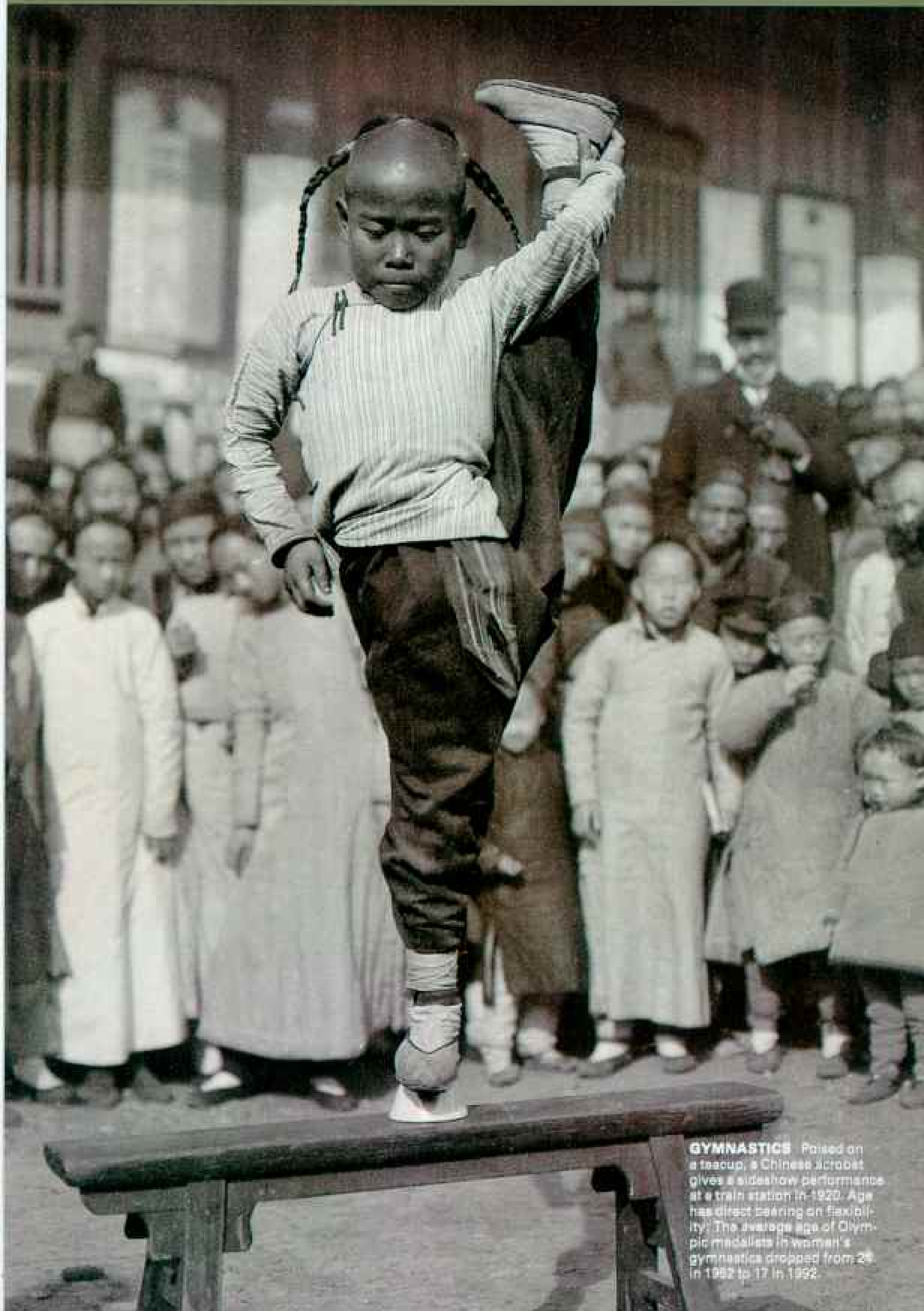
POLE VAULT A Dutch farmer stays high and dry by vaulting a canal. Devised as a means of crossing boggy terrain, vaulting was part of Ireland's ancient Tailteann Games but absent from the ancient Olympics.

WEIGHT LIFTING Italian muscleman Clevio Sabatino was one of an early breed of bodybuilders who flaunted their physiques on stage and in circus acts. Gaining respect, weight lifting was an event at the first modern Olympics.



ADOLPHUS FREDERICK (TOP); CORBIS-BETTMANN ARCHIVE (CENTER); JAN AND TERRY TODD COLLECTION (ABOVE); JOSÉ AZEL (LEFT); GUY MANGEL, JR. (RIGHT)

It ain't braggin' if you can do it. DIZZY DEAN



GYMNASTICS Poised on a teacup, a Chinese acrobat gives a sideshow performance at a train station in 1920. Age has direct bearing on flexibility: The average age of Olympic medalists in women's gymnastics dropped from 24 in 1952 to 17 in 1992.

Pain precedes glory for aspiring gymnasts at the Krylatskoye Sports Complex in Moscow. With generous state funding and an emphasis on talent identification, the former Soviet Union dominated international competition, claiming 83 gold medals over the course of 10 Olympics.

LYNN JOHNSON

THE GAME

TUG-OF-WAR Tribesmen in the Philippines strain at tug-of-war, introduced by Americans early this century as a substitute for head-hunting. The sport was an Olympic event between 1900 and 1920.

TENNIS Blending ballet and bravado, French prodigy Suzanne Lenglen helped turn a garden-party game into a major sport. Her short dresses caused a sensation, here at the 1920 Antwerp Olympics.

FIELD HOCKEY Played mostly by women in the U.S. – like these college competitors in 1905 – the Olympic sport of field hockey is one of the oldest stick and ball games. Early versions were played in Egypt, Greece, and Persia.

CLOCKWISE FROM TOP: INTERNATIONAL OLYMPIC COMMITTEE; PETER BESICK; UPI; CORBIS-BETTMANN; ROBERT J. SMITH; BLACK STAR; WELLESLEY COLLEGE ARCHIVES; DEAN C. WORCESTER

I keep both eyes on my man. The basket hasn't moved on me yet. JULIUS ERVING

BASKETBALL In 1891 James Naismith nailed up two peach baskets at a YMCA in Springfield, Massachusetts, and basketball was born.

SHUTTLECOCK Students in Beijing kick up their heels during a game of shuttlecock. Any part of the body may be used – except the hands and arms.

HORSE PUSHBALL Guests at an Arizona ranch in 1955 enjoyed this equestrian game centered around a jumbo ball made from a weather balloon.

Brotherly love turns competitive on a pelota court in the Spanish Basque country, where ball courts often share a wall with the village church. The sport's ecclesiastical connection is centuries old: An early version so enamored medieval monks that authorities banned it, citing neglect of priestly duties.

LYNN JOHNSON

THE FIGHT

A perfect combination of

WRESTLING Mongolians in the late 1920s compete in one of the world's oldest sports. Many ethnic styles endure: *yagli* in Turkey, *schwingen* in Switzerland, and *sumo* in Japan.

ARCHERY Once a survival skill for warriors and hunters—such as these Hopi stalking game in 1926—archery was also practiced early on as a sport in Egypt, India, Greece, and the Orient.

CLOCKWISE FROM TOP: KNUD EDBERSON; JAN AND TERRY TODD COLLECTION; WESTSIDE FENCING CENTER COLLECTION; LYNN JOHNSON; NATIONAL RIFLE ASSOCIATION; FRANKLIN PRICE KNOTT

violent action taking place in an atmosphere of total tranquillity. BILLIE JEAN KING

BOXING Winner of 63 pro fights—49 by knockout—Joe Louis reigned as world heavyweight champ for nearly 12 years starting in 1937. Evidence of boxing dates back 6,000 years.

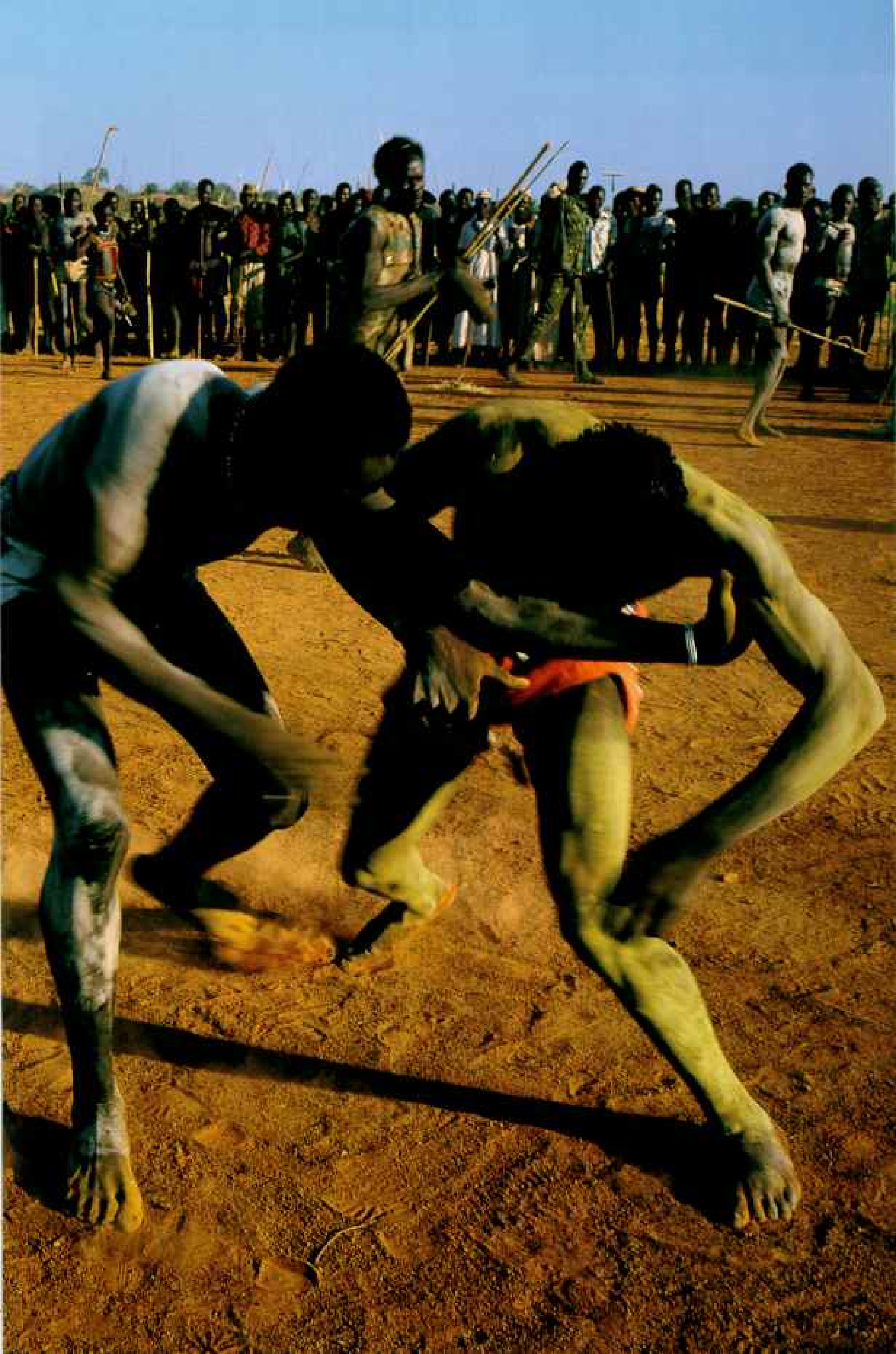
FENCING Swordplay as a performing art came into vogue—along with classical ballet—among Renaissance European aristocrats. This 1939 tournament took place in Monte Carlo.

SHOOTING Supine has long been a favorite position for marksmen aiming for steady shots. Sharpshooters competing at the 1900 Olympics in Paris used live pigeons for targets.

MOUNTAIN BIKING Armed with off-road bikes, Swiss troops train for war. The mountain biking boom began in California during the 1970s. This year it becomes an Olympic sport.

With the honor of their villages at stake, Nube wrestlers scramble to topple each other at an intertribal competition in central Sudan. Dancing, feasting, and home-brewed beer turn such contests into carnivals—though Sudan's civil war now endangers this ancient tradition.

DAVID STEWART-SMITH, KATZ PICTURES



MYSTIC SEAPORT MUSEUM

CANOEING Rough waters test men of the Dedham Canoe Club in Massachusetts. Such clubs proliferated late last century after John MacGregor, founder of England's Royal Canoe Club, turned this age-old mode of transport into a popular sport.

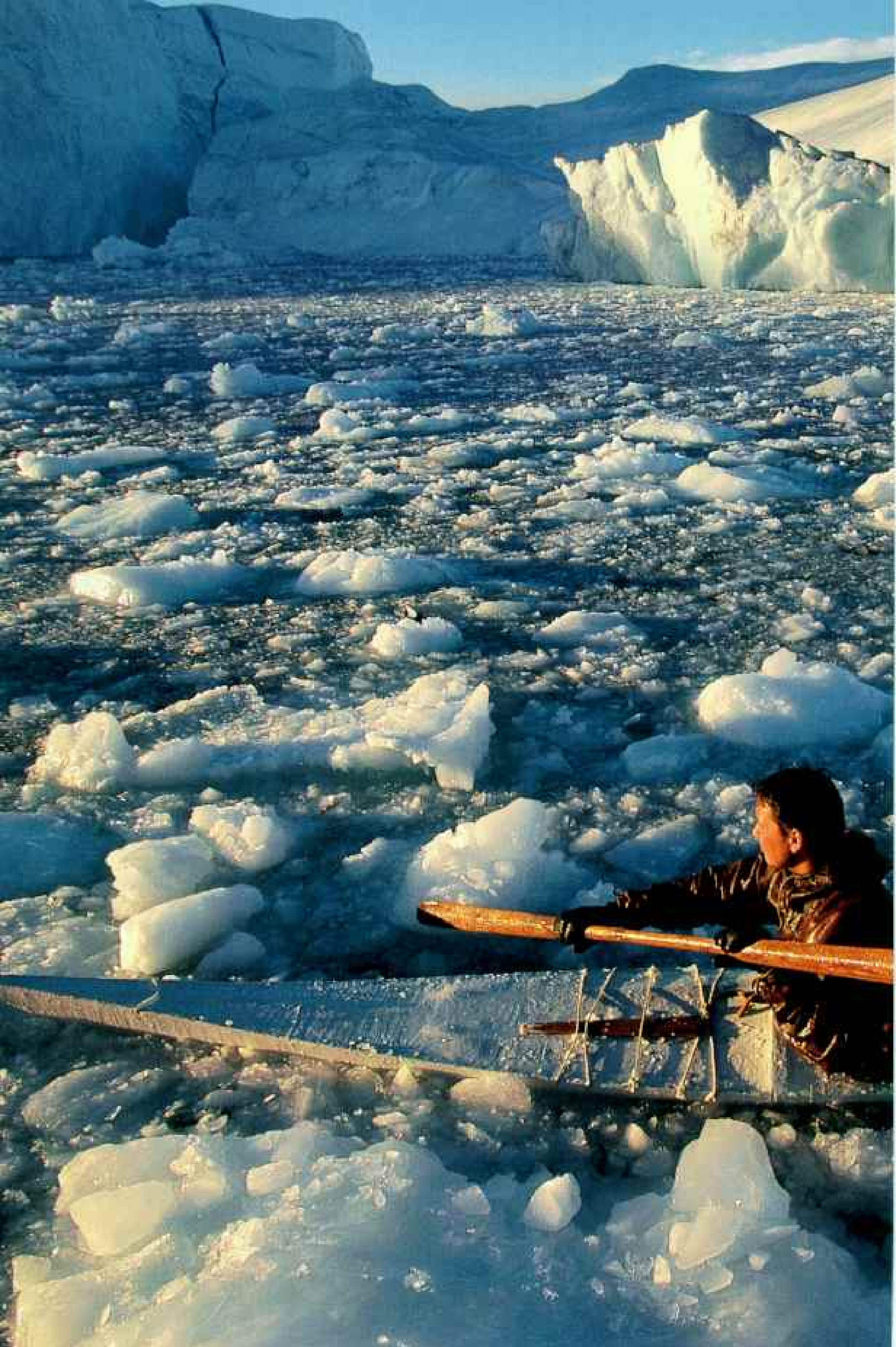
FREESE SPORTS (LEFT); DAVID MYERS AND ANDREW SACKS, TONY STONE IMAGES

CYCLING Racing bikes have come a long way since Robert Jacquinot, here refueling at a café, competed in an early Tour de France. Using a Michigan wind tunnel, scientists strive to build the world's fastest bike for the U.S. Olympic cycling team.

SWIMMING American swimmers gained worldwide fame during the 1920s. Gertrude Ederle—greased for protection against cold water—in 1926 became the first woman to swim the English Channel. Star of early Tarzan movies, Johnny Weissmuller won five Olympic gold medals and set 67 world records—all before his 26th birthday.

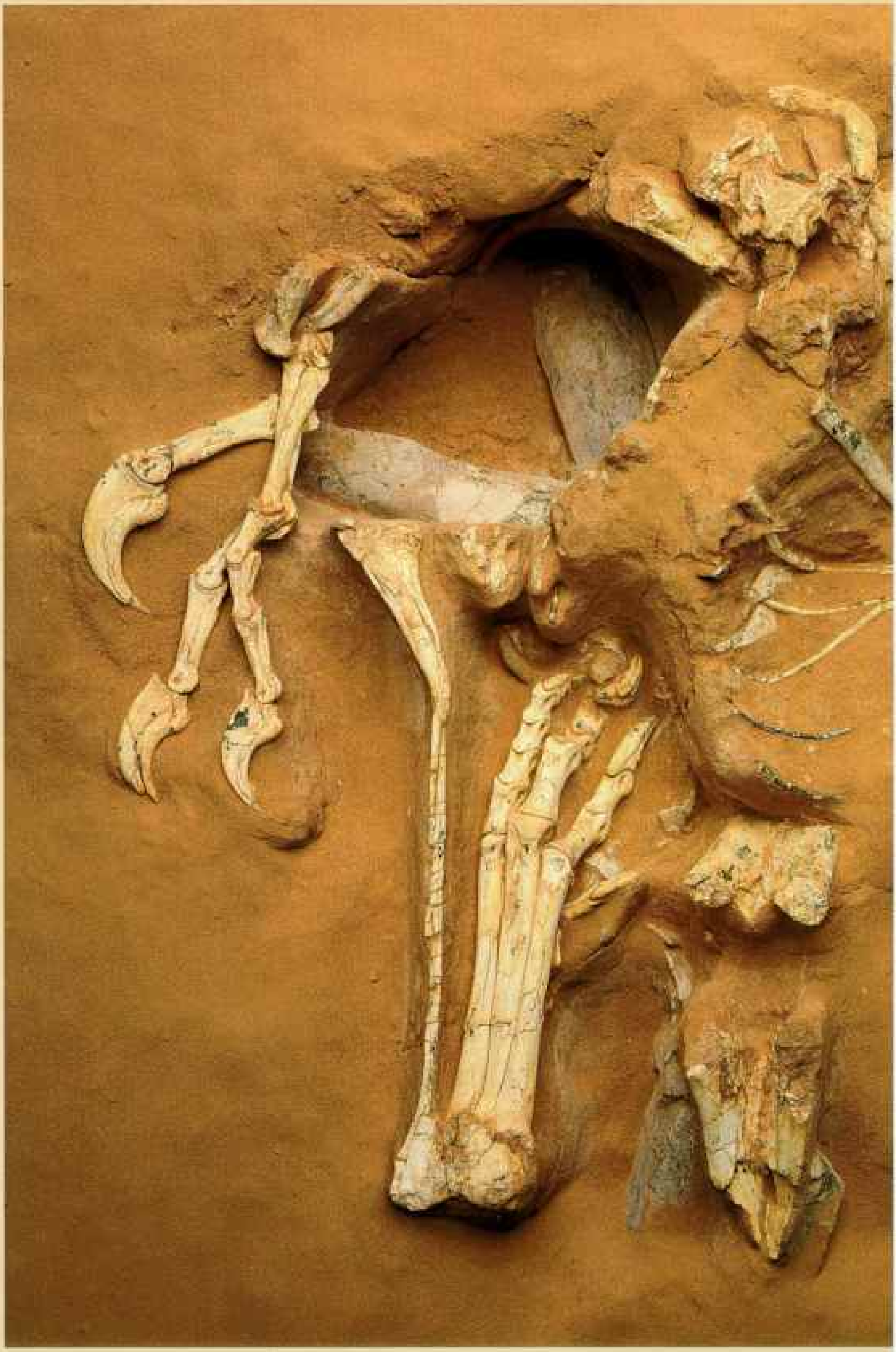
INTERNATIONAL SWIMMING HALL OF FAME; ACME NEWSPICTURES (BELOW)

STEEPLECHASE As if taking wing, horses "clear the sticks" during a 1936 hurdle race in Australia. Moments later the lead horse lost its rider. Jockeys in the ancient Olympics rode bareback and naked.



Wedging through ice off Greenland, the sea kayak was once the workhorse of Inuit hunters but now is used mainly for recreation. Such is the wellspring of sport: the human impulse to turn work, warfare—indeed, all of life—into games.

JOSÉ AZEL



Imagine *Oviraptor,* a beaked dinosaur that resembles an ostrich with a tail, returning to its nest and feeding its young (right) just like a mother bird. That's what scientists picture after the spectacular find in Mongolia of the remains of a nesting dinosaur (left). "It is the first proof that dinosaurs exhibited parental care," says Mark Norell, paleontologist with the American Museum of Natural History and discoverer of the nest.

Nicknamed Big Mama and currently on view at the museum in New York City, the eight-foot-long animal died with its forelimbs wrapped around at least 20 eggs and its legs tucked beneath its body. An egg from another nest held bones of the first known oviraptor embryo (above, at bottom). Inside the nest lay the skull of a young dromaeosaur (above, at top), possibly a baby *Oviraptor's* first meal.

DINOSAURS OF THE GOBI

UNEARTHING A FOSSIL TROVE

BY DONOVAN WEBSTER
PHOTOGRAPHS BY LOUIE PSIHOYOS
ART BY JOHN SIBBICK

NEWLY DISCOVERED TERRAN MAMMAL, 9 INCHES

At the edge of the sandstorm, the cargo truck belches smoke and shudders to a stop, its engine stilled by a *chunka-chunka* that signals snapped piston rods. Coming in from the west, the storm bears down on us. A gray-brown wall of Gobi desert grit, it towers a mile in the air, racing toward us at 50 miles an hour.

Our 28-member expedition is in Mongolia to search for fossils. Having spent the past week driving 500 miles across a trackless desert toward our dig site, we have been knocked to a halt more than a dozen times by a string of flat tires and mechanical problems. And now there's this airborne sandpaper. As we inspect the engine, the grit claws our faces. Yet even inside the sandstorm's sting, the work is slow for a different reason: Everyone is watching our Mongolian drivers.

Will they remove their clothes?

Mongolians, it is said, enjoy nothing more than standing naked in howling sandstorms. They claim the flying sand adds vitality and strength to anyone hardy enough to withstand the pain. Some even believe the tradition comes from Genghis Khan, Mongolia's 13th-century king and the conqueror of Asia. Genghis and his warriors, the legend goes, gained invincibility by taking sandstorm baths and drinking the blood of their horses as they crossed the waterless Gobi. Together, Mongolia's famously strong steeds and airborne soil are said to have given Genghis's armies the strength to overwhelm the largest continent on earth.

It is now—about an hour from our base camp with night coming fast—that our expedition co-leader Michael Novacek, provost of the American Museum of Natural History in New York City, begins to grin. After it's decided the truck will be abandoned overnight and a party will be sent to the nearest town tomorrow to scavenge for parts, several team members—including our other co-leader, Mark Norell, our Mongolian drivers, and me—strip to our waists to test the Mongolian ardor for flying sand. Novacek starts to belly laugh. As the next wave of sand slams us (and I turn rotisserie style to distribute its pain), I hear a voice riding high on the gale. "Gobi Expedition '95," Novacek's saying. "Oh yeah. Feel the magic."

DINOSAUR DISCOVERIES

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

We are traveling through a 500,000-square-mile wasteland the size of five Wyomings. We're 12 people fewer than the most famous exploration of the Gobi in modern history: the 1922 to 1930 peregrinations of Roy Chapman Andrews, also of the American Museum, the first Western scientist to study this part of the world. Yet our expedition's size—and the expense of transporting us to one of the least populated spots on earth—is a well-spent gamble, since Novacek, Norell, and their host and colleague, Demberelyn Dashzeveg of the Mongolian Academy of Sciences, know the address of one of the best fossil sites ever found.

Accidentally discovered in July 1993 by Dashzeveg, Novacek, Norell, paleontologist Jim Clark, and several

Trailing clouds of dust and glory, a caravan of scientists pushes across Mongolia's Gobi desert. In the sun-scorched hills of Ukhaa Tolgod, where sand blows mercilessly (upper left), U.S. and Mongolian researchers have found one of the world's richest dinosaur fossil beds. Huge sandstorms apparently suffocated and then entombed scores of animals gathered at an oasis, from birdlike dinosaurs to early mammals (title page), many preserved in their death throes. From their remains, experts begin to envision life 80 million years ago.


RUSSIA
MONGOLIA
Beijing*
CHINA
Lake Baikal
RUSSIA
Lena
MONGOLIA
Ulaanbaatar
ALTAY MOUNTAINS
Tatal Gol
Mongolian Plateau
Khaboor
Toqrogeen Shireh
Khara Khutuul
Expeditions of Mongolian Academy-American Museum: 1990-95
Expeditions of Roy Chapman Andrews: 1922, 1923, 1925
Khermeen Tsav
Khulsan
Flaming Cliffs
Ukhaa Tolgod
Fossil site
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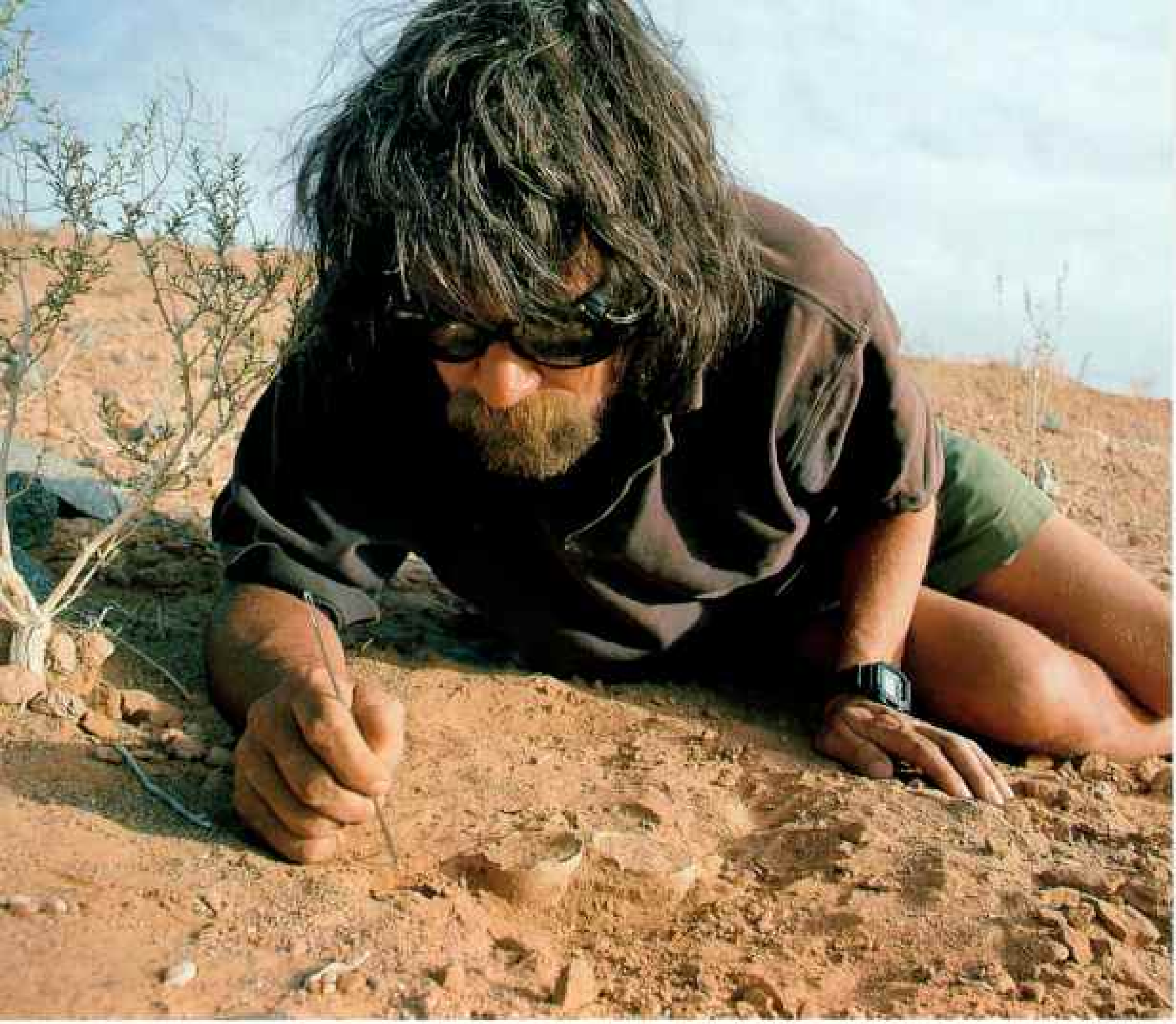
Beijing



AMERICAN MUSEUM OF NATURAL HISTORY

With surgical tenderness Mark Norell investigates a nest of prehistoric eggs at Ukhaa Tolgod. "This place is so rich we have to be choosy," says Norell, who concentrated on this nest when he saw bones belonging to a member of the dromaeosaur group, two-legged carnivores such as *Velociraptor.* Seventy years earlier American Museum scientist Roy Chapman Andrews (left, with revolver) dropped to his knees when he spied eggs "the shape of a loaf of French bread." His epic Gobi expeditions produced the first known nest of dinosaur eggs.

colleagues, the site—called Ukhaa Tolgod—is a basin that extends five miles, ringed by a series of auburn spires. The place is home to the seemingly impossible: eroded cliffs peppered with complete skeletons of 80-million-year-old dinosaurs, mammals, and lizards from the late Cretaceous period.

"The late Cretaceous was when mammals, dinosaurs, and birds were evolving together," Novacek says. "So the richness of this place may help us learn more about connections between animal families. For me, that's what truly enlivens Cretaceous fossils. Seeing common ancestors, identifying shared skeletal features of different species at their roots, that's exciting. It helps us trace the origins of modern life."

Novacek isn't alone. Ukhaa's secrets seem to spark the imagination of the rest of the world too. The first time Ukhaa made news was in 1993, when Norell stumbled across a fossil embryo of the oviraptor group, carnivorous, ostrich-like dinosaurs that walked on their hind legs and had curved claws, beaks, and crests on their skulls. The fossil was still cloaked in bits of shattered eggshell.

The 1993 expedition also extracted the fossil specimen of a mature eight-foot-long *Oviraptor* that had been buried while sitting on a nest full of eggs. It demonstrates that dinosaurs had parenting behaviors like birds, which care for their young.

Novacek and his colleagues have also discovered hundreds of perfectly preserved skulls and skeletons of lizards and tiny mammals.

"We don't know why all these species chose this one locality," Novacek says. "We think it was a breeding and nesting ground at the edge of a spring or marsh.

"All we know is that late Cretaceous species lived and bred here in great profusion; then they were buried quickly by sandstorms or collapsing dunes. Sometimes, in the way their skeletons are oriented—forelimbs out and pushing—we see evidence they may have struggled against the sand as they died, like skiers covered by avalanches."

IT'S SUNRISE, the day after the sandstorm, and we're camped on a wide promontory overlooking a broad dry-wash basin. The 6,800-foot peaks of the Gilvent Uul range stand purple in the morning light.

We're the only human presence visible on this desert expanse, and we resemble a small city. Twenty-two yellow dome tents barnacle the pebbled sand. Canvas safari chairs and stacks of aluminum food lockers encircle a woodstove kitchen.

"Let's go, everybody," Novacek keeps announcing. "Let's move out."

We heft our rucksacks and spread across the dry wash in groups of two or three as we begin the mile walk toward the twin peaks we call the camel's humps. After 20 minutes we arrive at a natural amphitheater that is far larger than it appeared from our campsite. Its floor is spread with house-size rills that abut tall cliffs of red sandstone.

I follow Luis Chiappe, an Argentine paleornithologist from the museum, up the cliff walls. Eighty feet above the desert floor he moves slowly along a steep pitch, searching the loose sandstone for clues.

"You want to find little fragments of white, little bits of bone," he says. "Then you follow that crumbled bone uphill—and often you will get a fossil specimen."

A former editor of *Outside* magazine, DONOVAN WEBSTER says the Gobi assignment was his "second longest camping trip." This article is the third that LOUIE PSIHOYOS has photographed for our dinosaur series. To learn how JOHN SIBBICK created his paintings, log on to National Geographic Online (http://www.nationalgeographic.com on the World Wide Web or GO NATIONAL GEOGRAPHIC on CompuServe).

The amphitheater begins to echo with voices. "Got something here," somebody shouts. "Over here too," someone else yells.

"Here's one," comes a voice from the opposite side. It's Norell. "Looks like *Oviraptor*. Specimen seems to go into the hillside."

In three or four minutes of searching it's obvious a new layer of fossils has been exposed by eroding winds, snows, and rains during the past year—and it holds dozens, if not hundreds, of new fossil finds.

On the cliffside Chiappe and I move forward, a measured step at a time. Chiappe points toward the ground. "Here's a piece of bone," he says. "It probably slid down the hill."

He looks up the slope, takes an uphill step—and there it is. Like a crumbly white shelf, the pale line of a fossil skeleton sticks out from the eroded hillside.

Chiappe unzips his rucksack and extracts a soft-bristled brush and a vial of glue with an eyedropper top. He brushes the fossil, then drops little beads of glue across the bone. "We do this so the specimen won't disintegrate," he says. He extracts a steel dental tool and begins to pick away the sandstone.

Fifteen minutes later Chiappe has exposed the forelimbs and spinal column of an immature, six-foot-long *Oviraptor*. "It's a well-articulated specimen," Chiappe says, smiling. "That means its bones and joints are still arranged as they were in life, and they appear to be complete."

Chiappe marks the fossil's location with a strip of toilet paper and moves on. We spot another exposed fossil a few yards ahead—and another and another. We mark each location before descending to the desert floor.

All around us I hear shouts of other discoveries. Within an hour we've found 30 fossils, including whole skeletons of ten *Oviraptor* and a number of rabbit-size mammals.

"This place is ridiculously easy," Novacek says, shrugging. "Paleontology isn't like this anywhere else on earth. Most of our colleagues—who are fine paleontologists—collect only a few teeth or partial jaws in a lifetime. They have to make reconstructions from spare parts. Here, because sandstorms buried the animals quickly, the specimens are usually complete. It's almost unfair."

As the new fossil locations are being noted and marked in the morning's growing glare, Novacek hums a snatch of the song "Isn't It Romantic?" then breaks into another grin. He turns in a circle, taking in the dry wash and the loop of red stone walls, which are now festooned with white strips of toilet paper.

"Something terrible happened to these poor animals," Novacek says. "Which is very good for us. We thrive on carnage."

A HUNDRED YEARS AGO, no one considered Mongolia the center of the fossil world. Back then the skeletons being unearthed in the arid American West were what held paleontologists' thrall. That changed, however, in 1922, the year Roy Chapman Andrews and his fleet of Dodge motorcars rolled into the Gobi.

A prototype for Indiana Jones who dressed in jodhpurs and a felt hat, Andrews hadn't gone to Asia for dinosaurs. Instead he hoped to find the fossil origins of humans, a goal he never achieved. His findings, which he chronicled in the remarkable book *The New Conquest of Central Asia* and in the June 1933 issue of NATIONAL GEOGRAPHIC, included discovery of the first *Oviraptor* (Latin for "egg stealer," because it was discovered on top of a nest of eggs) and the first complete skull of a hog-size species with an elaborate head shield and parrot beak named *Protoceratops andrewsi*.

Andrews considered the discovery of mammal fossils one of his greatest achievements. The Gobi fossil beds are still the only places where skulls of mammals of the late Cretaceous period are commonly found.

Writing of bandits, two-hump Bactrian camels, herdsmen wearing black knee-length tunics called *dels*, snakes, sandstorms, and the mythical sand serpent *Allergorbai horbai* (whose mention sets our 1990s drivers into panic), Andrews documented the Gobi's otherworldliness in language both florid and descriptive. Calling it "studded with giant buttes like strange beasts" and having cliffs like "medieval castles with spires and turrets, brick red in the evening sun," he mixed gaudy metaphor and broad-brush science to push field-based paleontology forward with a single lurch.

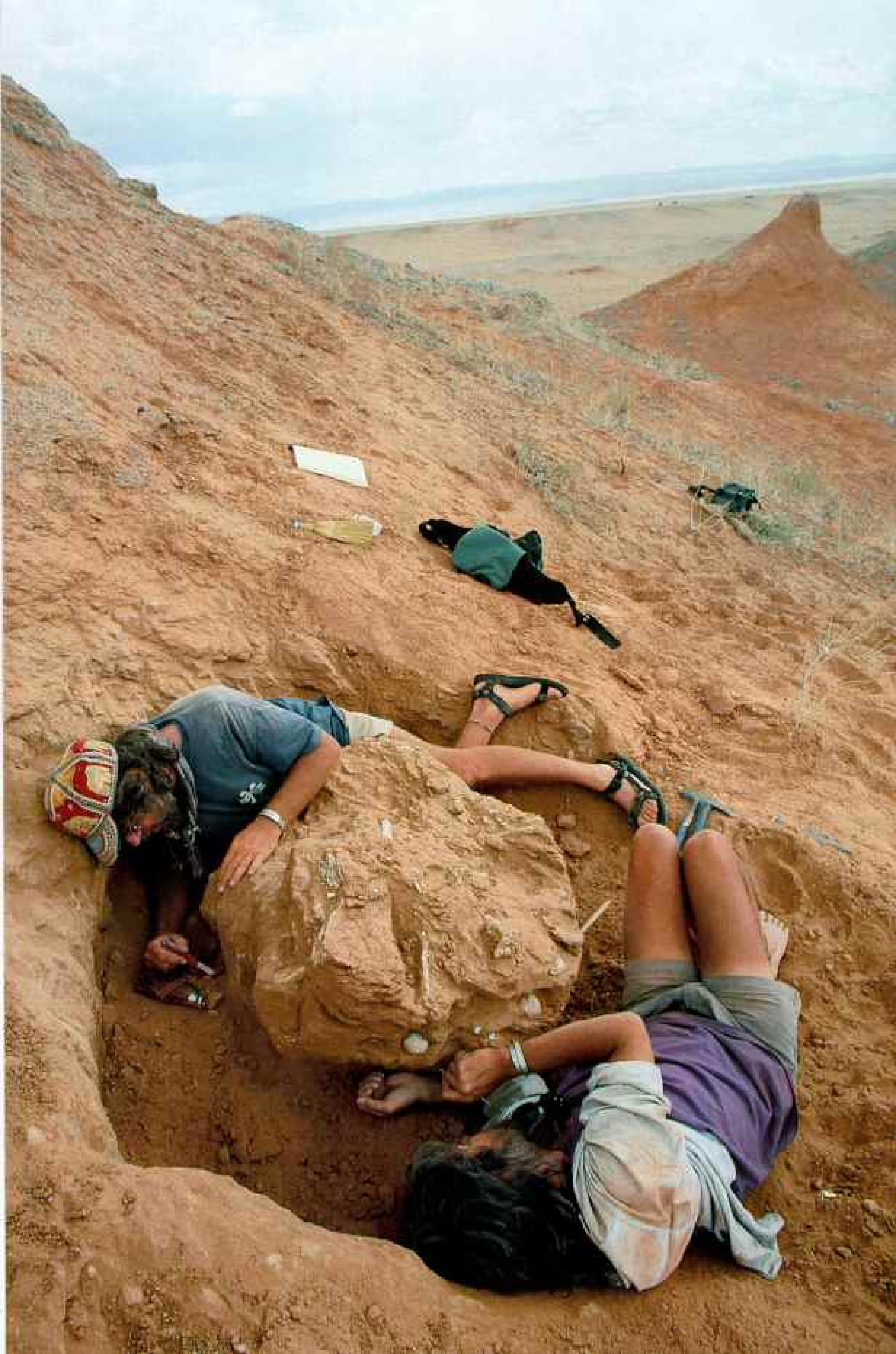
Frustrated by communist political pressures, Andrews ended his Gobi explorations in 1930. In the next six decades paleontologists from the Soviet Union and Poland

pushed deeper into the Gobi, regularly coming out with astonishing results.

Most notable, and now on display at the Mongolian Museum of Natural History in Ulaanbaatar, is a find known as the fighting dinosaurs. Excavated in 1971 by a joint Polish-Mongolian expedition about 80 miles north of Ukhaa, the specimen is two complete skeletons of *Velociraptor* and *Protoceratops* locked in mortal combat.

The six-foot-long *Velociraptor*, a smaller version of the two-legged pack hunters from the movie *Jurassic Park*, is bearing down on the hog-size *Protoceratops*. The *Velociraptor* is using its short forelimbs to grasp the *Protoceratops*'s goring snout, while beneath the proto's belly the hooked talons of the raptor's hind

Forget bone chips or jaw fragments: When Norell prospects at the "camel's humps" (top), he expects to find an entire dinosaur skeleton. On the rise behind him scientists found 30 rare skulls of lizards and mammals. On the flats, expedition co-leader Mike Novacek plays groundskeeper (above) to help colleagues search for eggshells and hatchling bones. "Within 15 minutes of arriving," says Novacek, "we knew this place was amazing."



claws prepare to slash its opponent open.

More than 70 million years after death, the combatants' frantic energy seems to kick dust in the air.

IT'S FIVE DAYS after our original search at Ukhaa, and teams have broken up to begin preparing specimens for excavation. Norell and I stroll in a rocky, sun-blasted basin nicknamed Xanadu. It's where Norell—a 37-year-old whose dark sunglasses, rock-star haircut, and full beard suggest an outlaw biker more than the American Museum's associate curator of paleontology—found the *Oviraptor* embryo in 1993. The next year he spotted a circular nest near the spot where he'd found the embryo, but time prevented him from removing the nest.

Now, after ten months of back-burner worry in his cluttered museum lab, he's hoping to see how the snows and winds of the long Mongolian winter have treated it.

As we prospect for fossil eggs, Norell explains the cladistic system of biological taxonomy. Also called phylogenetic systematics, cladistics defines links between living and extinct species by comparing shared physical features that represent evolutionary advances.

German entomologist Willi Hennig, who developed this methodology 40 years ago, exhaustively collated lists of hundreds of anatomical features—such as joint architecture—to create family trees of living and extinct animals. During the past two decades dinosaurs have been added to these trees, linking, for example, the thin-walled bones, hip-joint sockets, and arm, shoulder, and skull features shared by some dinosaurs and modern birds.

"We're using fossil evidence to link different species," Norell says. "But that doesn't mean we understand evolution. When a new fossil comes along and upsets our theories, well, we adapt. That's how we learn."

Norell points to a flattened portion of the hillside. "There's where I found the embryo," he says, his head turning to scan for the nest. "So the specimen should be right about . . . there it is."

Partly covered by a dried, leggy weed, a perfect ring of nine dark orbs rises slightly from the ground. Most of the eggs seem to have been broken open by weathering and are filled with red sand, but some are still buried, making it hard

Down and dirty, Novacek and Norell excise a 600-pound hunk of sandstone containing the bones of a nesting *Oviraptor*. Eggs are visible above Norell's hands. Getting the plaster-encased fossil off the hill (below), says Novacek, "was like moving a grand piano."

to know whether they're intact and might contain embryos, something that won't be seen until the specimen is returned to New York and stripped of its rock casing. Norell drops to his belly, his face only inches above the nest. "This is great," he says as he starts to scrape the soil. "Oh yeah. Look at this, look at this!"

He pauses for a moment and sits up.

"It's a dromaeosaur nest," he says, invoking the dinosaur group that includes *Velociraptor*. "We've got some infant specimens here too. Look." Norell lifts a tiny twig of fossil bone. "That's the proximal end of a femur, a leg bone." He lifts a half-inch-long, v-shaped piece. "Here's the tip of a jaw."

Because he's conversant in skeletal comparisons—layered on a lifetime of studying fossil and contemporary skeletons—Norell can identify what animal the fossils came from, even by the scant evidence these bones provide.

"How do I know it's a dromaeosaur?" he asks, repeating my question. "These little grooved indentations are sites where muscles attached to the bone. These occur in the same place in all dromaeosaurs."

Because some dinosaur evolutionary trees are more fleshed out than others, the museum's team has let some of the more well-known specimens—such as *Protoceratops* and the four-legged, armor-bodied *Ankylosaurus*—go unexamined. Instead the team has collected specimens of Cretaceous mammals, lizards, and theropods. Theropods are a diverse group of dinosaurs that all stem from a three-toed, meat-eating, upright ancestor. They encompass everything from the gigantic *Tyrannosaurus rex* to today's tiniest hummingbirds.

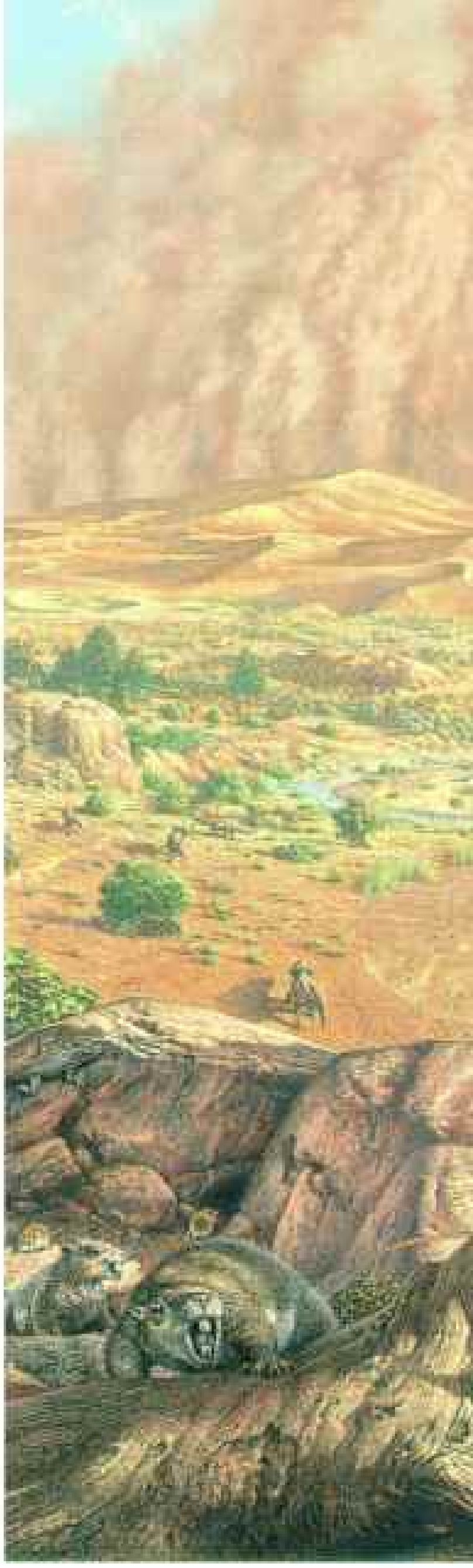
"It's not that we won't pull a perfect proto if we find one and have room on the truck," Norell says, scrunching over the nest, "but we're collecting mammals and theropods first. I'm mostly concerned with theropods, since there's good evidence that they evolved into birds. They have the same wrists as modern birds, many of the same skull structures, and the same eye placement as modern birds."

He scrapes and brushes, scrapes and brushes. Gusts of wind throw sand and dust into his face and hair, but he doesn't seem to notice. He begins to apply the glue.

Finally he sits back up, a huge smile crossing his face. He takes a strip of orange surveyor's tape and marks the spot by knotting the tape to the nearby weed. He reaches into his bag and removes a Rambo-style knife, which he uses to trench around the nest. When a shallow gutter is cut, he gently spreads his fingers across the nest's surface. "We've just transcended the world of dinosaur bones and entered the world of behavior," he says.

He explains: "There's a nice, round configuration to the eggs. This gives clues to nesting behavior. The eggs didn't get this way by accident—the parent arranged them. If we find other nests with this configuration, well, we can begin to believe egg arrangement is a behavior."

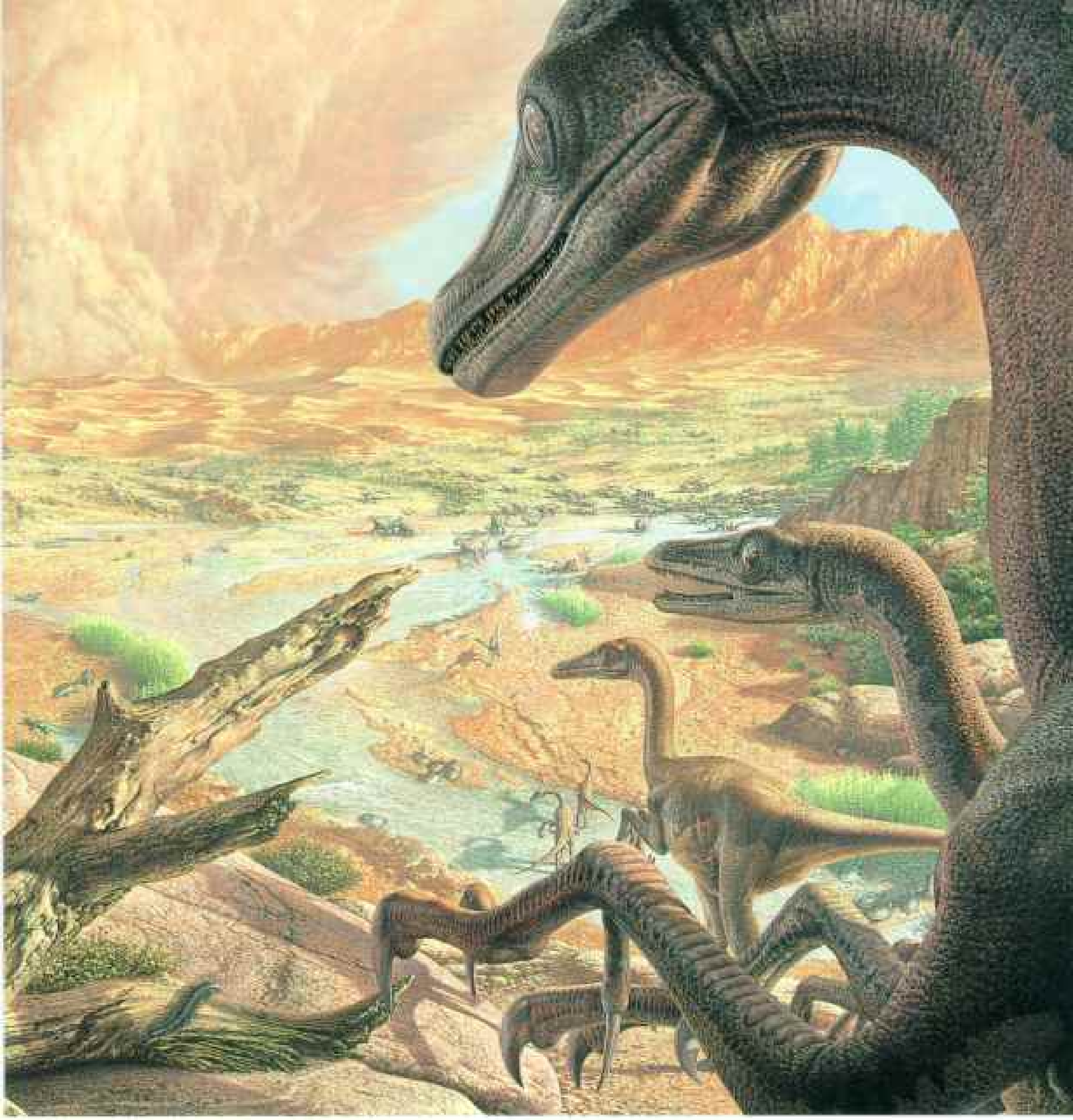
"Some things about dinosaurs we'll never know," he says. "Like what color were they? What sounds did they make? So at times like these, when we find evidence that



might show how they lived, we're ecstatic."

Norell reaches out, caressing the nest like an ancient masterpiece. He chuckles. "You'll be reading about this for years."

TIME AT UKHAA has slowly melted together. Days are blistering hot, and with each new morning the rhythms of modern life are cooked from our memories,



A pack of troodontids freezes as a deadly wall of sand bears down on a crowded oasis. This is how experts imagine the end came for many of the animals whose remains now emerge at Ukhaa Tolgod. On this day in the late Cretaceous, armored ankylosaurs walked the shores, turtles and crocodiles basked, and rodent-like mammals tried to keep out of harm's way.

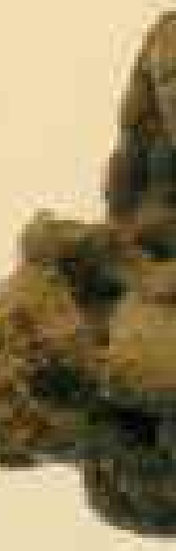
further blanketed by an all-consuming fascination with things Cretaceous. Within weeks wristwatch-based timekeeping has been erased. In its place is a daily succession of gritty work stratified by zones of rising heat.

We wake around seven, with the sky purple and the high-desert air at 40°F. By 3 p.m., after eating lunches of canned tuna and saltines, washed down with sun-hot canteen water, the temperature often exceeds 100°. Still, the afternoon's 110° peak generally doesn't arrive until after five—and it's often accompanied by a 40- to 50-mile-an-hour wind.

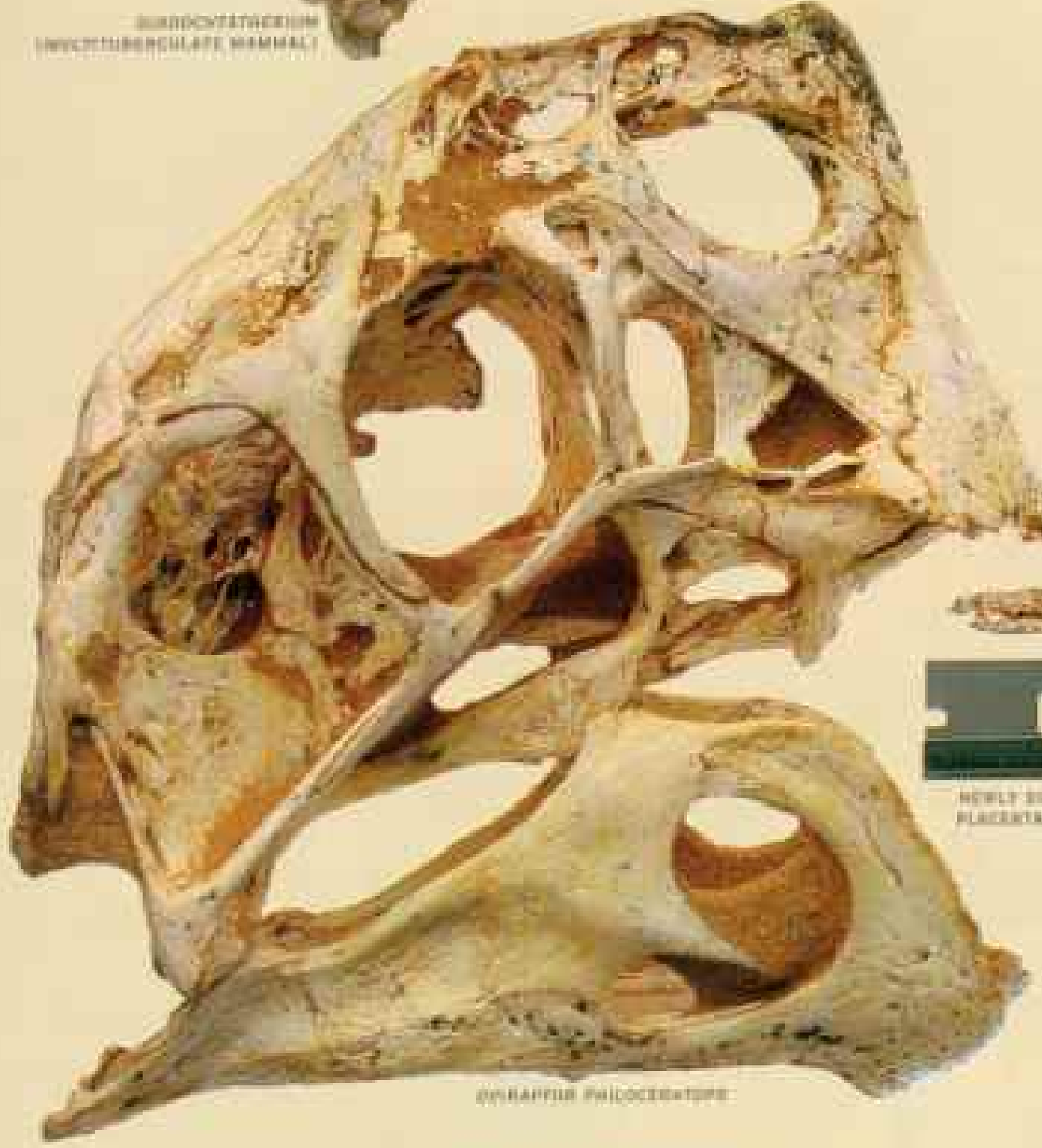
The gale results from solar energy on the desert floor, which heats the air and makes it rise. The slightly cooler air off the Gilvent Uul rolls downhill and takes its place—making working, cooking, or

VELOCIRAPTOR

SUBDICYNODON
UNGULATE MAMMAL



ARSINOITHERIUM PROBOSCIDEAN



OVIRAPTOR PHILOCERATOPS

NEWLY DISCOVERED
PLACENTAL MAMMAL

Finest of their kind, Gobi skulls help scientists unmask a past when dinosaurs coexisted with mammals in the final period of reptilian dominance. The larger skulls belong to theropods – bipedal dinosaurs generally regarded as kin to modern birds. Prominent beaks distinguish the toothless oviraptors (left), with the *Ingenia* type resembling a parrot in profile. A predator's ferocity is imprinted in the skull of a four- to five-foot-long mature *Velociraptor* (top), an exaggerated version of which created havoc in Hollywood's *Jurassic Park*. Equipped with the largest brains relative to their size among dinosaurs, theropods are now seen as swift, intelligent hunters. Some experts guess that because of their exceptional agility, troodontids (below) might have been warm-blooded. The most common mammal skulls belong to multituberculates (upper left), small mammals with ambitious incisors.

(INGENIA YANSHINI)

JUVENILE PROTOCERATOPS

NEWLY DISCOVERED TROODONTID

TRIASSIC PERIOD Millions of years ago	JURASSIC PERIOD	CRETACEOUS PERIOD	DINOSAUR EXTINCTION ▶	TERTIARY PERIOD	QUATERNARY PERIOD ▶
◀ 245	208	146	80-75 GOBI SITE	65	2

MARSUPIALS

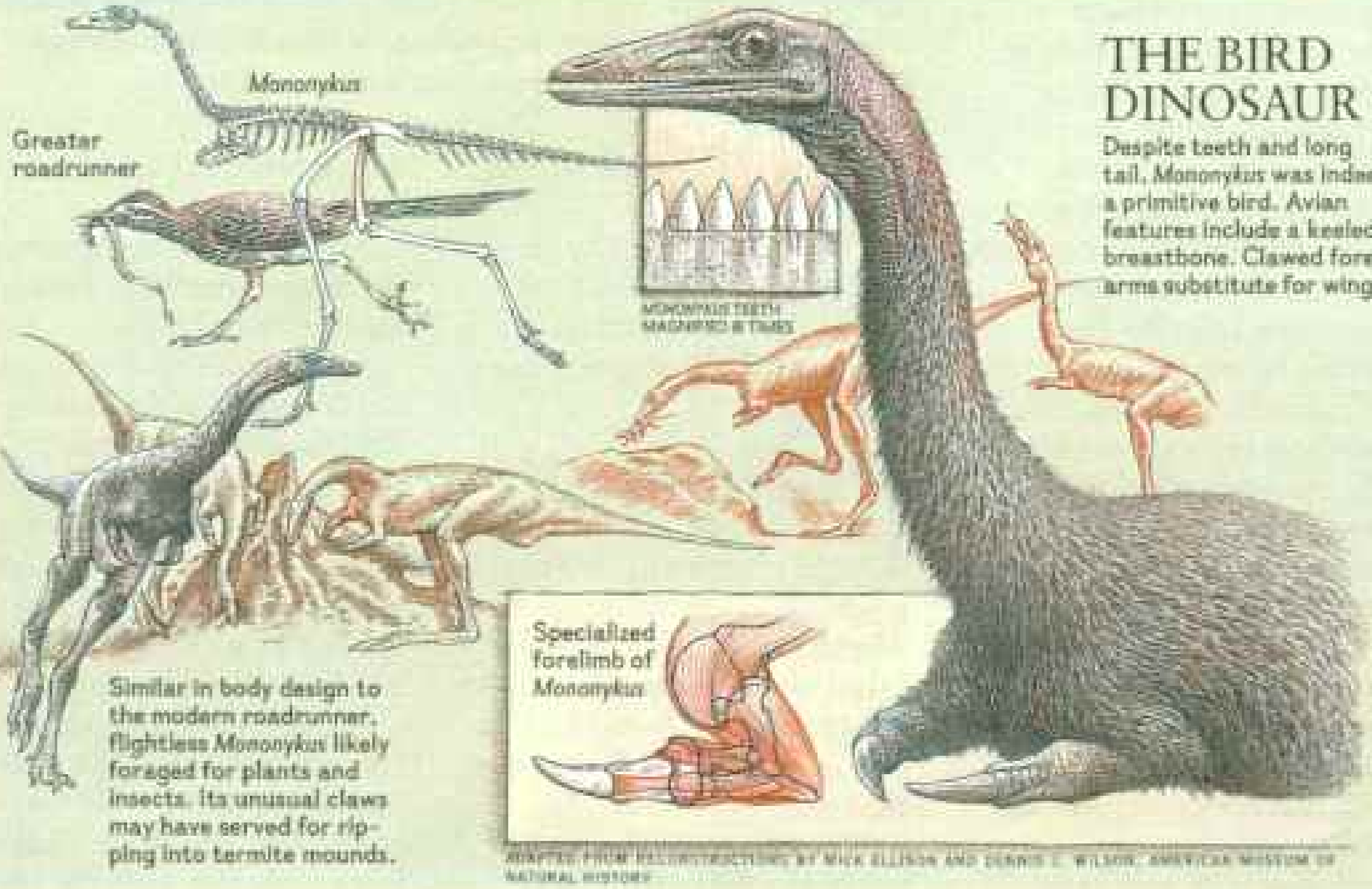
Though marsupial ancestors lived in the Gobi, this primitive mammal order would predominate only in Australia.

PLACENTALS

Small, shrewlike insectivores herald the time when, with the extinction of dinosaurs, placental mammals come to dominate the animal world.

MULTITUBERCULATES

Derived from the earliest mammalian stock, the rat-size "multis" disappeared about 30 million years ago, probably replaced by early rodents.



THE BIRD DINOSAUR

Despite teeth and long tail, Mononykus was indeed a primitive bird. Avian features include a keeled breastbone. Clawed forearms substitute for wings.

Similar in body design to the modern roadrunner, flightless Mononykus likely foraged for plants and insects. Its unusual claws may have served for ripping into termite mounds.

ADAPTED FROM RECONSTRUCTIONS BY MICK ELLISON AND DENNIS E. WILSON, AMERICAN MUSEUM OF NATURAL HISTORY

doing just about anything fall secondary to merely surviving two hours of flying, searing sand.

It's these afternoon winds that generally cue expedition members to leave Ukhaa's roasting pan for camp. Usually by seven or eight most people have returned to their tents to write field notes and take a quick nap followed by a ten o'clock dinner. Around the campfire we often make a guessing game of time:

"How long have we been at Ukhaa?" I ask.

"Eight days?" someone ventures.

I check my notebook. "Sixteen days," I say.

"When do you think the last dinosaurs walked this place?" I ask.

Mark Norell pipes in. "Dinosaurs are still here—only now they're called birds."

It's strangely comforting, this paleontologist's long view. There seems nothing but days upon days upon days, and in the desert sameness it feels as if we've been here for all of them. Events of last week and millions of years ago merge into an infinite river called time. Yet inside this withering heat, numbing sameness, and sunburned science, the expedition has also been marked by milestones.

On day 8, for instance, after the whole team spent two exhausting days chipping dense stone from a mystery fossil discovered on day 1, it's determined the specimen was already eroded away—only a scrap of tail remains. Because hopes were so high, our entire camp is pitched into a depression. Novacek and Norell—who've been putting in 14-hour days with pickaxes, hammers, and chisels—both silently walk off.

Down at the local oasis a camel drover delights in a Mongolian sleigh ride. Expedition members came here to pump water for drinking and for making plaster specimen wraps.

"We've had so many great finds here," Novacek finally says, "that we talked ourselves into believing this one was a given."

FIVE DAYS LATER Amy Davidson, one of the fossil preparators for the museum, takes me out to Xanadu to show how fossils are transported home. Walking up a jeep path in a rare drizzling rain, she spots the orange tape that marks the find.

"It's a lizard," she says, removing the surface sand with a brush. "This won't take too long."

After clearing the specimen, she begins trenching around the fossil's red rock.

At the museum the 39-year-old Davidson is the person who takes the rocks we've been collecting and painstakingly reveals the skeletons inside. A professional sculptor before becoming a preparator, she enjoys working with fossils more than creating art.

"Sculpture was too hard emotionally," she says. "Now I get to work the same way—but I know this stone already has a sculpture inside it. It's

very satisfying, without all the uncertainty."

In another minute Davidson carefully undercuts the five-inch fossil until it stands like a balanced rock on a small stone pillar. Then she covers the top of the stone with wet toilet paper and gauze soaked in plaster of paris. "This is jacketing," she says. "We want a tight, hard-plaster skin over the specimen to keep it from damage on the trip home."

Soon Davidson snaps the rock from its pedestal and quickly jackets its underside. Once the bottom dries, she cradles the 80-million-year-old lizard into the safety of her rucksack.

Davidson says that she tries to personally jacket as many fossils as she can so she knows what to expect in the museum. "I love working on specimens in the lab," she says. "Sometimes as I remove a jacket, I'll be surrounded by tools and lights and steel, and I get these little puffs of desert smell. That makes me smile. Eighty million years after these things died, they've traveled halfway around the world and landed on my clean little lab table. I become the first person to see them."

WHEN the sandstorm hit, the *Oviraptor* leaned into the hillside to cover a clutch of eggs. Now, some 80 million years later, it is still there, 15 stories up a cliff wall.

The days have slipped by. And now, with only a short time left at Ukhaa, Norell, Novacek, Andy Taylor, the team's mechanic, and I are preparing the largest fossil we'll take this summer: a mature *Oviraptor*, perhaps 12 feet long. Leaning precariously with the pitch of the wall, we've worked on the specimen into the night until it sits on its stone pedestal.

This morning we begin the slow process of undercutting an area roughly the size of a pool table. We work slowly, with steel files and pronged tools. Then: success. "Got an egg here," Norell says, after hours of lying on the sand, gently scraping the specimen's underside.

We all stand to examine the egg. A pale oval encased by stone, it lies eight inches beneath the rock's surface. It's official. We've got the fourth nesting *Oviraptor* the world has ever seen.

Another one—unearthed almost directly across from us on a neighboring butte—is currently on display at the American Museum of Natural History in New York.

I saw it a month before we left for Mongolia, and except that time and death had flattened the scene, the nest looked like that of an oversize bird. The dinosaur was squatting low, over a circle of roughly 20 eggs, as if it had been either warming the eggs or shading them from the sun.

Now Novacek uses his index finger to follow the vertebrae of this new specimen, noting how the long-necked head curves back on the body, like a nesting bird. Locking his hands and lifting his elbows to the height of his shoulders, Novacek squats low, showing

Andy Taylor and me how the *Oviraptor* shielded its eggs from the blowing sand.

He relaxes and gently picks at the stone near the specimen's edge. As bits of sandstone flip away, Novacek doesn't seem surprised as he uncovers the hooked, four-inch claw of the *Oviraptor*'s forelimb, which glows white against red rock.

Standing on the cliffside, Novacek compares this specimen to the one back in the museum. "Look at that," he says. "They both have the same nesting posture. I don't know what it means, but it's intriguing."

Then, like a kid with a toy, he kneels close to the specimen and starts counting visible eggs. The tally rises to 15.

As Novacek and Norell begin jacketing the fossil, Taylor and I move along the wall of the canyon in search of another specimen.

Just ahead we find it: another long strip of exposed bone, bits crumbling down the hillside in a white trail. We begin to dig. And, slowly, yet another *Oviraptor* begins to materialize. First we find its hip bones, then we unearth a forelimb claw.

"Hey, Mark, check this out!" shouts Taylor.

"I think you may have found another nester," Norell exclaims when he sees our dinosaur.

Taylor and I slap high fives. Then everyone realizes we won't be able to excavate our specimen. There's just not enough time.

We dig for another few hours before Novacek comes over. "Great find," he says. "Looks like there might be a mass-death assemblage at this level. It's amazing." Novacek stares into Ukhaa's depths. "We'll come back for this one next year," he says.

He instructs us to cover our specimen with bubble wrap and plastic, topping it with a camouflage layer of Ukhaa's red stone so no one else will find it.

Still feeling the flush of our first discovery, Taylor and I are crushed.

Wait until next year? But, hey, hold on! Might there be more nesting specimens here? Might this level hold a whole rookery? What would that say about this place? About dinosaur behavior?

Novacek, however, is adamant: The expedition has to be back in Ulaanbaatar in ten days, and we have a scouting trip deeper into the Gobi yet to go, plus a punishing, three-day drive out.

So, reluctantly, Taylor and I do as Novacek asks, regularly glancing toward the white jacket that now encases the other nesting *Oviraptor*. Tomorrow it will require the whole team and a complex rope-and-pulley system to trundle that 600-pound monster down 150 feet of cliff and onto a waiting truck.

But for now, at sunset, all I can think about is what I'm leaving behind.

AND THEN, TOO SOON, it's time to leave. As we break down our tents and load the aluminum food boxes onto trucks alongside our jacketed fossils, all of us have already started disentangling ourselves from this place and one another. There are now long silences and talk of American food and movies.

As the last of the camp is loaded up, my thoughts focus on one afternoon when we took a break to explore the peaks of Gilvent Uul. That day most of us climbed into the four-wheel drives and headed for the mountains. Before long we were rolling up a dry, braided riverbed created by spring snowmelt. When steep canyons rose on all sides in front of us, we left the cars and started nosing around. Immediately we found the ruins of a shepherd's lot: shattered rock walls and livestock pens. Then we began climbing the tallest peak.

Up the mountainside from us endangered Mongolian argali sheep with spiral horns scrambled over a ridgeline. Norell told me snow leopards and wolves inhabit these mountains too.

It took us more than an hour—often clinging to nearly sheer rock faces—to reach the peak. Once on top, we enjoyed the first cool breeze in weeks, while around us the earth stretched pastel-colored forever.

Cloud shadows raced across red valleys. A line of four dust devils moved east on the afternoon wind, pushing a herd of gazelles ahead of it. The curvature of the earth was visible. We could see a hundred miles in any direction, and except for a trio of herdsmen's tents in a distant valley, there was no sign of human habitation.

If we forgot a jet creasing the sky overhead, the landscape looked exactly as it would have to Roy Chapman Andrews in 1922 or Genghis Khan in 1222.

Balancing between the past and the future on a mountain so isolated that no one's ever named it, we clapped shoulders and hugged one another while staring into the distance.

With 80-million-year-old

fossils below and jet aircraft glinting 35,000 feet overhead, no other moment could challenge this one as the instant when our team was knit together. Not the evening when someone opened the doors of a jeep, plugged in a reggae cassette, and everyone danced past 1 a.m. Not the storm-tossed night when the whole expedition crammed into the back of a canvas-covered cargo truck to watch *Laurence of Arabia* on a tiny video setup.

For a few moments the enormity of dinosaurs and people crossing this landscape over geologic time fitted comprehensibly together, like a piece in an unspeakably beautiful puzzle.

Mike Novacek was right: We have felt the magic. □

"Hardships . . . are a great nuisance," wrote Gobi pioneer Roy Chapman Andrews. True to his spirit, Norell and Novacek end a dusty, 110°F day with champagne cooled by a medical ice bag. But even a desert drizzle (above) seems intoxicating when each day, with each new fossil, the age of dinosaurs comes alive.

Gleaning Treasure

SILVER

ASTROLABE
FOUND BY
BURT WEBBER
EXPEDITION, 1978

Seventy miles from shore, divers Jim McLean and Darío Carcano carefully probe a barely submerged coral reef off the Dominican Republic. I follow with

From the BANK

BY **TRACY BOWDEN**

PHOTOGRAPHS BY **JONATHAN BLAIR**

ART BY **RICHARD SCHLECHT**

a metal detector, a constant companion in my quest for the gold, silver, and artifacts spilled by the Spanish galleon *Concepción* when it sank in 1641.

A galleon's golden glories

Dazzling jewelry salvaged by two expeditions makes up a priceless trove. The heavy gold chain and thinner chain inside it were found in 1978 by salvager Burt Webber. My team brought up the three gold-and-diamond pendants and 32 flowers of gold petals centering on a diamond, probably used as decorative studs.

The richly laden ship, *Nuestra Señora de la Pura y Limpia Concepción,* was employed in the Spanish empire's far-flung trading network. From 1565 to 1815 Spain ran a hazardous shuttle of ships from the Philippines, where they took on silk, spices, porcelain, and other goods sent from China and elsewhere in the Far East. Leaving Manila, galleons sailed the Pacific to Acapulco, where cargo was hauled overland to the Gulf of Mexico at Veracruz. From that port and other New World colonies, ships rendezvoused each year at Havana for the trip to Spain.

The *Concepción* strained under cargo that cluttered the passageways. She carried extra goods, since bad weather and other setbacks had prevented the trip the previous year.

TRACY BOWDEN was featured in the December 1979 article "Graveyard of the Quicksilver Galleons." This is JONATHAN BLAIR'S 32nd GEOGRAPHIC article. Artist RICHARD SCHLECHT specializes in maritime subjects.

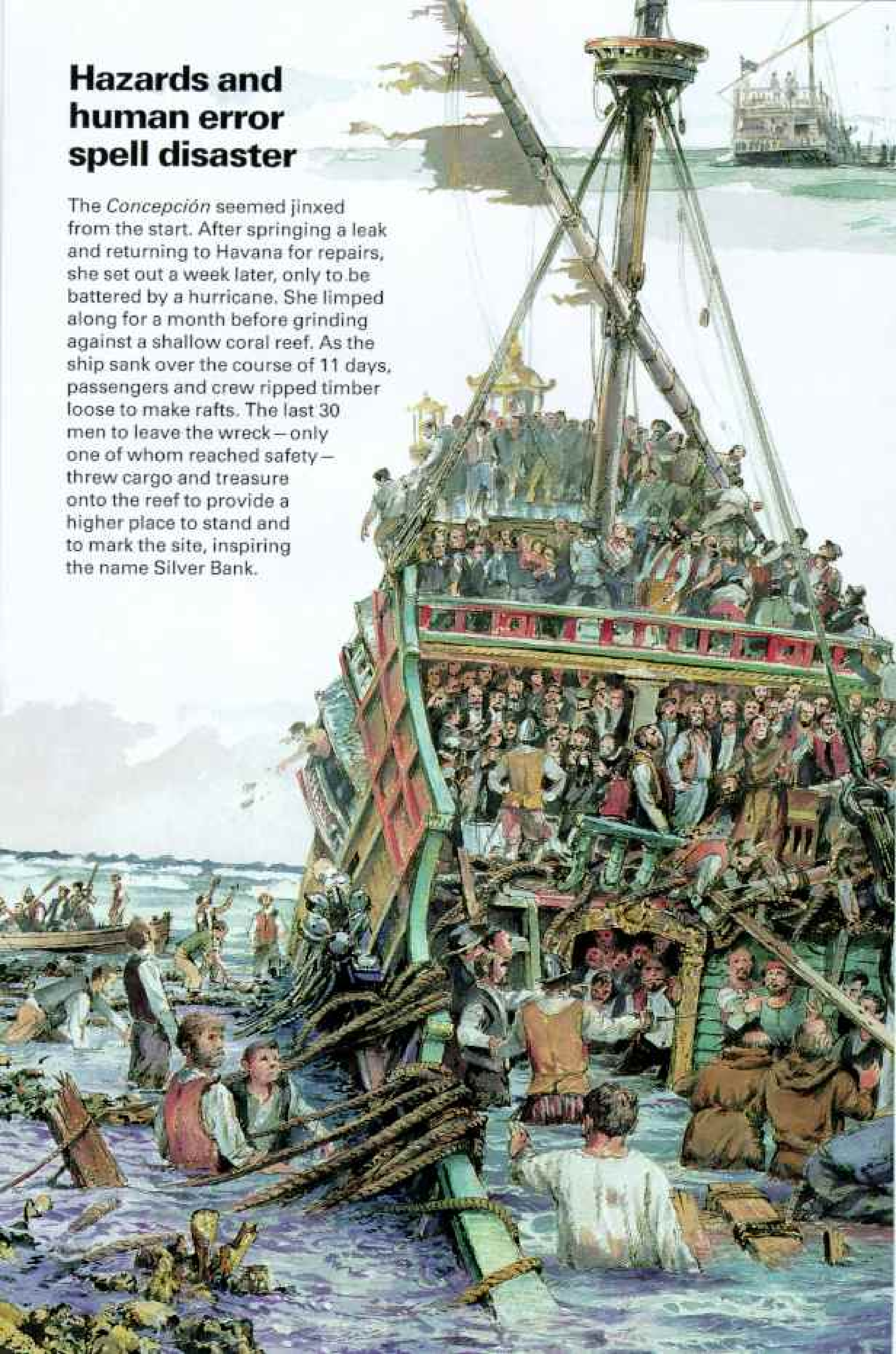
Air force does the heavy lifting

To excavate a promising site, we moved a 16,000-pound chunk of dead coral with ropes and balloon-like lift bags pumped full of air. This uncovered a 14-pound silver ingot, silver plates and cutlery, hundreds of coins, and a gold watch. The coral had broken off and fallen during a storm years ago. We let it drift 60 feet with the current, then set it down.

Among the New World flavors that tickled Old World taste buds was chocolate, as evidenced by the tableware we excavated, including a badly eroded copper melting pot. To replicate what might have been a 17th-century chocolate service, we heated milk, then used a silver spoon with a mother-of-pearl bowl to add chunks of chocolate. We mixed the concoction by rotating a long-stemmed "frother," found by Burt Webber, back and forth between our hands. The round box at lower left might have stored sugar or spices.

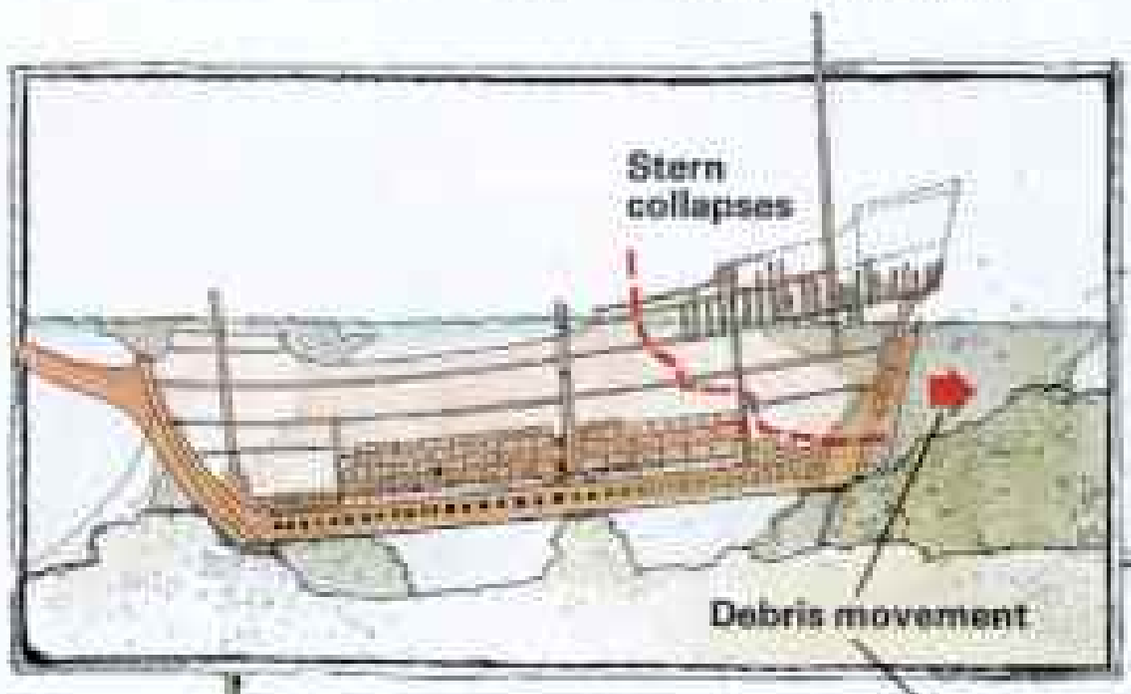
Hazards and human error spell disaster

The *Concepción* seemed jinxed from the start. After springing a leak and returning to Havana for repairs, she set out a week later, only to be battered by a hurricane. She limped along for a month before grinding against a shallow coral reef. As the ship sank over the course of 11 days, passengers and crew ripped timber loose to make rafts. The last 30 men to leave the wreck—only one of whom reached safety—threw cargo and treasure onto the reef to provide a higher place to stand and to mark the site, inspiring the name Silver Bank.



The ship's two pilots sealed her doom. Thinking they were north of Puerto Rico, they sailed south, legally overruling Admiral Juan de Villavicencio. He correctly figured the ship to be north of treacherous shoals. The admiral ordered a silver bowl brought forth. In front of the passengers, he literally washed his hands of the decision.

Though running aground made a fearful noise, initial damage was light. With heroic effort, the crew used anchor lines to free the ship, only to have the wind push it back, grinding holes in the hull. Ultimately the ship, sitting on a point of coral, broke apart at the stern, which drifted away. Of the some 500 passengers and crew, fewer than 200 survived.



A close call at 50 feet

Discoveries large and small are the reward of painstaking thoroughness. A nobleman's brass seal about the size of a quarter (above), found by Burt Webber, was used to make an impression in wax to authenticate documents. I discovered one of the few sizable pieces of wood to survive, a section of one of the *Concepción*'s ribs (bottom right) that was preserved when it became buried in sand.

Passing through a bower of coral at a depth of about 45 feet (above right), I kept flashlight and metal detector at the ready, eager to hear the screech in my earphones that signals another find. The route I followed is called the debris path—the most likely location of treasure based on how we believe the ship broke up and drifted, given prevailing winds and currents. So far we have excavated less than 20 percent of the path.

We came close to disaster when divers Tomás Guerrero and José Martinez were excavating with me in and around a coral cave as photographer Jonathan Blair stood by with his camera. Suddenly we heard a muffled roar as large rocks came crashing down around us, hitting the seafloor like an avalanche. Silt mushroomed up, clouding the water and disorienting us as we groped for a path to safety. Rocks had partly filled the cave, and through the gloom I could barely make out the faint yellow glow of Tomás's underwater light. I reached in and tugged at his flippers to steer him toward the way out. As I felt my way along, I ran hard into Jonathan, not realizing at the time that I was freeing him from a rock that had pinned his legs to the bottom. We swam to clear water and looked each other over. We were all OK.

Reconstructing artifacts – and history

Shattered pieces of Ming dynasty porcelain (above) speak to quality workmanship, the vivid color undimmed by three and a half centuries on the ocean floor. Chinese characters on the bottoms are called reign marks, identifying the emperor reigning when a piece was made. These beakers and bowls carry the name of the emperor Chenghua, who ruled from 1465 to 1487, an era noted for fine porcelain. But the designation is apocryphal. False markings were commonly used to add to a piece's cachet.

At the Commission for Underwater Archaeological Recovery in Santo Domingo, conservator Francis Soto fits another piece into an ornately decorated serving dish. Formed in the style of a piece of European dishware, it was made expressly for the brisk export trade that some 17th-century Chinese porcelain workshops catered to.

Many treasures were hidden by thick encrustations of coral. When we found a piece of dead coral that appeared to contain a foreign object (below left), we took it to a lab, where an X ray revealed a shape (center) that proved to be a woman's amethyst ring (below). Like the other gemstones we recovered, its surface had been blackened by silver sulfide, created in the water by the surrounding silver treasure.

Treasure found, lost, then discovered anew

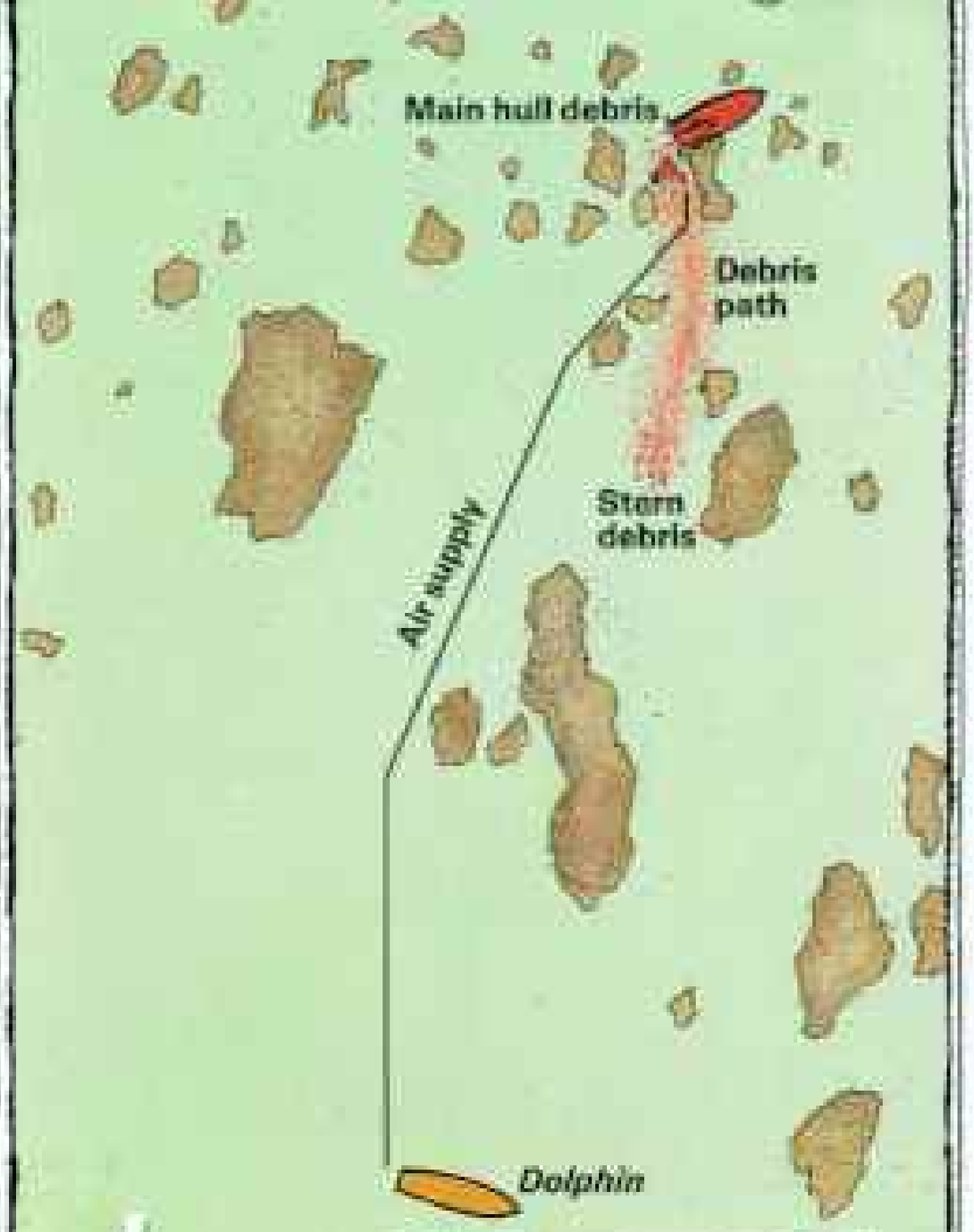
The sea did not easily yield the secret of where *Concepción*'s riches lay. Recovery expeditions were mounted by private consortiums in the 1650s and '60s to no avail.

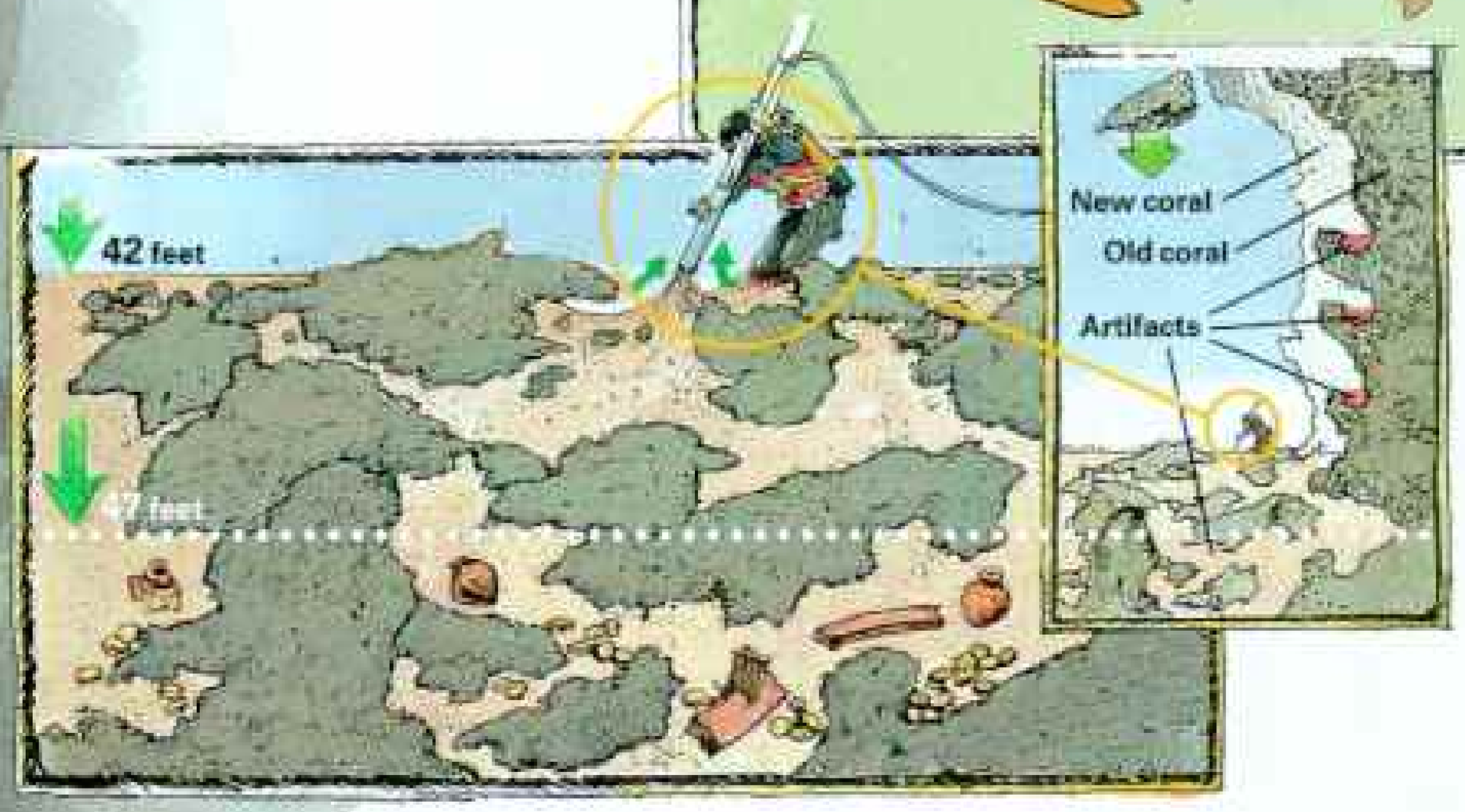
William Phips

But success came to William Phips, a brash young seaman from New England who wheedled financing from several English noblemen. He located the wreck in 1687, recovered an enormous amount of treasure, then quit the site because of low provisions, threatening weather, and French pirates. As a reward, Phips was knighted by James II—and received a share of the goods.

Once the site was found, Phips relied on the astounding abilities of native pearl divers. Clutching rocks to aid their descent, they could hold their breath for up to five minutes.

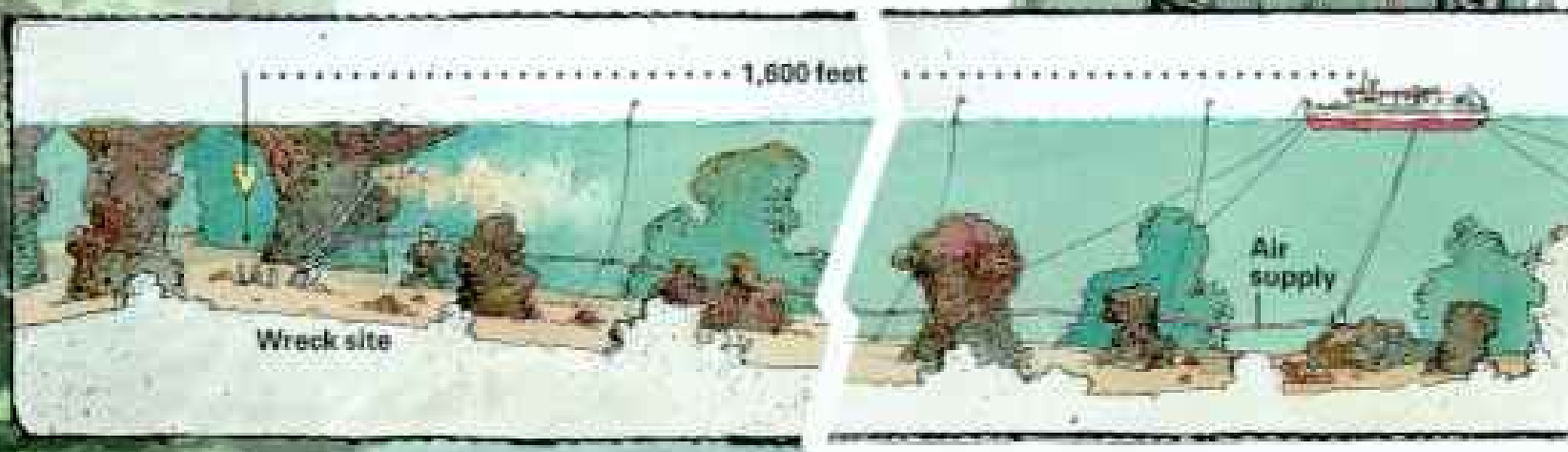
The Silver Bank reefs make salvage efforts especially difficult. It is grueling to navigate around the mushroom-shaped coral heads lurking just below the surface. Treasure had been covered when coral heads broke off and fell to the seafloor.





In 1978 the log of one of Phips's ships, pinpointing the long-lost wreck site, was found. Soon salvager Burt Webber, using a newly developed magnetometer, located the site and recovered another handsome fortune. Convinced that much more treasure lay covered, I used suction pipes reaching 1,600 feet from the pumps aboard my salvage ship, *Dolphin*, to remove layers of sand that averaged five feet deep.

Tracy Bowden



The team included, clockwise from left, Navy Lt. Victor Santos, representing the Dominican government; conservator Francis Soto; diver Tomás Guerrero; and me. The task was simple but exacting: If three of us arrived at the same count but the fourth was just one off, we all started over again.

Taking stock of treasure

The nearly disastrous cave-in proved something of a boon. When our adrenaline stopped pumping, I decided to move our search to a safer area. Within hours we made a major find: an almost obliterated wooden chest that had spilled its prize of some 3,000 silver coins (left). A perfectly preserved Ming jar and the lid of another lay nearby; beyond that, an oval pewter box containing ambergris, more valuable at the time than gold. For 12 hours we sifted the surrounding sands by hand. We were rewarded with the gold-and-diamond pendants and studs shown on pages 92-3.

Recording our finds was a chore we faced virtually every night (above). The Silver Bank is in the economic zone of the Dominican Republic. I have a contract with that nation through its Commission for Underwater Archaeological Recovery, directed by Pedro Borrell. We divide the treasure fifty-fifty, and an accurate inventory is compulsory.

An unexpected find was the *Akwa,* a recently sunk sailboat with onions and other foodstuffs still floating through the galley. We never learned what caused her sinking. But it is clear that the alluringly named Silver Bank has lost none of its ability to bring misfortune to those who venture near. □

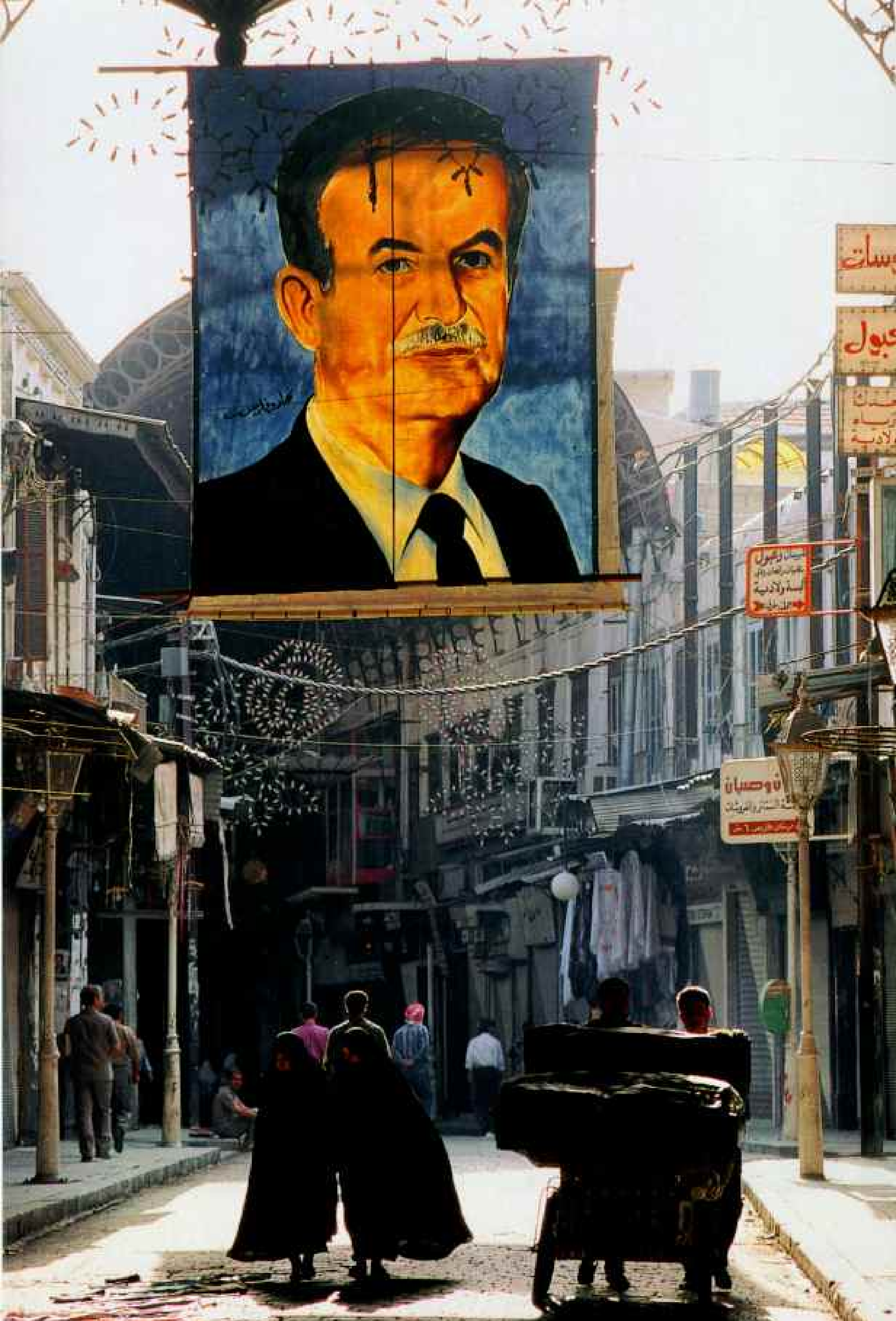
Syria Behind the

Mask

Bullhorns and razor wire edge a Syrian-held fragment of the Golan Heights, where a family of Druze shout greetings to relatives in Israeli-occupied territory 500 yards away across a UN demilitarized zone. Glorious in ancient times, Syria today is edging toward warmer relations with the West. Yet return of the Golan, captured by Israel in 1967, remains a national priority.

HIGH ON SYRIA, two visitors from Saudi Arabia drink beer—forbidden by strict Islamic laws back home—overlooking the Damascus suburbs, which sprawl under the veil of a summer dust storm. Among the oldest continuously inhabited cities on earth, Damascus was the

capital of the Muslim world in the seventh and eighth centuries A.D. Today it attracts thousands of Arab tourists, some of whom can't resist sampling a Syrian lifestyle influenced more by the Mediterranean than by Mecca.



By PETER THEROUX
Photographs by ED KASHI

"I HAVE BEEN TO ISRAEL," a young carpet dealer boasted to me in Damascus. We were sitting in a tiny stockroom off an alley in the Old City's ancient covered market, which soars as high as a cathedral and is several city blocks long. His claim, while still risky in the mid-1990s, would certainly have landed him in prison for treason only a few years before. "It wasn't bad," he added. "It's like here."

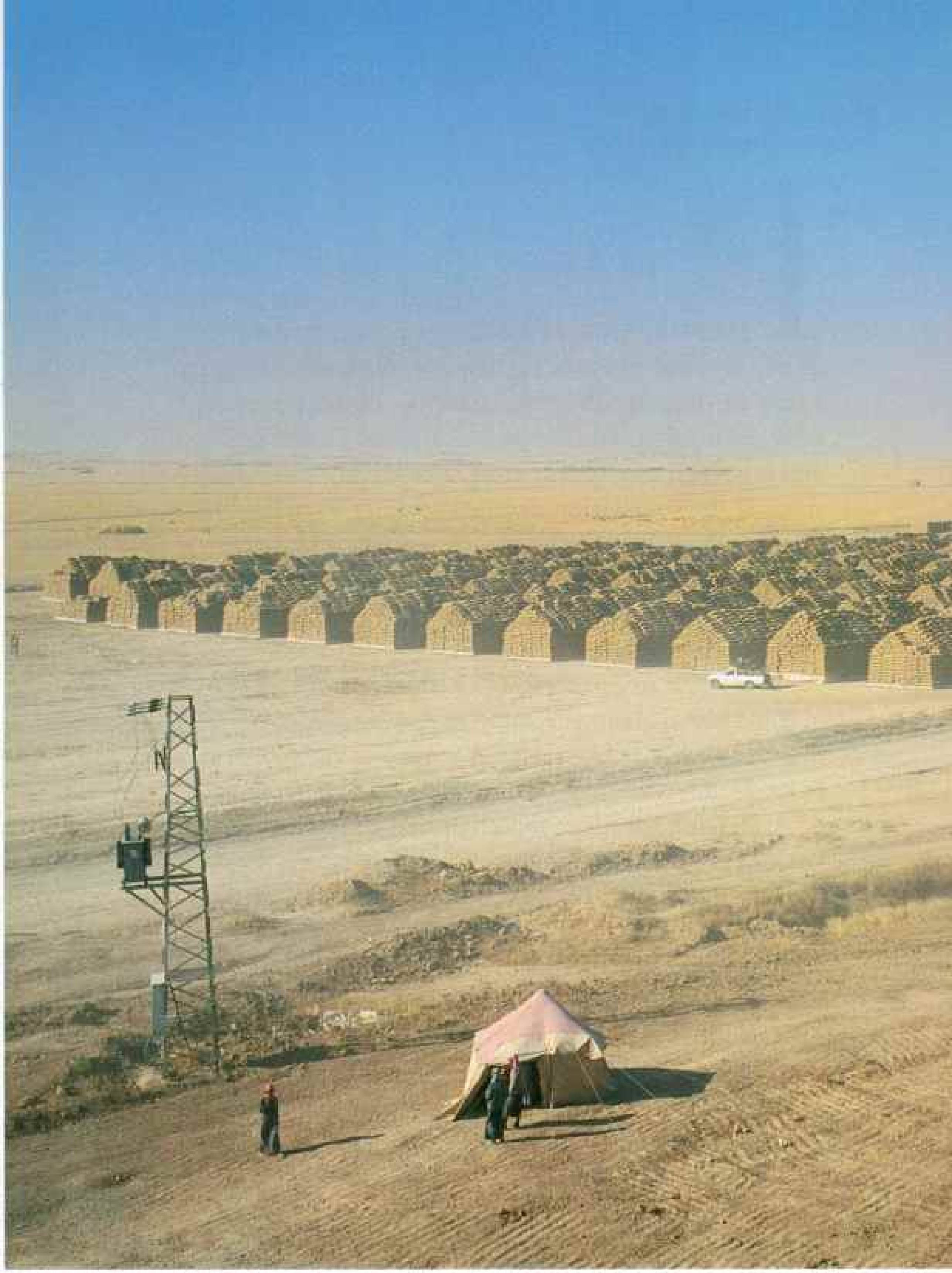
He had told me he was Palestinian, but had the Israelis known he lived in Syria?

"They saw my papers. They didn't care."

If his initial claim surprised me, this took my breath away. For five decades Syria has viewed Israel as its deadliest enemy, an aggressor and an occupier of Arab land; for more than half that time most of the Golan Heights—part of Syria itself—has been occupied by Israelis. Despite skepticism, direct negotiations may one day return the land to Syria. In an age when the long-held taboo on direct talks with Israel has fallen, is anything impossible? This was the first question that came to mind on a recent visit to Syria.

On the surface little has changed in Damascus since I first visited in 1979. Three U.S. Presidents have come and gone, and yet the same portraits of Syria's president, Hafez al-Assad, adorn the city's buildings.

GAZE OF THE DICTATOR belongs to President Hafez al-Assad, whose likeness appears everywhere, including the *suq* in the Old City of Damascus. Raised in a poor mountain village, Assad climbed in the military and seized power in 1970, bringing stability and a socialism that raised living standards. Now 65, Assad (a diabetic with a history of heart trouble) has no clear successor.



A CITY OF WHEAT rises from the Syrian desert near Al Qamishli, where sacks of grain awaiting distribution make a study in balance and burlap. Despite recent wheat surpluses, Syria is a net importer of agricultural products, with plans on the drawing board for irrigation

projects on the Euphrates River that could lead to self-sufficiency. A client of the Soviet Union until 1991, Syria is now in the market for new investors to help develop petroleum and natural gas reserves and to diversify a stagnant economy.

PIECING TOGETHER THE PAST, archaeologists are reassembling the Roman-era colonnade of Apamea, a city founded in the third century B.C. by the Seleucids, among the many foreign powers to hold sway over this strategic crossroads. "The pride of our nation lies dormant in those stones," says Syrian hotelier Osmane Aidi, who is bankrolling the restoration.

Traffic still clogs downtown streets, though I notice a few more Mercedes-Benzes.

But with the fall of Syria's Cold War patron—the former Soviet Union—economic constraints in this socialist state have loosened. And government newspapers now run previously unthinkable articles on Assad's negotiations with high-ranking Israelis. Such changes reveal a tentative easing of Assad's decades-long ironfisted rule over his country.

I remember the Syria of the late 1970s as a police state—a place where soldiers, at posts located every few hundred yards, routinely asked to see my papers when I walked around at night, and where Syrians, the friendliest of people, tried to avoid more than casual contact with foreigners.

Now tour groups crowd into Syria. Busloads of Europeans, Japanese, and even Americans plow through the narrow streets of Damascus and along the desert autostradas that link the capital with the ancient ruins of once elegant cities to the north and east.

In Syria, one of the most interesting and varied countries of the Middle East, I too wanted to see what was new: in Aleppo, Damascus's historic rival in grandeur and prestige; in Hamah, the city decimated by government forces in a 1982 uprising; in the town of Dayr az Zawr, near the firmly closed Iraqi border; and in the Golan, upon whose fate may hang the hope for peace between Syria and Israel.

THE ROAD into the Golan city of Al Qunaytirah passes through villages with six-foot-high piles of garlic and truck convoys heaped with rosy apples. This is big-sky country, windswept and gorgeously

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BORDERS OF MODERN SYRIA were drawn by foreign diplomats after World War I; France ruled under a League of Nations mandate until being forced out in 1946. To nationalists, the country France left behind is a fragment of its former self—the Greater Syria known from biblical times until 1920, which included Palestine, Transjordan, and parts of Iraq.

pastoral. But it is also dotted with war-damaged buildings, long unrepaired and covered with Arabic and Hebrew graffiti. Syrian officials hope that visitors given access to the tightly sealed Golan Heights will remember the vistas of wrecked public buildings and dynamited houses.

The destroyed buildings are the legacy, one is told, of Israel's spite following its withdrawal from the area in 1974. Israel had begun its occupation in 1967, after defeating Syria in the Six Day War, and it continues to control the Golan Heights farther to the west. From an elevation of more than 7,000 feet, the Golan Heights gives Israel a strategic view of the Syrian border and guards the freshwater Sea of Galilee.*

But the beauty of the area overwhelms the landscape of ruins and controversy. Farms and orchards stretch beneath snowcapped Mount Hermon and serve as a reminder of how far many Syrians live from their nation's difficult history.

Over the centuries Syria's borders have, mirage-like, closed in or slipped away, at times dividing the area into small internal fiefdoms, at other times expanding to embrace present-day Lebanon, Jordan, Israel, Palestinian territories, and morsels of Iraq and Turkey in the Levantine region of Greater Syria.

At the moment, the borders are in a contracting phase. Formerly Syrian, Alexandretta and Antioch are part of Turkey; none of the Arab states bordering Syria show any signs of surrendering their independence to Damascus; and even the magnificent Tall Abu an Nada—the "hill of dew," rising 3,950 feet above sea level—bristles with an array of Israeli radio masts and satellite dishes.

"It is two miles from the cease-fire line," said Munir Ali, my official Syrian escort. This line, marked by big spools of barbed wire,

*See "Israel's Galilee," by Don Belt, June 1995.

AS ETHNICALLY DIVERSE as the nation it represents, Syria's 250-member People's Assembly convenes regularly, although debate is mostly cosmetic. All decisions are made by Assad and his inner circle, who use a phalanx of security agencies to target critics. "Thousands of political prisoners . . . continue to be held in Syrian jails," Amnesty International reports. "Almost all have been tortured or ill-treated." Syria also harbors several terrorist organizations.

was at our feet. "Look, the hills beside it, Tall al Aram and Tall Mishmasi—aren't they beautiful?—also have Israeli installations. That one was the Syrian village of Al Mansurah. See the van? That's an Israeli patrol. They pass by every 30 minutes. It's just 200 yards away."

The Golan reveals the complexity of Syria's people, and not only with abandoned mosques and a ravaged Greek Orthodox church. Touring Al Qunaytirah on a Friday, the Muslim holy day, I met picnicking families whose backgrounds could be traced to points all across the Middle East: Druze, Circassians, Turkomans.

"Our ancestors came here to fight in the Crusades," declared Musa Alijan, a Druze, as he served freshly grilled lamb to his family and anyone he could flag down from the road. "We are true Syrian Arabs. We have lived in Damascus since the war, but our ancestral village is Kafr Naffakh—five miles southwest of Tall Abu an Nada. I want my children to know this is their land—

that's why we always come here for picnics."

Musa had something to celebrate this time too. His nephew had bought a microbus and could now look forward to a profitable career ferrying commuters around Damascus. The proud ten-seater was parked under a nearby almond tree. Its white sides were decorated with red handprints for good luck—made with the blood of the lamb we were chewing.

Al Qunaytirah had been lively with day-trippers, but the next stop was sparsely populated. The land mines in the 500-yard-wide no-man's-land below the Israeli-occupied village of Majdal Shams kept that area empty, and deafening winds kept most of the usual Friday visitors to the adjacent hillsides away.

"It's a bad day," a young man informed me, toying with the controls on his useless bullhorn, his oversize shirt flapping like a flag in the wind. His name was Nur al-Din; he and his sister Rasha stood alone on the slope under the United Nations post. "No one will hear us. No one has shown up over there."

This was Wadi al Surakh, the "shouting valley," where Syrians from the Golan go once a week to shout their news across the demilitarized zone to their relatives on the Israeli side.

"We get news of marriages, illnesses, deaths, all that," Nur told me. "We can't easily visit one another, and there is no phone service between Israel and Syria. But our voices would never travel in this wind."

Around us the hills were a picture of quiet serenity. Across the valley an Israeli flag snapped in the wind, and on the highest peak to the west a military listening post towered over the landscape. As I viewed this calmest

of Arab-Israeli borders, I wondered if peace between the two nations would ever come.

SYRIA'S IMAGE as a radical power stems in part from its long loyalty to the former Soviet Union. But even in this regard, there was a surprise in store for me. "It's as if 30 years of Soviet influence never existed—they vanished and never left a trace," said Adli Qudsi, an American-educated architect active in the Project for the Rehabilitation of the Old City of Aleppo. Having met at a dinner in the northern Syrian city of Aleppo, we were walking beside the city's ancient wall. "This is such a vibrant place, so fast-moving, turning away from all types of fanaticism."

Fanaticism, however, quite nearly describes Adli's feeling for the project. Focusing on neighborhoods rather than monuments, the project—funded by the city along with Germany, Kuwait, and others—is aimed at improving basic services to encourage the current residents to stay. When Adli suggested a tour of the project area, I did not need to be asked twice.

Aleppo is best known—by sight—for the grace and austerity of its medieval citadel and other buildings of creamy limestone. The city's reputation, though, is as a merchant city in this nation historically known for its traders. For much of its history it has been larger and richer than Damascus. The city's commercial zest, concentrated in its covered markets, or *suqs*, is literally proverbial. One historian of the city, Abdallah Hadjar, assured me that "a blind man can easily find his way through the suqs, using only his nose," with spices, flowers, and foods compelling him through the twisting streets. And, he added, "It was said in the Middle Ages that one day's sales in Aleppo equaled a month's in Cairo. The merchants were so ambitious that

HAVE SHEEP, WILL TRAVEL: A Bedouin family (below) wanders west each spring to graze its herd on the stubble left by wheat harvests in the Al Ghab Valley, the breadbasket of Syria. In Jaramanah refugee camp outside the capital (left) 9,000 Palestinians cling to their pastoral ways by penning livestock on the roof. Some of the country's 337,000 Palestinian refugees have resided in Syria "temporarily" for more than 45 years.

STIFF AS STARCH, students wear uniforms of the Vanguard, a Baathist youth group for children age 6 to 11. Based on a *baath,* or renaissance, of Arab pride, Syria's ruling party has emphasized education and raised the literacy rate to 71 percent. President Assad, who joined Baath at 16, calls his own hard-won education the "turning point of my life."

even the lame among them reached India."

We passed through an undulating alley whose pavement and walls were all symmetrical gray stone. Adli knocked on a door whose nameplate read Abd al-Razzaq Unbashi.

"We have something called the Emergency Fund, which makes small loans to homeowners and renters," Adli explained.

The man of the house welcomed us in, and we were seated overlooking his courtyard, roofed with a trellis of grapevines. Bowls of white jasmine blossoms scented the air of his home, which was humble in scale, but grand, with archways and twittering birds.

"I am a blacksmith," Abd al-Razzaq began, and he went on to detail the terrible condition of his house a few months before. Two ceilings had nearly fallen in, and there were leaks. An upper room was unusable—no small problem when there were 16 family members living in one house.

"We got a loan of 40,000 Syrian pounds [$960 U.S.]. I did much of the work myself; so did my brother. He's a blacksmith too; he just moved in because his house was demolished to make room for a high-rise. His wife is pregnant with twins. We need more space!"

The medium-scale philanthropy, the use of private money (from a Friends of Aleppo group in Germany), and the irrepressible optimism all conflicted with my old experience of Syria as an ideological, government-driven, closed world.

As we walked through the Old City, I saw signs in Russian. I deciphered them to read *Firma, Fabrika,* and *Magazin* and asked Adli what they were.

"Businessmen attracting customers. Russians come here to buy wholesale," he answered. "They can get a pair of shoes for five dollars! They get wonderful textiles cheap. Lots of East Europeans import from us. And Western Europe! Ask Susu. She was at the dinner where we met."

OFFICIAL VOICE OF ISLAM, Sheikh Ramadan al-Bouty appears on state television weekly to address Syria's Muslim majority. Handpicked by the government, the *imam* preaches moderation and condemns Islamic militants such as the Muslim Brotherhood, who mounted the only serious challenge to Assad—before being massacred by the thousands in 1982.

Susu, whose real name is Ibtisam Asfari, is in business manufacturing sweatshirts. Usually, talk about economic reform in Syria refers to new chances to import; here was someone exporting. This was a new twist on Aleppo's centuries-old tradition of making fine textiles.

"We were living in the States in 1984, and my husband died," Ibtisam told me a few days later. She was sitting in her office at a battered metal desk, the hum of her workshop audible through the wall behind her. "What could I do? We came home. I myself made the decision to start up. I run the business with my two sons. Now we export to a company in Holland with the Disney license. Our capital is 15 million pounds."

Her son Yesr gave me a tour of the basement workroom where 30 clean-cut men and women worked at sewing machines or boxed T-shirts and sweatshirts for shipping. All of the workers looked up and smiled, but what caught my eye were the designs on the clothing: Mickey Mouse, the Lion King, and 101 Dalmatians.

"We make these under license for European markets," Yesr said, showing me the "Made in SAR [Syrian Arab Republic]" on a label. "We make about 3,000 T-shirts a day, and 1,500 sweatshirts. We also make shorts and other sportswear with the New York Yankees and Georgetown Hoyas logos."

What was most remarkable about this business was not the obvious Western influence but the fact that it was being run by a woman.

"Women have all their rights in Syria, and the government is full of high-ranking women," Ibtisam had told me in her office. "But the private companies we deal with weren't used to it at first. Now it's easier. All the men have gotten used to respecting me. I deal with them nicely, and I've earned a good name in the business."

At this point Ibtisam's brother-in-law

"SYRIANS ARE SOPHISTICATED: We love to try new things," says Sadi Afra, who helps manage Nobles Palace in Damascus, an opulent restaurant featuring French art, marble floors, and a menu of international proportions. "We serve the cuisines of India, China, Switzerland, England, Italy, and Mexico," he boasts. "Syria too!"

walked in, clicking his prayer beads. "She comes from a family that gives women's opinions far too much importance," he groused, as he wheezed down into a chair beside me. This gave Ibtisam an opportunity to display some of her tact and show the aptness of her name, which means "smile."

IT COSTS 65 POUNDS, less than $1.60, to take the bus from Aleppo to the city of Hamah. The buses used to be old and dusty, and having to buy a seat a day in advance was an ordeal. I recall overhearing, in 1989, a Syrian in line at a bus station window mutter to his wife, "It would be easier to walk!" But now there are dozens of private bus companies operating out of Aleppo, and the smooth ride is enhanced by free chocolates, cups of water, and an Egyptian video shown on a television bolted to the front of the bus cabin. As the rows of poplars rushed by outside the window, we watched *Al-Munsi, The Forgotten*, featuring the comedian Adel Imam and the music of the American rap duo Kriss Kross.

Near the scenic stone gate that arches over

the main street of Hamah, I was befriended by a young local intrigued by the sight of a foreigner stopping to buy an Arabic newspaper. We walked down Gamal Abdel Nasser Street together, passing a storefront filled with satellite dishes, one nearly six feet in diameter.

"I thought those were illegal in Syria."

"But they are popular," he said. "The government was worried about them, but now news can't be controlled. Anyway, they're not political. Most people are like us, they use them for sports and Egyptian and Turkish movies. And look—those dishes are locally made."

This struck me as a classic instance of a government subtly loosening up—allowing the dishes to be sold, yet leaving open its option to crack down if it chose. But more glasnost was to come. The young man, whom I will call Ahmad, suddenly volunteered the information that his father had died. When I offered my condolences, he immediately said, "It was back in 1982."

He was referring to the 1982 uprising of the fundamentalist Muslim Brotherhood, which ended in a violent crackdown by Assad's government. I instinctively scanned the street behind us. This was a sensitive subject, but Ahmad did not lower his voice.

"You know what happened. It's no secret: The government left the city in ruins for months so everyone in Syria could come and see what happens if you resist them."

The four weeks of fighting ended in the death of perhaps 20,000 people, nearly all civilians. Almost a fifth of the city was leveled, including some of its finest mosques. Rebels used the minarets to call the populace to arms and as snipers' nests.

While Ahmad was comfortable discussing the slaughter in public, I was still not used to such openness. Before I went on my way, he insisted I have a light supper at his family's house that evening, and it led me into the middle of a family squabble.

"LEAVE ME ALONE!" shouted a 13-year-old boy, who pushed past me as I entered the apartment.

"I want to talk to you!" exclaimed a young man following him.

Ahmad shrugged as he set a pot of tea and a dish of fruit in front of me and turned down the television, set on a Lebanese station showing an American movie.

"My older brother is religious—not a fanatic, but religious. He considers music a sin. My younger brother plays the lute. Muhammad kept warning him to give it up. But Taher wouldn't. So Muhammad smashed his lute into a hundred pieces. That was last year. Taher saved up and bought another lute but keeps it hidden. He keeps it in the neighbors' apartment. But Muhammad heard about it, so he wants to discuss it."

The people of Hamah have a reputation for being religious, although even the most extreme call themselves moderates, none wishing to be taken for sympathizers with the banned Muslim Brotherhood.

"I don't like the fanatics, and I'm glad they're gone," declared Ahmad, slicing a banana on his plate. "We don't have any

WITH FEAST AND FANFARE, the friends and relatives of Hajji Kourbi (above, in white cap) take to the streets of Damascus to welcome him home from the hajj, the pilgrimage to Mecca that all Muslims are encouraged to make at least once in their lives. Neighbors (left) look on as a lamb is slaughtered in his honor.

of the fanatic problem Egypt or Algeria has."

To smash the rebels, the government had gone so far as to call in the air force. The lovely and ancient Kaylani neighborhood on the Orontes River had been destroyed, and the square black-and-white stone minaret of the Grand Mosque, Hamah's most famous landmark, had been bombed to rubble.

"Some of that they had to do. But when it was over—when we *thought* it was over—then the military took its revenge. That was when my father was killed. Imagine my poor mother. We were terrified."

Despite this, Ahmad reiterated that he was proud of Syria's zero-tolerance policy on religious extremists, who had set off bombs and carried out massacres. He also boasted that the president's brother Rifaat al-Assad, who had masterminded the military attack on Hamah, had been exiled. However, Rifaat did resettle in the Damascus suburb of Al Mazzah in 1992, when his mother died.

THE WAVES OF HISTORY that have washed over Syria have often left severe damage, none more than the Crusades, the 11th-, 12th-, and 13th-century campaigns by Christians to wrest Jerusalem from Muslim control. The landscape between the Mediterranean and the desert is still dotted with soaring crusader castles, majestic in their scale and yet monuments to the foolish pride that thought occupation could last forever. Like the Pyramids of Egypt, these fortresses have given life, through tourism and a sense of history, to the land. As I brushed the coast, Syria's long past came into full view.

It was when walking through the rock-strewn precincts of Qalat Salah al Din, a few miles from President Assad's birthplace of Al Qardahah, that I learned about one of the crusaders' legacies. My guide plucked a little four-petaled flower and offered it to me.

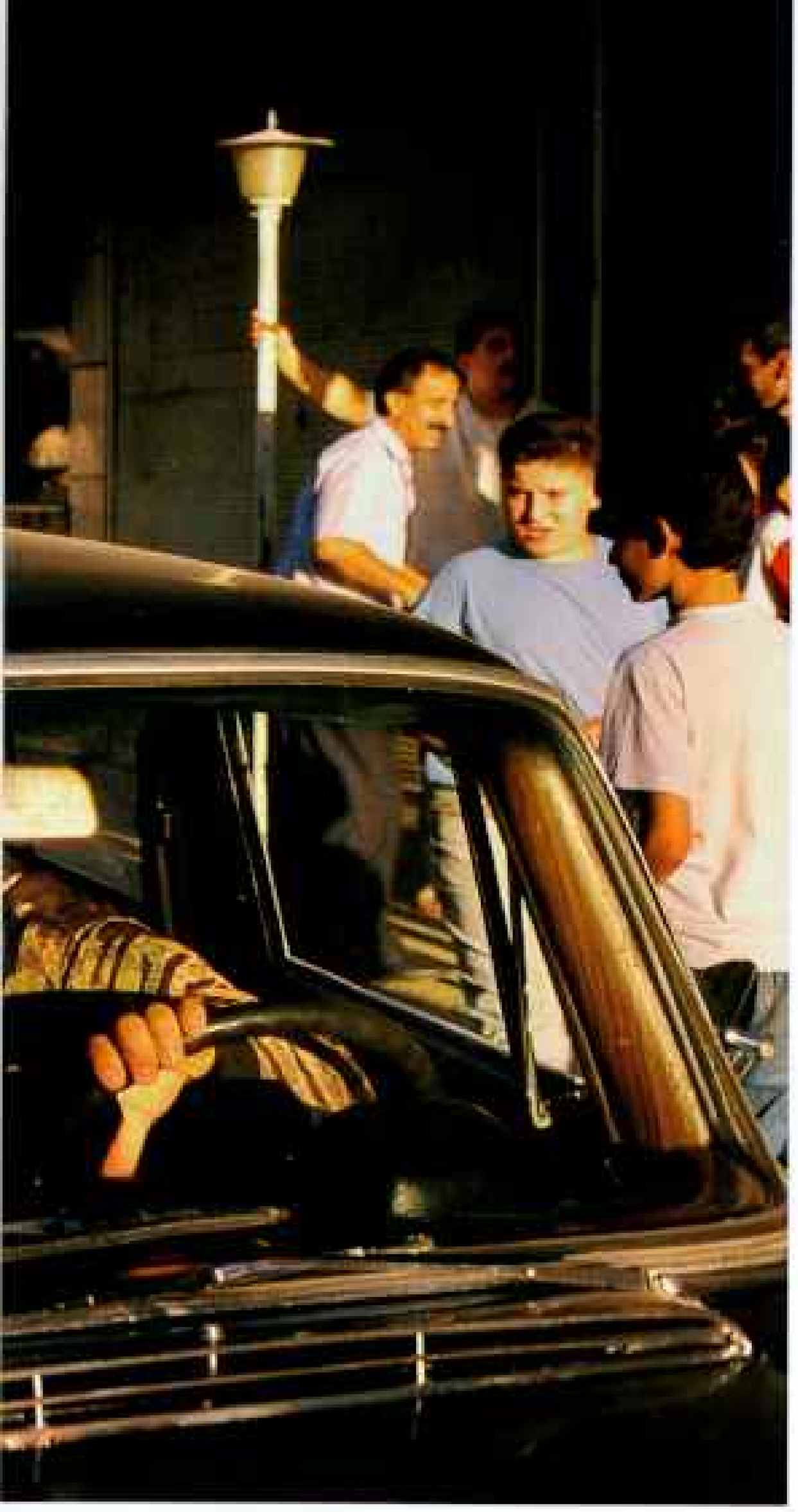
"We call this *delacroix*, or in Arabic *zahrat al-salib*—the flower of the cross. Do you know

FREEWHEELING ALEPPO, a swirl of color and commerce in northern Syria, is a historic trading center that today specializes in textiles, glassware – and having a good time. "Aleppo is as different from Damascus as spring from summer," says a local architect. "There are always friends to see, things to do, deals to be made."

how many influences remain here from those days? You find Muslims in the mountains named George and William. And the Muslim peasants here celebrate St. Barbara's Day." Barbara was a popular medieval saint. She was the protectress against sudden death.

But the most tangible legacies are, of course, the castles themselves. Northwest of Hamah, I had seen the Christian fortress of Qalat al Madiq. Still sheltered by the powerful walls and hilltop location overlooking the wheat fields and ruins of Apamea, it has become a diminutive Syrian town. Here I was struck by the crusader promise fulfilled, but by Arabs: This was a functioning, integrated polity, not an isolated installation. The center of the fortress, about 30 paces wide, was Nasser Square, named for the fiercely Arab nationalist leader of Egypt—a touch of defiant sarcasm within the European battlements.

AT FIRST I WAS GOING TO SKIP the city of Dayr az Zawr—many Syrians smirk at how far away and provincial it is. But it sits on the Euphrates, a surging green giant of a river that is the lifeblood of this arid



nation. The road leads through a spare desert landscape that is undisturbed except by a rare movement of Soviet-made tanks leaving banks of dust in their wake. The clean desert and lusty river reminded me of western Iraq.

"You almost are in Iraq!" insisted Qasim Azzawi, an ophthalmologist and poet I met. "This is Syria, but geographically it is similar to Iraq. But we are Syrians, and we are against the Iraqi regime," he added. Qasim was driving me around the must-sees of Dayr az Zawr: the famous suspension bridge, the Armenian cultural center, the prison.

"We have more political prisoners than Damascus," he commented. It sounded like a boast. Was it? "No! But people in Dayr az Zawr are very political. I've been in prison," he added. "That was in the 1980s; the government cracked down on the leftists along with the Muslim Brotherhood. I was on the left."

We sat and snacked in an open-air café on the riverbank, in view of the tremendous lime green bridge that appears on every postcard of the city. Because he was politically minded as well as a poet, I wanted Qasim's views on a recent controversy: The Syrian-Lebanese poet Adonis, one of the Arab world's greatest writers, had been expelled from the Union of Arab Writers. His sin was attending a UNESCO conference in Spain, boycotted by most Arabs but at which an Israeli delegation was present. Adonis had also reportedly asserted that Israel should be recognized as a neighbor.

"I support his expulsion. I don't just dislike his politics but his ego too. He wants the Nobel Prize. In the West they give the Nobel only to obedient pro-peace people. I want peace too, but I believe Israel should be a secular country. They discriminate against Arabs and all non-Jews."

I wondered if he supported the peace process—what he thought of the controversial notion of Syria extending full diplomatic recognition to Israel. He paused.

"Normalization might cost Syrians their identity. Egypt accepted normalization, but Egypt has a strong cultural identity to fall back on. We are different."

"That is a dangerous point to make," I said. I knew that Syria's national identity, unlike Egypt's, is largely tied to its hard-line opposition to Israel, but I was still surprised by his candor. "I can report you for lacking patriotism!" I told him.

He laughed delightedly. "You don't need to report anything. This is a small town. Everyone in Dayr az Zawr knows I have an American visitor today, and everyone knows I postponed an operation to have lunch with him. And everyone knows my views! And I don't care. These are different times."

"Different times" certainly describes an era when the bookstores in Dayr az Zawr carry the memoirs of George Bush and Norman Schwartzkopf. While Arab radicals regard Operation Desert Storm as an embarrassing uniting of Arabs with Israel's allies, Syria's official policy is one of pride: It had sided with the United States to take part in the liberation of an Arab country. Today Kuwait, tomorrow Palestine. Or, at least, a Palestinian state coexisting with Israel in peace.

Before I left Syria, there was one more person I wanted to speak with. When I found him

BARING FEET and little else, the women of a Muslim family cool themselves on the beach north of Latakia, Syria's busiest Mediterranean port and its window on Europe and beyond. Torn between two worlds—secularized West and Muslim fundamentalist Middle East—

Syria seeks to open its doors economically while somehow controlling the political, cultural, and religious liberalization that would inevitably follow. "This is something we think about," says a typically circumspect government official. "It's a dilemma."

in Damascus, he welcomed me with the traditional Jewish greeting: *Shabbat shalom!*

I WAS NOT EXPECTING MUCH from Yousef Jajati, the head of the Jewish community in Syria. In Arab countries Jewish leaders tend to be more royalist than the king. In my experience you ask them about Israel, and you get a lecture about the evils of Zionism. And, to find my way through the tiny alleys of the ancient neighborhood spreading like a spiderweb west of Amin Street in the Old City, I was accompanied by an employee of the Information Ministry.

Yousef is a middle-aged, mustached man who could easily be an Armenian, Muslim, or any other Syrian merchant. He runs a department store, with a tailor shop upstairs, in downtown Damascus, but I met him on a Saturday morning in the Jewish Quarter, in his synagogue's stone courtyard. Services had just ended.

"There are 22 synagogues in Damascus, including seven major ones," Yousef told me. "This one was founded a few hundred years ago, by descendants of Jews who had fled Spain."

Syrian Jews have been in the spotlight since long before the start of the Arab-Israeli negotiations in 1991. When many Jewish communities in Arab countries emigrated to Israel following its declaration of statehood in 1948, thousands of Syria's Jews stayed put. Before long the government placed heavy restrictions on their departure. When other Syrian identity cards said nothing about religion, those carried by Jews were marked *Musawi*, "follower of Moses." In the early 1990s they were finally allowed to leave, and most did; currently only two of the synagogues are in use. But the story did not end there.

"Some have come back," said Yousef. "One of our teachers tried Paris, but he came back. His father comes and goes on business. They expected to be rich. They did not realize the extent of crime, of social alienation. Here in the Old City, we are a family, Jews and non-Jews. We enjoy our neighbors and trust everyone."

I was curious about how the Syrian Jews had fared during the various Arab-Israeli wars throughout this century.

"We were safe," Yousef commented. "But we fared much better after the 'corrective revolution.' "

This was the movement that brought Assad to power in 1970. It was well-known that Assad, as a member of a religious minority—the Alawite Muslim sect—frowned on strict religious affiliation. It was he who removed the word "Musawi" from the national identity cards of Jews.

"We feel that we can come and go; there is no risk in leaving and none in coming back," said Chhade Katri, a lawyer.

As we talked, some of the 40 or so male worshipers, in dark suits and ties, left the synagogue. Some boys skipped out the front gate, shouting *"Shabbat shalom!"* behind them. Yousef's son Murad, a teenager with braces on his teeth, stood eagerly by, waiting for a chance to interpret, using his English.

I was curious about Yousef's duties as head of the Jewish community that remains here.

THE GREAT DIVIDE between Syria and Israel narrows in the northern Golan Heights, where Syrians stroll on the hillside overlooking Israeli-occupied Majdal Shams, background. Coveted for its military value and water resources, the Golan is also a matter of pride for Assad. And the average Syrian? "We'll have peace, or we won't—that's all," says a man in Damascus, requesting anonymity. "I have other things to worry about besides politics."

So far, he said, he had contacts with every Jewish community in the world except Israel. So far? I prepared myself for a lecture on Palestinian rights. My Information Ministry companion was well within earshot.

"I thank Presidents Clinton and Assad and everyone who wants peace. I mean peace everywhere—not just in the Middle East but in Sarajevo too—everywhere. I have visited Assad and talked about peace, and I felt his desire for it. He knows Syrians want peace. We want it soon. We want it today! I would like to have peace with Israel this afternoon!"

I left the synagogue precincts feeling that, though Syrian peace with Israel was not easy to foresee, peace within Syria itself—suggested by the hope and confidence of this small Jewish presence—seemed not only possible but, in some measure, to exist already. This posed a quandary for me, as a reporter in a country I had always known as pessimistic. Were people smiling because they thought things were fine? Or because they believed things were truly about to change? □

ALFRED S. HART

■ FROM THE GEOGRAPHIC ARCHIVES

Swept Out of Childhood in South Africa

Bristling reed masks, rustling palm skirts, and clay-smeared skin disguise Xhosa dancers from Kentani, a district on the southeast side of the Cape of Good Hope. This photograph was originally published in "Cairo to Cape Town, Overland" in the February 1925 issue. The young men kept their identities secret when performing in public as part of annual coming-of-age ceremonies. After the youths—who were first circumcised, then isolated for three months from their families—completed initiation lessons, their grassy fashions were torched to signify their new adult status. A modified form of the initiation continues to this day.

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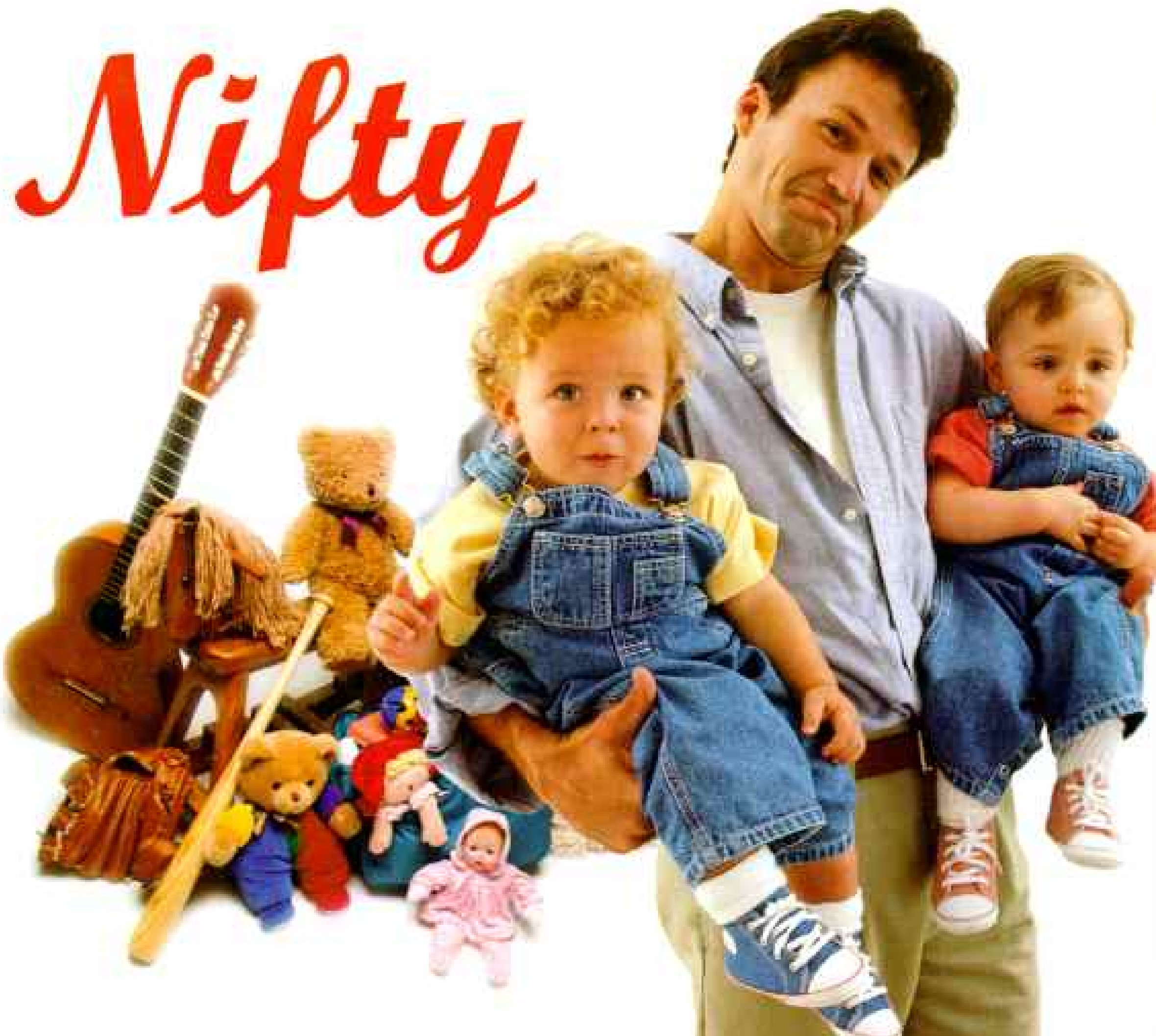

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JULY 1996

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The Cover

A mother leopard grooms her cub in South Africa's Mala Mala Game Reserve. Photograph by Chris Johns

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NGS and the 1996 Olympics

Countries on Parade

WE'RE CARRYING A TORCH for geography during this summer's Olympic Games. On Friday, July 19, during the Opening Ceremony at Atlanta's Olympic Stadium, NBC plans to air Society-provided "geo-graphics" including maps and flags, sound-bites of native languages and music, and video clips. These instant national profiles—displayed on a special computer screen format for the television audience—will help illustrate the physical and cultural geography of selected home countries of the participating athletes.

Starting Early

THE 1963 SHOT-PUT CHAMPION of the summer games played in his Framingham, Massachusetts, backyard, Bill Mallon grew up to write nine books on Olympic history and serve as a consultant for this issue's "Let the Games Begin." "Other kids followed baseball; I kept Olympics statistics," he says. After a stint as a professional golfer, Bill came back to putting shots—of a different sort. He's now an orthopedic surgeon in Durham, North Carolina.

JACK MALLON

LUIS GALDAMEZ

In the Wake of Generosity

READERS REACTED to the photo of Berti de Jesús Castro being carried from his boat in our September 1995 article on El Salvador. The fisherman had lost both legs to a land mine. Letters and donations, including $2,000 from 91-year-old Fern Tainter of California, arrived at the Society soon after Tomasz Tomaszewski's photo appeared; members hoped to help Berti buy a wheelchair. But since he had a wheelchair at home, he asked that the money be spent on an outboard motor for his boat. It arrived in January. "Receiving this motor has been like a miracle," he says. "It has changed my family's life."

Get the Point?

SOME PEOPLE never do take to technology. Longtime GEOGRAPHIC writer Tom Abercrombie is proud of his portable "word processor maintenance kit" (below). "Admittedly, this is 19th-century mechanics, one step beyond charcoal on the back of a shovel," says the author of 31 stories for the magazine, "but processing words has never been the problem. It's finding the words—and making them sing."
—MAGGIE ZACKOWITZ

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Forum

Emperor Penguins

I would add to your beautiful article in the March 1996 issue the fascinating account of the first explorers to enter a winter breeding colony of emperor penguins and collect eggs. This five-week trip was made by Apsley Cherry-Garrard, Lt. Henry "Birdie" Bowers, and Dr. Edward "Bill" Wilson in 1911. They were members of Capt. Robert F. Scott's party overwintering on McMurdo Sound. A theory then was that emperor embryos might provide the missing link between birds and reptiles. The three men endured darkness and hurricane-force winds to travel 70 miles to Cape Crozier, where they collected eggs. Wilson and Bowers died with Scott on his return from the South Pole, but Cherry-Garrard delivered three embryos to the Natural History Museum in South Kensington, England, in 1913.

THOMAS W. SCHMIDLIN
Kent, Ohio

I received this issue during yet another of the snowstorms we had this year. To read about how the emperors endure the bitter winter was inspiring.

GENE DE LISA
Maple Shade, New Jersey

You did not explain why a creature with a body temperature of 96.8°F does not stick to the ice as a barefooted human surely would. As I understand it, a penguin has double-walled blood vessels leading to its feet that act as heat exchangers. The warm blood going down is cooled by the chilled blood coming up, thus reducing the foot temperature to close to the freezing point.

ALAN S. BURRIDGE
Woodstock, Ontario

When I unwrapped the March issue and showed my daughter (age three), she said, "Look, there's a mommy, a daddy, and a baby." My son (age two) said, "Good, good, good." They think animals live lives similar to their own, largely due to the time they spend examining pictures in your magazine.

LORI KARAOSMANOGLU
Potomac, Maryland

Penguin parents take turns tending a chick, so it is likely that one of the adults on the cover is a neighbor mimicking the head-bowed greeting.

Xinjiang

Before the communist Chinese takeover in 1949, the Turkic Muslim population of eastern Turkistan (now Xinjiang) was more than 94 percent of the estimated 14 million total. This figure has greatly changed due to Chinese immigration. Although it is called Xinjiang Uygur Autonomous Region, there is no self-government for the Uygurs.

HABEEB AHMED
Searingtown, New York

I was surprised that the inhabitants of Baojachaozi believe they are at the geographic heart of Asia (page 13), when in fact the Centre of Asia Monument is located in Kyzyl, capital of the Republic of Tuva in the Russian Federation.

TERENCE G. LANGDON
Santa Monica, California

You refer to people having "Indo-European" features, but Indo-European is a linguistic classification not a physical one, and the people speak a Turkic tongue. It is possible their antecedents spoke an Indo-European language. Perhaps you meant Caucasian or white. Such physically distinct peoples as Asian Indians speak an Indo-European language, while many white Europeans (Basques, Estonians, and Finns) do not.

ERIC M. FLAXENBURG
Elverson, Pennsylvania

Hudson River

What strikes me most is the nostalgia reflected in the article and in the minds of the residents of Nyack. To what past ought we return? To the time of the old factories, the original sources of pollution? To the Nyack of the 1950s, with its segregated elementary schools and high dropout rates? Native Americans could suggest a date that the descendants of the Dutch patroons might well object to.

GEORGE STERN
Valley Cottage, New York

Don't look now, but the woman taking her children to Manhattan (pages 72-3) is going in the wrong direction! No way is the river on her left if she is going south into Manhattan. Please do put the railroad and the river back.

MARIAN DYMES
Croton-on-Hudson, New York

The railroad tracks lie on the east side of the Hudson, but this car has seats that face backward. The picture and caption are correct.

The famous landscape painter Thomas Cole (1801-1848) perfected his art in the Catskill Mountains, where he tutored the most celebrated landscape artist of the age, Frederic Edwin Church (1826-1900). Atop a hill with a panoramic view of the Hudson River Valley, Frederic Church built his home, Olana, in the 1870s, an eclectic blend of Persian, Moorish, Oriental, and European designs. Visitors still throng to this artistic mecca.

JOE McELWEE
Drexel Hill, Pennsylvania

Lucy's Family

Author Donald Johanson seems rather subjective about his finds. He rejects the Stony Brook team's findings regarding locomotion by Lucy's kind and

During the past year, the Colorado River carved another millimeter into the Grand Canyon, Santa Ana winds shifted millions of tons of sand around the Mojave Desert, and Jeep engineers added over 40 major advancements to Jeep Grand Cherokee Limited 4x4.

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draws unwarranted generalities regarding their dietary habits from their teeth. Who would have guessed from examining the teeth of modern chimpanzees that they are capable of mounting a combined ground and arboreal pursuit and ambush of colobus monkeys?

R. A. BLAIS
Cupertino, California

Your series on "The Dawn of Humans" has me scratching my head in wonderment. That these people have found hominids is not to be disputed. That they resemble modern man in many ways is obvious. But to conclude that they are in man's lineage is more a statement of faith than of fact. The bones are nothing more than remains of an extinct animal species.

STEPHEN M. STURM
Delaware, Ohio

Macedonia

When I saw the title on the March cover, I expected an article on the region of Macedonia that contains my hometown in northern Greece. Instead it dealt with the Former Yugoslav Republic of Macedonia, FYROM. As I read, the distinction between Macedonians and Greeks was in conflict with my ethnic consciousness, since I grew up regarding myself as a Macedonian Greek. I recognize the FYROM people's right to independence, but supporting their cause would infringe on my rights. A compromise should be possible.

G. IMANIDIS
Binningen, Switzerland

It was Tito who invented the country of Macedonia with its language and history. Tito, a Croat, in 1946 formed the southern area of Serbia as the new Republic of Macedonia. His reason was to weaken Serbia, to have a claim later to Greek Macedonia with access to the Aegean Sea, and to stop Bulgaria from having any claims on Serbian Macedonia.

E. KIRIAGIS
Astoria, New York

President Harry Truman objected to the use of the name Macedonia. Secretary of State Edward Stettinius stated that the name represented "aggressive intentions against Greece." Since the "proud Macedonians" know who they are and trace their ethnicity to the Slavs, why are they usurping Greek names and symbols?

JOHN MOBILOS
North York, Ontario

I was a member of an international team sent to Macedonia to ensure that the UN trade embargo against Serbia was enforced. I witnessed the negative effect it had on Macedonia's economy. I saw Macedonians as a complex people struggling with complex issues in a volatile part of the world. They are a culmination of a troubled past. I hope for peace for all of them, regardless of ethnic origin.

MICHAEL BOSSON
Windsor, Ontario

Sometimes, simple things are the most important.

Walter Duran, Product Manager, Colour TV for Latin America, São Paulo, Brazil.

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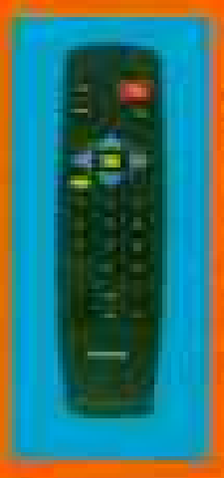

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I'm Walter Duran, product manager for colour TVs in Latin America, working in São Paulo.

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PHILIPS

To state that thousands of Macedonians and Turks were expelled from Aegean Macedonia after the Greeks took over is not the complete story. After four wars between 1912 and 1922, the Allied Powers brokered the exchange of populations. A quarter of a million Macedonians and Bulgarians were evicted from their homes, 1.4 million Greeks from Bulgaria and Turkish Ionia, and 400,000 Turks from Grecian Thrace. Most did not want to give up their homes. The Greeks from Turkey, including my family, settled around Thessaloniki, trading homes with others forced out by greater powers.

JIM XENOS
Lynnwood, Washington

Regarding the closure of the Albanian-language university last year, the problem is not the use of the language in classes but the change in curriculum. Albanian students in Macedonia were supposed to learn that their territory is occupied by Macedonia and historically is a part of Albania. This same tactic led to the situation in the Serbian province of Kosovo. No country will tolerate such behavior, much less finance it.

SLOBODAN KRUCICAN
Bern, Switzerland

As a Bulgarian I was offended by the idea that Bulgaria had "expansionist temptations," a rather strong statement not supported by examples. Bulgaria was the first country to establish diplomatic ties with newly independent Macedonia; currently business between the two is booming.

DIMITAR DROUMEV
Carrboro, North Carolina

To describe early Christians worshiping "almost furtively throughout the Turkish occupation" is misleading. The Ottoman Empire thrived for 623 years because of religious toleration through their *millet* system. When Sultan Mehmed conquered Constantinople in 1453, he reassured the Greek Orthodox Church that they could continue business as usual. When Spain and Portugal expelled the Jews in the 1490s, Sultan Bayezid opened Turkish lands to resettlement.

ERGUN KIRLIKOVALI
Irvine, California

As the author of the first book on the standard Macedonian language published in the U.S., I am well aware of the difficulties of explaining a complex situation in a limited space to a varied audience. Little mention was made of Macedonian-speaking Muslims, who constitute a substantial minority, or that Albania also participated in the partition of Macedonia. But this was a balanced portrayal of the tensions faced by a beleaguered nation.

VICTOR A. FRIEDMAN
Professor of Slavic and Balkan Linguistics
University of Chicago

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JOSEPH H. BAILEY, WHITE HOUSE HISTORICAL ASSOCIATION (WLL)

Gifts to Presidents: Just What They Always Wanted?

THESE BOOTS, crafted by Zeferino and Eli Rios of Mercedes, Texas, were not made for walking but as a gift to President Dwight Eisenhower.

Since George Washington's time, U.S. Presidents have received presents from both ordinary citizens and heads of state. An exhibit of some 200 "Tokens and Treasures" dating back to Herbert Hoover is on display until February 1997 at the National Archives in Washington, D.C. Some are sublimely beautiful, others pure kitsch. This Lyndon Johnson caricature signs a bill with multiple pens to give as souvenirs. The carved whale tooth was sent to Richard Nixon. Presidents must report gifts from Americans valued at more than $250, but most donate everything to their presidential libraries. Ronald Reagan's library alone stores 75,000 items. "People invest their time, money, and emotions on these gifts," says Lisa Auel, the exhibit's curator. "It's a way to directly address the President."

Cornfield of Dreams: an A-maize-ing Site

DON FRANTZ produces Broadway musicals, so he thinks big. When he heard about Britain's Year of the Maze in 1991, it piqued his interest. Then he looked down as he flew across the U.S. and thought, "I could make a maze tomorrow; all I have to do is cut paths in a cornfield."

The result was this maze in Shippensburg, Pennsylvania, linked to the annual corn festival in the town of 5,300. To Frantz the maze, which took up four acres of Jim Witter's farm, was "magic, unbelievable."

Witter planted the corn, and Frantz and local volunteers later cut the paths, following the design of English maze master Adrian Fisher. Some 23,000 people found their way through the labyrinth; school groups used it to hone navigational skills and map reading. This year Frantz is creating mazes in Detroit and Stroudsburg, Pennsylvania, as well as Shippensburg.

As for Witter, 59, the whole thing was thrilling. "I felt like a recycled teenager," he says.

STEVE LISS

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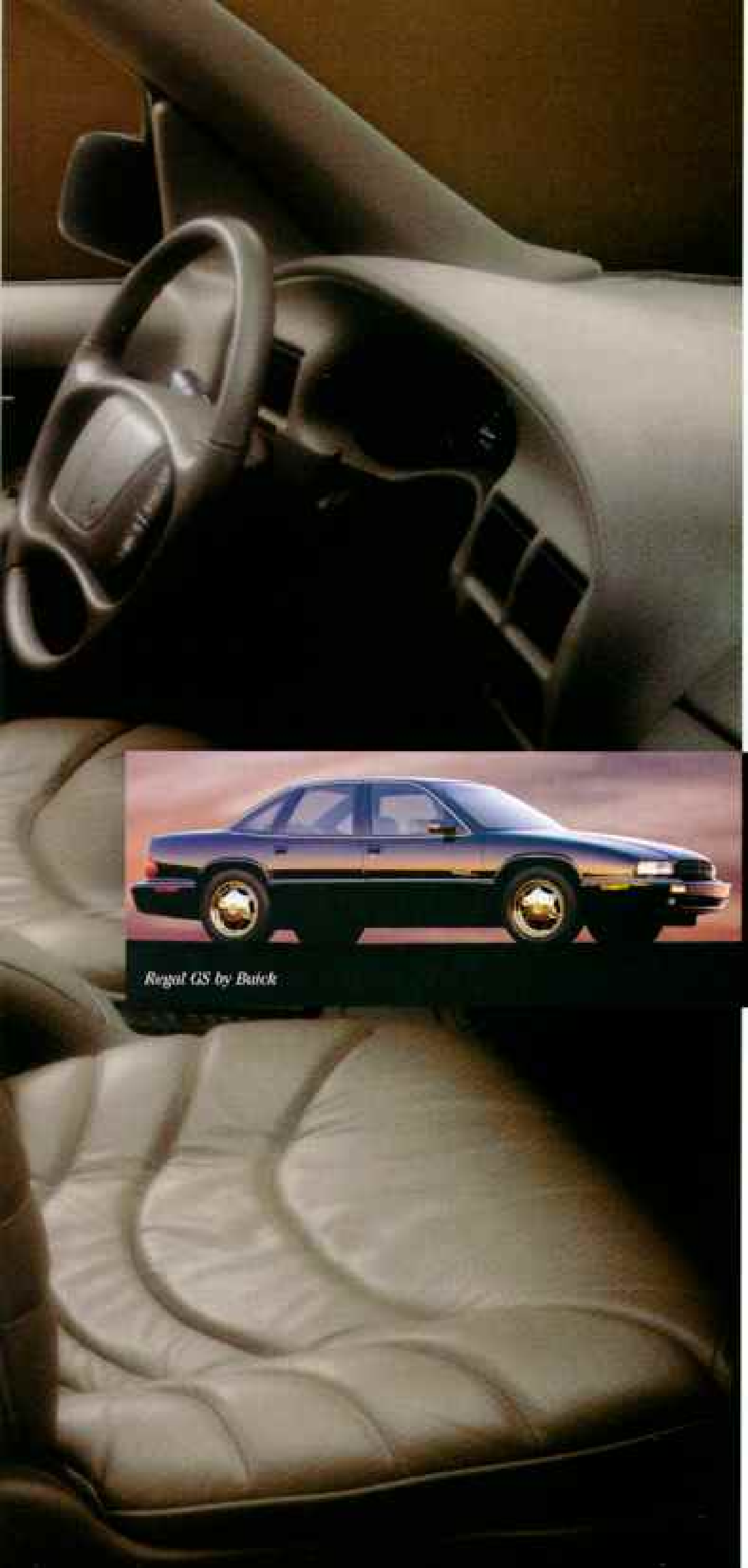

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An Ocean Queen, a Night to Forget

JUST BEFORE DAWN on July 26, 1956, the lights of the stricken *Andrea Doria* cast an ominous glow on the North Atlantic. In thick fog at 11:10 the night before, as she was nearing the end of a voyage from Genoa to New York City, the Italian liner was struck by the Europe-bound Swedish vessel *Stockholm*. By 10:10 a.m. the 697-foot-long "unsinkable" *Andrea Doria* had sunk in 260 feet of water. Forty-six of her passengers and five *Stockholm* crewmen died. But a remarkable 1,660 of *Andrea Doria*'s 1,706 passengers and crew were rescued by a flotilla of ships, notably *Ile de France*, that heard her distress calls.

Named for a 16th-century Genoese admiral, *Andrea Doria* was hailed on her maiden voyage in 1953 as a "new ocean queen." Columnist Robert Ruark called her "as beautiful a piece of new marine construction as I ever saw."

This month 100 survivors will gather at the U.S. Merchant Marine Academy at Kings Point, New York, on the 40th anniversary of the collision. "Some survivors still have nightmares and need this," says organizer David Bright.

Photographer Brian Skerry has dived to "the Everest of shipwrecks" a dozen times since 1991, bringing back hundreds of images, such as this bronze letter from the hull.

BRIAN SKERRY (INSET); UPI, CORBIS-BETTMANN

FRANÇOIS GOHIER

Goodness Snakes Alive! It's Reptile Romance

ALL WRAPPED UP in each other, thousands of male red-sided garter snakes in a spaghetti-like tangle await the emergence of females from underground wintering caves in Manitoba, Canada, so that they can compete for the chance to mate. The snakes' ungainly courtship rituals have long been an object of scientific wonder (NATIONAL GEOGRAPHIC, November 1975). Robert Mason of Oregon State University has learned that look-alike female and male red-sided garter snakes produce chemical signals to help them find each other. Mason has identified the compounds in the lipids in a snake's skin.

Males come out of the caves first (left), then mill around waiting for females, which emerge a few at a time. So how does a female choose from among so many potential partners? She drags a male around during mating as if to test him, Mason believes. If the male doesn't measure up to some as-yet-unknown standard, she may mate again in a few days, hoping to make a better choice.

—BORIS WEINTRAUB

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– Derrick "Suwaimá" Davis, Hopi/Choctaw

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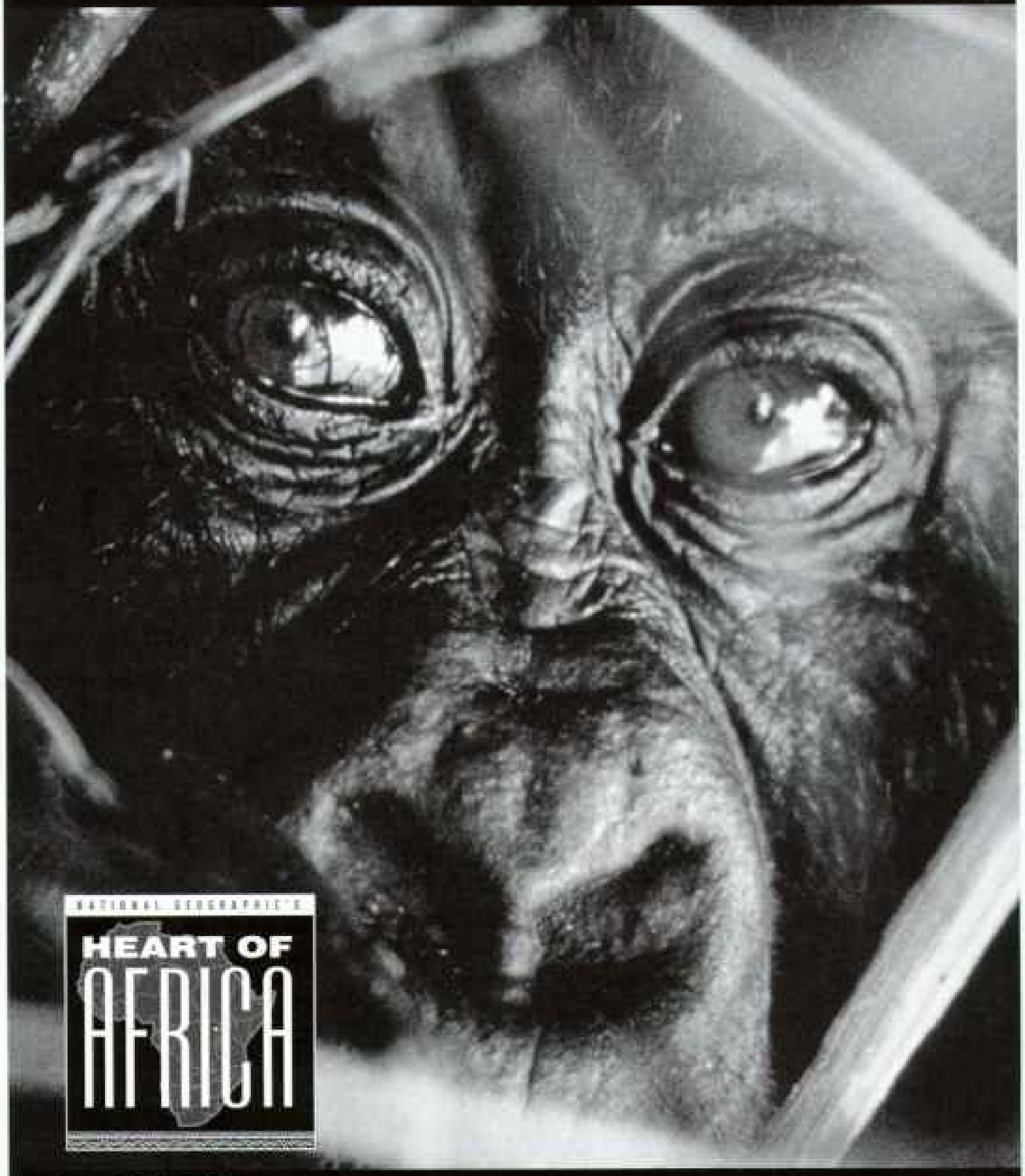

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Desert Tortoise *(Gopherus agassizii)* **Size:** Length, up to 37 cm **Weight:** 3 – 9 kg **Habitat:** Mojave and Sonoran deserts in USA and Mexico **Surviving number:** Unknown; currently in sharp decline Photographed by Jeff Foott

WILDLIFE AS CANON SEES IT

Just out of winter hibernation, a desert tortoise lumbers about foraging on a profusion of wildflowers in springtime bloom. By June the blistering sun will send the tortoise back into its underground burrow where it can stay cool until the late summer rains arrive. With water supplies replenished, adult tortoises restore energy for another hibernation, while tiny hatchlings scramble out from buried nests to begin their own life cycle. The desert tortoise has survived for milleniums in its harsh environment. But within just one tortoise generation, these ancient denizens of the desert have dwindled dramatically, a result of habitat loss and disturbance. 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 Television

VICTORIA STONE AND MARK DEEBLE, SURVIVAL ANGLIA (BELOW); MICHAEL NICHOLS, NGS

■ *HEART OF AFRICA*, PBS
JULY 15, 16, 17, 8 P.M. ET

Journeys Beyond the Farthest Safari

HIDDEN by rich vegetation, isolated on the remote slopes of ancient volcanoes, a mountain gorilla named Rugabo (above) was thought to be safe from poachers. Then, last August, hunters illegally entered Zaire's Virunga National Park and killed the silverback male leader.

Among the last outsiders to see Rugabo alive—before refugees from the war in Rwanda threatened the park's unique ecosystem—was African wildlife filmmaker Alan Root.

Four years in the making, his film about Virunga, "Fire and Ice," opens National Geographic Television's trilogy, *Heart of Africa*. As the first hour unfolds, the mists of Virunga part to reveal the elusive mountain gorillas as well as mud-dappled hippos and snake-eating civets.

In the second program, "Jewel of the Rift," filmmakers Mark Deeble and Victoria Stone plumb the clear waters of Lake Tanganyika and witness a confrontation (left) as highly specialized cichlids protect fry from an intruding terrapin.

"Forest Primeval," also by Root, captures on film the giraffe-like okapi and the fishing genet—a nocturnal creature so rarely seen that its lifestyle remains a mystery.

■ PROGRAM GUIDE

National Geographic's *Heart of Africa,*
PBS. July 15, 16, 17, 8 p.m. ET

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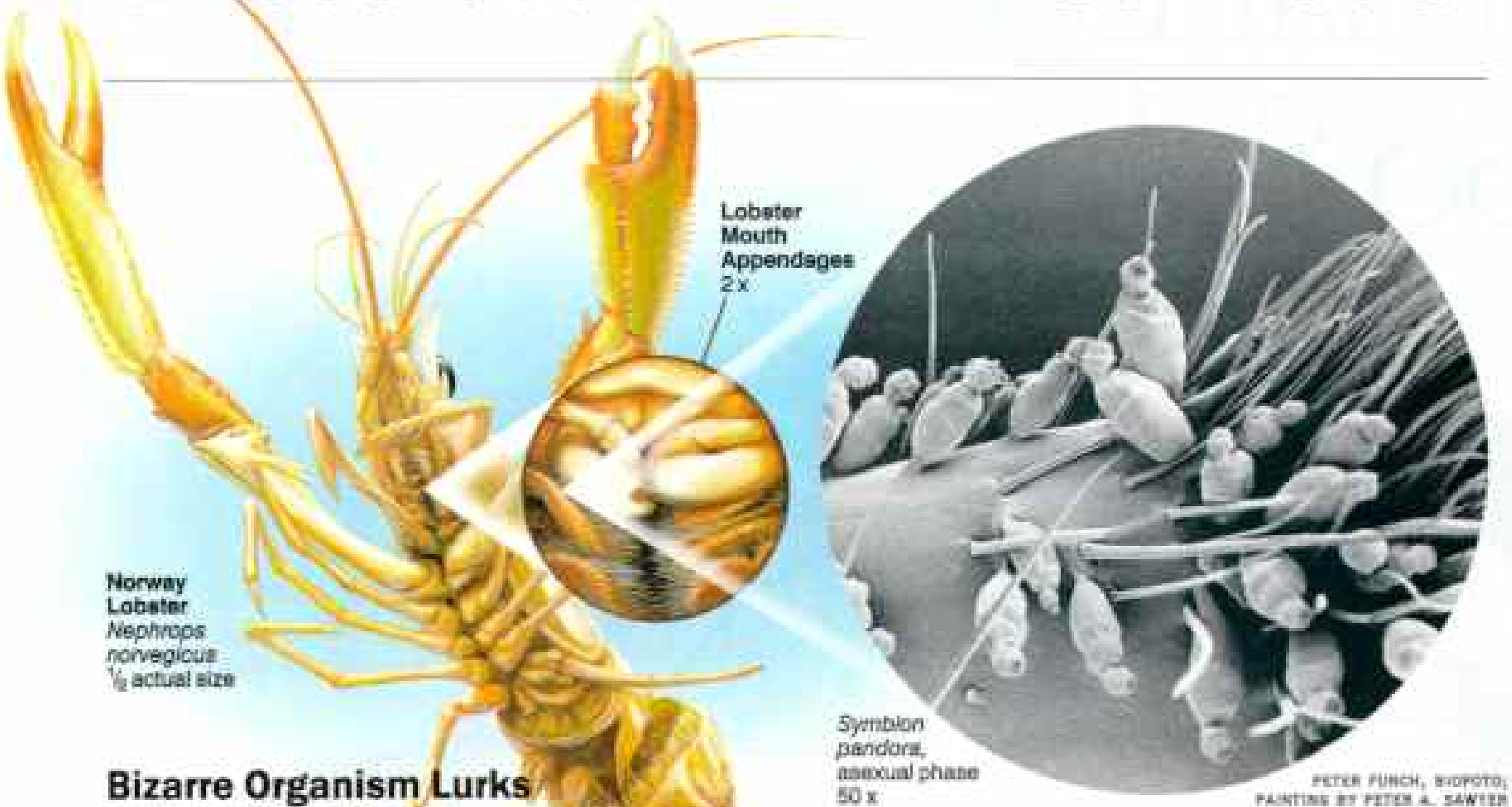

PETER FUNCH, BIOFOTO; PAINTING BY PETER A. SAWYER

Bizarre Organism Lurks on Lobster's Mouth

NEW SPECIES are discovered all the time; some 1.5 million are known to science. Each is also classified within a much larger group sharing the same body plan, called a phylum. Only 35 animal phyla generally are recognized. Make that 36.

Smaller than a millimeter, a creature has been discovered on the mouth of the Norway lobster by researchers Reinhardt Møbjerg Kristensen and Peter Funch of the University of Copenhagen. So strange is its complex life cycle that they have pronounced it not only a new species—*Symbion pandora*—but a new phylum, Cycliophora.

Sometimes the organism reproduces asexually, developing both a bud and a larva. At that stage it anchors itself on a cilia-covered appendage on the lobster's mouth (above right) and feeds on scraps from its host's meals. But lobsters molt frequently, a process that would destroy the stationary hitchhikers. Perhaps chemically sensing the onset of the molt, *Symbion* begin sexual reproduction, growing dwarf males loaded with sperm that will fertilize the eggs of developing females, creating free-swimming individuals. They escape the molting lobster and settle on another mouth to begin the fascinating cycle anew.

ALLAN G. POTTS, BRUCE COLEMAN

Squirrel vs. Squirrel in Britain

UP A PERILOUS TREE, Britain's native red squirrels are being overrun by their larger cousins, North American gray squirrels. Brought to Britain as a novelty in 1876, grays outcompete reds for food. Only about 160,000 reds remain, against an onslaught of some 2.5 million grays.

Grays may have a secret ally. Some scientists suspect that grays carry a virus called parapox, which is killing reds in northern and eastern England. But the cause and the origin of the disease are still unknown. To beef up reds' chances, landowners are urged to plant the proper tree mix. Red squirrels need conifer seeds in winter—they have difficulty digesting acorns, which grays readily wolf down.

Take **SPORANOX** treatment orally for just 3 months and you may see a visible difference.

Soon after you stop taking SPORANOX, you may notice that the new nail growing in appears normal. Since nails need time to grow, you should expect it to be several months before healthy, new nails grow in.

So, now you can give thick, yellowing, brittle nails the boot and start growing fresh, new nails!

Ask your doctor or other healthcare professional about prescribing SPORANOX today.
For more information, call

1-800-595-NAILS ext. 194

What you should know about the safety of SPORANOX: SPORANOX has been well tolerated in patients. In clinical trials involving patients with thick, hard, yellowish, and/or brittle nails (onychomycosis), the following adverse effects led to either a temporary or a permanent discontinuation of treatment: elevated liver enzymes (4%), gastrointestinal disorders (4%), and rash (3%).

WARNING: SPORANOX must not be taken with terfenadine (Seldane®), astemizole (Hismanal®), cisapride (Propulsid®), or oral triazolam (Halcion®).

In rare instances, there were reports of elevated liver enzymes and hepatitis. (If clinical signs and symptoms consistent with liver disease develop, SPORANOX should be discontinued.) If you're pregnant or considering pregnancy, you should not take SPORANOX. Take SPORANOX only as directed by your doctor, and report any adverse effects to your doctor as soon as possible.

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Before prescribing, please consult complete prescribing information of which the following is a brief summary.

WARNING: Coadministration of terfenadine with itraconazole is contraindicated. Serious cardiovascular adverse events, including death, ventricular tachycardia, and torsades de pointes have occurred in patients taking itraconazole concomitantly with terfenadine. This is due to elevated terfenadine concentrations caused by itraconazole. See CONTRAINDICATIONS, WARNINGS, and PRECAUTIONS sections.

Another oral azole antifungal, ketoconazole, inhibits the metabolism of astemizole, resulting in elevated plasma concentrations of astemizole and its active metabolite desmethylastemizole, which may prolong QT intervals. Based on results of an *in vitro* study and the chemical resemblance of itraconazole and ketoconazole, coadministration of astemizole and itraconazole is contraindicated. See CONTRAINDICATIONS, WARNINGS, and PRECAUTIONS sections.

Coadministration of cisapride with itraconazole is contraindicated. Serious cardiovascular adverse events including death, ventricular tachycardia, and torsades de pointes have occurred in patients taking itraconazole concomitantly with cisapride. See CONTRAINDICATIONS, WARNINGS, and PRECAUTIONS sections.

INDICATIONS AND USAGE

SPORANOX (itraconazole capsules) is indicated for the treatment of the following fungal infections in immunocompromised and non-immunocompromised patients:

1. Blastomycosis, pulmonary and extrapulmonary;
2. Histoplasmosis, including chronic cavitary pulmonary disease and disseminated, non-meningeal histoplasmosis;
3. Aspergillosis, pulmonary and extrapulmonary, in patients who are intolerant of or who are refractory to amphotericin B therapy; and
4. Onychomycosis due to dermatophytes (tinea unguium) of the toenail, with or without fingernail involvement.

CONTRAINDICATIONS

Coadministration of terfenadine, astemizole or cisapride with SPORANOX (itraconazole capsules) is contraindicated. (See BOX WARNING, WARNINGS, and PRECAUTIONS sections.)

Concomitant administration of SPORANOX with oral triazolam or with oral midazolam is contraindicated. (See PRECAUTIONS section.)

SPORANOX should not be administered for the treatment of onychomycosis in pregnant patients or in women contemplating pregnancy.

SPORANOX is contraindicated in patients who have shown hypersensitivity to the drug or its excipients. There is no information regarding cross-hypersensitivity between itraconazole and other azole antifungal agents. Caution should be used in prescribing SPORANOX to patients with hypersensitivity to other azoles.

WARNINGS

In U.S. clinical trials prior to marketing, there have been three cases of reversible idiosyncratic hepatitis reported among more than 2900 patients taking SPORANOX (itraconazole capsules). One patient outside the U.S. developed fulminant hepatitis and died during SPORANOX administration. Since this patient was on multiple medications, the causal association with SPORANOX is uncertain. If clinical signs and symptoms consistent with liver disease develop that may be attributable to itraconazole, SPORANOX should be discontinued.

Prior to U.S. marketing, there have been three cases of life-threatening cardiac dysrhythmias and one death reported in patients receiving terfenadine and itraconazole. (See BOX WARNING, CONTRAINDICATIONS, and PRECAUTIONS sections.)

Coadministration of astemizole with SPORANOX is contraindicated. (See BOX WARNING, CONTRAINDICATIONS, and PRECAUTIONS sections.)

Concomitant administration of oral ketoconazole with cisapride has resulted in markedly elevated cisapride plasma concentrations, prolonged QT intervals, and has rarely been associated with ventricular arrhythmias and torsades de pointes. Due to potent *in vitro* inhibition of the hepatic enzyme system mainly responsible for the metabolism of cisapride (cytochrome P450 3A4), itraconazole is also expected to markedly raise cisapride plasma concentrations. Therefore, concomitant use of cisapride with SPORANOX is contraindicated. (See BOX WARNING, CONTRAINDICATIONS, and PRECAUTIONS sections.)

PRECAUTIONS

General: Hepatic enzyme test values should be monitored in patients with preexisting hepatic function abnormalities. Hepatic enzyme test values should be monitored periodically in all patients receiving continuous treatment for more than one month or at any time a patient develops signs or symptoms suggestive of liver dysfunction.

SPORANOX (itraconazole capsules) should be administered after a full meal.

Under fasted conditions, itraconazole absorption was decreased in the presence of decreased gastric acidity. The absorption of itraconazole may be decreased with the concomitant administration of antacids or gastric acid secretion suppressors. Studies conducted under fasted conditions demonstrated that administration with 8 ounces of a cola beverage resulted in increased absorption of itraconazole in AIDS patients with relative or absolute achlorhydria. This increase relative to the effects of a full meal is unknown.

Information for patients: Patients should be instructed to take SPORANOX with a full meal.

Patients should be instructed to report any signs and symptoms that may suggest liver dysfunction so that the appropriate laboratory testing can be done. Such signs and symptoms may include unusual fatigue, anorexia, nausea and/or vomiting, jaundice, dark urine or pale stools.

Drug interactions: Both itraconazole and its major metabolite, hydroxyitraconazole, are inhibitors of the cytochrome P450 3A4 enzyme system. Coadministration of SPORANOX and drugs primarily metabolized by the cytochrome P450 3A4 enzyme system may result in increased plasma concentrations of the drugs that could increase or prolong both therapeutic and adverse effects. Therefore, unless otherwise specified, appropriate dosage adjustments may be necessary.

Coadministration of terfenadine with SPORANOX has led to elevated plasma concentrations of terfenadine, resulting in rare instances in life-threatening cardiac dysrhythmias and one death. (See BOX WARNING, CONTRAINDICATIONS, and WARNINGS sections.)

Another oral azole antifungal, ketoconazole, inhibits the metabolism of astemizole, resulting in elevated plasma concentrations of astemizole and its active metabolite desmethylastemizole which may prolong QT intervals. *In vitro* data suggest that itraconazole, when compared to ketoconazole, has a less pronounced effect on the biotransformation system responsible for the metabolism of astemizole. Based on the chemical resemblance of itraconazole and ketoconazole, coadministration of astemizole with itraconazole is contraindicated. (See BOX WARNING, CONTRAINDICATIONS, and WARNINGS sections.)

Human pharmacokinetics data indicate that oral ketoconazole potently inhibits the metabolism of cisapride resulting in an eight-fold increase in the mean AUC of cisapride. Data suggest that coadministration of oral ketoconazole and cisapride can result in prolongation of the QT interval on the ECG. *In vitro* data suggest that itraconazole also markedly inhibits the biotransformation system mainly responsible for the metabolism of cisapride; therefore, concomitant administration of SPORANOX with cisapride is contraindicated. (See BOX WARNING, CONTRAINDICATIONS, and WARNINGS sections.)

Coadministration of SPORANOX with oral midazolam or triazolam has resulted in elevated plasma concentrations of the latter two drugs. This may potentiate and prolong hypnotic and sedative effects. These agents should not be used in patients treated with SPORANOX. If midazolam is administered parenterally, special precaution is required since the sedative effect may be prolonged. (See CONTRAINDICATIONS section.)

Coadministration of SPORANOX and cyclosporine, tacrolimus or digoxin has led to increased plasma concentrations of the latter three drugs. Cyclosporine, tacrolimus and digoxin concentrations should be monitored at the initiation of SPORANOX therapy and frequently thereafter, and the dose of these three drug products adjusted appropriately.

There have been rare reports of rhabdomyolysis involving renal transplant patients receiving the combination of SPORANOX, cyclosporine, and the HMG-CoA reductase inhibitors lovastatin or simvastatin. Rhabdomyolysis has been observed in patients receiving HMG-CoA reductase inhibitors administered alone (at recommended dosages) or concomitantly with immunosuppressive drugs including cyclosporine.

When SPORANOX was coadministered with phenytoin, rifampin, or H$_2$ antagonists, reduced plasma concentrations of itraconazole were reported. The physician is advised to monitor the plasma concentrations of itraconazole when any of these drugs is taken concurrently, and to increase the dose of SPORANOX if necessary. Although no studies have been conducted, concomitant administration of SPORANOX and phenytoin may alter the metabolism of phenytoin; therefore, plasma concentrations of phenytoin should also be monitored when it is given concurrently with SPORANOX.

It has been reported that SPORANOX enhances the anticoagulant effect of coumarin-like drugs. Therefore, prothrombin time should be carefully monitored in patients receiving SPORANOX and coumarin-like drugs simultaneously.

Plasma concentrations of azole antifungal agents are reduced when given concomitantly with isoniazid. Itraconazole plasma concentrations should be monitored when SPORANOX and isoniazid are coadministered.

Severe hypoglycemia has been reported in patients concomitantly receiving azole antifungal agents and oral hypoglycemic agents. Blood glucose concentrations should be carefully monitored when SPORANOX and oral hypoglycemic agents are coadministered.

Tinnitus and decreased hearing have been reported in patients concomitantly receiving SPORANOX and quinidine. Edema has been reported in patients concomitantly receiving SPORANOX and dihydropyridine calcium channel blockers. Appropriate dosage adjustments may be necessary.

The results from a study in which eight HIV-infected individuals were treated with zidovudine, 8 x 0.4 mg/kg/day, showed that the pharmacokinetics of zidovudine were not affected during concomitant administration of SPORANOX, 200 mg b.i.d.

Carcinogenesis, Mutagenesis and Impairment of Fertility: Itraconazole showed no evidence of carcinogenicity potential in mice treated orally for 22 months at dosage levels up to 80 mg/kg/day (approximately 10x the maximum recommended human dose [MRHD]). Male rats treated with 32 mg/kg/day (3.1x MRHD) had a slightly increased incidence of soft tissue sarcoma. These sarcomas may have been a consequence of hepatic hydroxymethylation, which is a response of rats, but not dogs or humans, to chronic itraconazole administration. Female rats treated with 50 mg/kg/day (4.2x MRHD) had an increased incidence of squamous cell carcinoma of the lung (2/50) as compared to the untreated group. Although the occurrence of squamous cell carcinoma in the lung is extremely uncommon in untreated rats, the increase in this study was not statistically significant.

Itraconazole produced no mutagenic effects when assayed in appropriate bacterial, non-mammalian and mammalian test systems.

Itraconazole did not affect the fertility of male or female rats treated orally with dosage levels of up to 40 mg/kg/day (3x MRHD) even though parental toxicity was present at this dosage level. More severe signs of parental toxicity, including death, were present at the next higher dosage level, 160 mg/kg/day (12x MRHD).

Pregnancy: Teratogenic Effects, Pregnancy Category C: Itraconazole was found to cause a dose-related increase in maternal toxicity, embryotoxicity and teratogenicity in rats at dosage levels of approximately 40 [40] mg/kg/day (3.2x MRHD) and at more at dosage levels of approximately 80 mg/kg/day (10x MRHD). In rats, the teratogenicity consisted of major skeletal defects; in mice it consisted of encephalocystocele and/or exencephalia.

There are no studies in pregnant women. SPORANOX should be used for the treatment of systemic fungal infections in pregnancy only if the benefit outweighs the potential risk. SPORANOX should not be administered for the treatment of onychomycosis to pregnant patients or to women contemplating pregnancy. SPORANOX should not be administered to women of child-bearing potential for the treatment of onychomycosis unless they are taking effective measures to prevent pregnancy and the patient begins therapy on the second or third day of the next normal menstrual period. Effective contraception should be continued throughout SPORANOX therapy and for 2 months following treatment.

Nursing Mothers: Itraconazole is excreted in human milk; therefore, SPORANOX should not be administered to nursing women.

Pediatric Use: The efficacy and safety of SPORANOX have not been established in pediatric patients. No pharmacokinetic data are available in children. A small number of patients age 5 to 16 years have been treated with 100 mg/day of itraconazole for systemic fungal infections and no serious unexpected adverse effects have been reported.

In three toxicology studies using rats, itraconazole induced bone defects at dosage levels as low as 20 mg/kg/day (2.5x MRHD). The indicated defects included reduced bone plate activity, thinning of the bone compacts of the large bones and increased bone fragility. At a dosage level of 80 mg/kg/day (10x MRHD) given one year or 160 mg/kg/day (20x MRHD) for six months, itraconazole induced small tooth pulp with hypocellular appearance in some rats.

While no such bone toxicity has been reported in adult patients, the long-term effect of itraconazole in pediatric patients is unknown.

HIV-infected Patients: Because hypochlorhydria has been reported in HIV-infected individuals, the absorption of itraconazole in these patients may be decreased.

The results from a study in which eight HIV-infected individuals were treated with zidovudine, 8 x 0.4 mg/kg/day, showed that the pharmacokinetics of zidovudine were not affected during concomitant administration of SPORANOX 100 mg b.i.d.

ADVERSE REACTIONS

In U.S. clinical trials prior to marketing, there have been three cases of reversible idiosyncratic hepatitis reported among more than 2900 patients. One patient outside the U.S. developed fulminant hepatitis and died during SPORANOX (itraconazole capsules) administration. Because this patient was on multiple medications, the causal association with SPORANOX is uncertain. (See WARNINGS section.)

ONYCHOMYCOSIS:

Adverse events in the following table led to either temporary or permanent discontinuation of treatment:

Body System: Adverse Event	Incidence (%) n=1125
Elevated Liver Enzymes (>5x normal range)	4%
Gastrointestinal Disorders	4%
Rash	3%
Hypertension	2%
Orthostatic Hypotension	1%
Headache	1%
Malaise	1%
Myalgia	1%
Vasculitis	1%
Vertigo	1%

SYSTEMIC FUNGAL INFECTIONS:

Adverse experience data in the following table are derived from 462 patients treated for systemic fungal disease in U.S. clinical trials, who were immunocompromised or receiving multiple concomitant medications. Of these patients, treatment was discontinued in 10.5% of patients due to adverse events. The median duration before discontinuation of therapy was 81 days, with a range of 3-776 days. The table lists adverse events reported by at least 1% of patients.

Body System / Adverse Event (Incidence ≥ 1%)	Incidence (%)
Gastrointestinal Disorders	
Nausea	10.6
Vomiting	5.1
Diarrhea	3.5
Abdominal Pain	1.5
Anorexia	1.2
Body as a Whole	
Edema	3.5
Fatigue	2.8
Fever	2.5
Malaise	1.7
Skin and Appendages	
Rash	8.6*
Pruritus	2.3
Central and Peripheral Nervous System	
Headache	3.0
Dizziness	1.7

Body System: Adverse Event (Incidence ≥ 1%)	Incidence (%)
Psychiatric Disorders	
Libido decreased	1.2
Somnolence	1.2
Cardiovascular Disorders	
Hypertension	3.2
Metabolic and Nutritional Disorders	
Hypokalemia	2.0
Urinary System Disorders	
Albuminuria	1.7
Liver and Biliary System Disorders	
Hepatic function abnormal	2.7
Reproductive Disorders, Male	
Impotence	1.2

*Rash tends to occur more frequently in immunocompromised patients receiving immunosuppressive medications.

Adverse events infrequently reported in all studies included: constipation, gastritis, depression, insomnia, tinnitus, menstrual disorder, adrenal insufficiency, gynecomastia and male breast pain.

In worldwide postmarketing experience with SPORANOX, allergic reactions including rash, pruritus, urticaria, angioedema and in rare instances, anaphylaxis and Stevens-Johnson syndrome, have been reported. Marketing experiences have also included reports of elevated liver enzymes and rare hepatitis. Although the causal association with SPORANOX is uncertain, rare hypertriglyceridemia and isolated cases of neuropathy have also been reported.

OVERDOSAGE

Itraconazole is not removed by dialysis. In the event of accidental overdosage, supportive measures, including gastric lavage with sodium bicarbonate, should be employed.

No significant lethality was observed when itraconazole was administered orally to mice and rats at dosage levels of 320 mg/kg or to dogs at 200 mg/kg.

U.S. Patent No. 4,267,179

Rev. April 1995, September 1995

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A Killing Field for Birds

WHEN NUISANCE BIRDS foul barns with their droppings, some farmers take drastic action. Last December a New York farmer used a metal perch laced with the pesticide fenthion to kill starlings. Roosting birds absorbed fenthion through their feet, died, and were dumped in a field. There crows fed on them and also died. Then. . . .

"A hunter brought us this red-tailed hawk. It was eating a crow when it collapsed," says Dona Tracy (left) of the Hudson Valley Raptor Center. That hawk survived, but five others did not. The fenthion perches were banned by New York State in 1991; charges may be brought against the farmer. Birds of prey have been poisoned in the U.S. by fenthion on at least eight occasions since 1989. The EPA may issue tougher federal rules on fenthion this summer.

JULIE FLICKER SHOPE

Coral Disease Surfaces in the Florida Keys

SPREADING SO QUICKLY that "you can almost watch it," says marine biologist Steven Miller, a hitherto unknown malady has hit reefs in the Florida Keys. Called white-line disease, it was first reported last June by a tropical fish collector. The scourge mainly kills elliptical star coral (below left), among the loveliest species to diving tourists, although 17 other species have also been afflicted.

ROBERT E. SCHROEDER (INSET, RIGHT); DAN BURTON PHOTOGRAPHY

The disease usually attacks the bottom of the coral first, leaving white skeleton. "In some sites as much as 40 percent of the star coral is dead," says Miller, of the University of North Carolina at Wilmington.

He says the disease now stretches from north of Miami to the lower keys; this summer researchers are checking for further spreading.

The culprit? "It could be a bacterium, but there's seldom just one cause," Miller says. "No one really knows yet."

Butterfly Flutters Back

ONCE FEARED EXTINCT in Florida, the atala butterfly has been rescued by a native plant—the coontie.

Atala caterpillars feed mainly on coontie leaves. People once used the plants—settlers made arrowroot from them. The plants became scarce; that, habitat loss, and competition from another caterpillar species led to the atala's decline. Then in 1979 naturalist Roger Hammer found a few atalas on Key Biscayne. He placed coontie plants near the butterflies, which laid eggs on them. When the eggs hatched, the larvae were moved to a botanical garden. From them other atalas were reared. "Now people are planting coonties in their yards to attract atalas," he says.

—JOHN L. ELIOT

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On Assignment

LOUIS PSIHOYOS

■ GOBI DESERT DINOSAURS

A Writer Comes Clean

HIS "OFFICE" had few amenities besides a breathtaking view. But freelancer DONOVAN WEBSTER worked at his desk daily before the sun got too hot. The desert took its toll. "I shaved my head before I left home; I was told I wouldn't shower for six weeks," he says. "I wore these same clothes the whole time too. This photo was taken early in the trip. I look way too clean." Don's book, *Aftermath*, about the social and environmental effects of 20th-century wars, will be published this fall.

■ SOUTH AFRICA'S PARKS

A Photographer Horns In

A TRANQUILIZED RHINO isn't tranquil for long, says staff photographer CHRIS JOHNS, in Mozambique covering the rescue on pages 36-7. "Once I photographed one who'd been given an antidote," he recalls. "The handler said, 'If you don't move in the next 30 seconds, this animal will kill you.' I moved. Then that rhino exploded!" Chris, who grew up on an Oregon farm, was joined by his wife and daughters in South Africa. "This story," he says, "felt like home to me."

KENT J. KOBERSTEEN, NATIONAL GEOGRAPHIC STAFF

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