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NATIONAL GEOGRAPHIC

PETRA

Ancient City of Stone 116

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NATIONAL GEOGRAPHIC

From the Editor

LIKE MANY of the world's fascinating places, the traditional tomb of Moses' brother Aaron is in the middle of nowhere. Starting out from the ancient city of Petra, I spent six hours under a relentless Jordanian sun, bobbing and swaying atop a camel, to get there. And it was worth every sun-seared second.

Looking down on the barren landscape from atop the mountain called Jebel Haroun (top right), it was easy to imagine myself, guide Hamoudi al-Bedoul, and Don Belt, the author of this month's story on Petra, as the first people to make this journey since biblical times. But at our campsite a few hundred feet below the summit I saw just how wrong such an assumption would be. Carved into the rock was an Arabic inscription: "Fulan, the one who is poor in Allah's sight, comes to this holy place." According to the date, Fulan preceded us to this spot by 688 years.

From its earliest years NATIONAL GEOGRAPHIC has brought the world's most remarkable sites, no matter how remote, to its readers. When Editor Melville Bell Grosvenor visited Angkor Wat in Cambodia in 1959 (lower right), the magazine was preparing one of the last looks at the magnificent temple complex before it was ravaged by war. But armed conflict is not the only threat to such sites. They can also be loved to death by visitors who accidentally break things, wear down fragile structures, or walk off with seemingly insignificant souvenirs.

At the GEOGRAPHIC we sometimes worry that an article about an intriguing, yet fragile site may lead to too many visitors, who will in turn threaten a delicate environment or structure or way of life. That's why, on rare occasions, we may not cite the exact location of a particular subject, like a crumbling cliff dwelling.

After all, not every threatened site is buffered from civilization by a six-hour camel ride.

Bill Allen

Crossroads of Asia

SOUTH

Plying the waters of prosperity, ships in Hong Kong crowd one of the world's busiest harbors, a bridge between China and the international economy. Along the gilded rim of the South China Sea, trade has built cities and fortunes. But dense populations and industry tax the region's environment, and overlapping claims to ocean riches threaten its peace.

CHINA SEA

BY TRACY DAHLBY

PHOTOGRAPHS BY MICHAEL YAMASHITA


4CGD-PPC

EL NIDO, PHILIPPINES

Restricted by law to hooks, nets, and other handgear, Filipinos fish in a protected area where they are prohibited from using explosives. Elsewhere in the South China Sea, blast and cyanide fishing, pollution, and coastal development endanger 80 percent of coral reefs.

U. S. S. BLUE RIDGE

Crew members of the U.S. Seventh Fleet's flagship pump gravity during a cruise from Malaysia to Hong Kong. At the Cold War's end the U.S. Navy withdrew from its base in the Philippines but, citing "freedom of the seas," still patrols nearby in one of the world's most traveled shipping lanes.

After a long flight over the southeasterly reaches of the South China Sea, the C-130 transport plane banged down on Pagasa atoll in the middle of the Spratly Islands. Getting out to stretch my legs on the crushed coral runway, I could see a clump of spindly trees, a mossy concrete pillbox or two, and then nothing for 360 degrees but dazzling, jet-blue sea.

"*This* is Armageddon?" I thought, chuckling to myself, as 50 Filipino troops, armed with rifles, sauntered smilingly toward the tree line.

Not that there is anything funny about the Spratlys. Sporadic shooting sprees have left dozens of sailors and fishermen from neighboring countries dead or wounded as their governments vie for control of this scattered rosary of coral specks and sandbars. Officials in both Washington and Beijing peg the Spratlys as a possible trigger for a showdown between the United States and China.

But from Pagasa, a Philippine military encampment since the early 1970s, the Spratlys appeared to me less to augur the end of the world than to occupy it. From atop its battered concrete observation tower the island looked deceptively small, a disk of land that seemed no bigger around than Yankee Stadium, with a sparkling lagoon where huge brains of mottled coral communicated with a shallow bottom. Watching surf pound the thin reef wall separating the turquoise pool from the wild indigo sea, I felt my heart sink a little at the beauty of it all. How could any place this remote be the source of so much trouble?

The answer, in a word, is location. The Spratlys lie along one of the most strategic shipping routes in the world, a deepwater slot that zigzags up the middle of the South China Sea for 1,700 miles from the Strait of Malacca in the southwest to Hong Kong in the north (map, following pages). Each day some 200 merchant vessels haul oil from the Middle East (including 80 percent of Japan's total supply) and thousands of other riches. Shrimp come from Thailand, rice from Vietnam, Nike sneakers from Indonesia—much of it to stock store shelves in the West. What's more, the Spratlys could harbor sizable untapped oil reserves.

And nations have been willing to fight over this strategic property. Ten years ago a brawl with a Chinese gunboat here resulted in the death of at least 70 Vietnamese seamen. In 1995 the Filipinos went ballistic when the Chinese occupied nearby Mischief Reef and dynamited coral to put up what looked from reconnaissance photos like rickety backyard tree houses. A Filipino naval patrol responded by blowing up a Chinese structure, which brought a request from the U.S. to stop the retaliation before it got out of hand.

The delicate job of keeping this strategic ocean artery open for business ranks high on the U.S. list of global security concerns. But what keeps its big gray-hulled warships on permanent patrol there may increase the risk of a collision among major geopolitical interests. When and if a newly robust China, which claims historical deed to the entire sea, acquires

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TRACY DAHLBY has covered Asia as a correspondent for the *Washington Post*, *Newsweek*, and the *Far Eastern Economic Review*. Photographer MICHAEL YAMASHITA calls the South China Sea his favorite place to travel.

PAGASA ISLAND, SPRATLY ARCHIPELAGO

Staking a claim, the Philippines built this airfield to carry troops to a speck of land that China, Taiwan, and Vietnam also call their own. The United States pledges not to intervene in the contested Spratlys.

the naval weaponry to enforce its ambitions, will the U.S. be forced to get tough?

Publicly American officials downplay the potential danger, but privately they worry. "I just hope they don't find oil in the Spratlys," a Navy officer told me.

FOR 2,500 YEARS the South China Sea has seen one scramble after another for its limited and valuable resources. Early navigators—Malays, Chinese—braved its murderous typhoons, soul-numbing calms, and mysterious monsoon currents. They chased the lure of sandalwood and silk, teas and spices, over a no-man's-land of reefs and shoals, establishing its first trading routes. Beginning in the 1500s, European—and eventually American—fortune hunters sailed in, pursuing visions of God, gold, and glory. They were spellbound, as Joseph Conrad put it, by "dark islands on a blue reef-scarred sea." Pragmatic colonial powers meanwhile set up elaborate engines for pumping tin, antimony, rubber, nutmeg, gold, and other natural treasures to the outside world.

Today the old, semi-enclosed sea is more vital to the global economy than ever. Shaped like a hammerhead shark with a weight problem, the 1.4-million-square-mile body of water carries roughly a third of the planet's shipping and could harbor *trillions* of dollars in undersea deposits of oil and natural gas.

Survival Space

Contradictory claims crisscross the South China Sea, surrounded by what were, until the recent Asian financial crisis, some of the world's fastest developing nations. Overfishing exhausts catches close to shorelines here, and economic growth has outpaced existing oil supplies. Countries claim sovereignty over rocks, shoals, and reefs to establish national outposts for asserting ownership of fishing grounds and the petroleum believed to lie beneath.

Under the United Nations Convention on the Law of the Sea, countries may designate areas within 200 nautical miles of their coasts as exclusive economic zones, but across the South China Sea, especially in the Spratly Islands, zones overlap. They also intersect historical claims by the Philippines, Vietnam, and China and Taiwan—the latter both advancing the same boundaries.

While diplomats talk, navies raise flags, arrest fishermen, blockade oil rigs, and sometimes fire shots. In 1988 China sank Vietnamese ships, killing at least 70 sailors, before taking several of the Spratlys—the most serious clash since it seized the Paracel Islands from Vietnam in 1974. Tensions fuel a local arms race as well as fears that China aims to dominate all Asia by controlling the sea. Many experts, however, argue that China's military is too weak and its leadership too pragmatic to follow that course.

MYANMAR (BURMA)

C H I

VIETNAM

Hanoi

Haiphong

Gulf of

LAOS

THAILAND

Chao Phraya R.

Bangkok

CAMBODIA

Phnom Penh

Ho Chi Minh City (Saigon)

Vung Tau

Kompong Som

Gulf of Thailand

MALAYSIA

Kuala Lumpur

Strait of Malacca

SINGAPORE

Sentosa Island

Riau Archipelago

EQUATOR

INDONESIA

SUMATRA

100°E

N A

Xiamen

Taipei

Taiwan Strait

TAIWAN

Shantou

Kinmen (Quemoy)

MACAU (Portugal)

Guangzhou

Kaohsiung

Hong Kong

Beihai

Zhanjiang

Pratas Reef

120°

Haikou

Tonkin

Hainan

20°

Sanya

Da Nang

Paracel Islands

Scarborough Reef

Subic Bay

Manila

LUZON

China Sea

Nha Trang

Cam Ranh

Pagasa Island (Thitu)

Spratly

Occupied by Taiwan

Occupied by China

Mischief Reef

Occupied by Vietnam

Islands

Occupied by the Philippines

Occupied by Malaysia

PALAWAN

El Nido

Kota Kinabalu

Muara

Bandar Seri Begawan

BRUNEI

MALAYSIA

BORNEO

Kuching

INDONESIA

NEGOTIATED MARITIME BOUNDARY

- Brunei
- Indonesia
- Malaysia
- Thailand

- 200-nautical-mile limit
- Approximate range of Chinese claim
- Major shipping lane

- Oil field
- Gas field
- Pipeline

0°

Scale at Equator: 1 inch = 166 miles or 1 centimeter = 105 kilometers

NATIONAL GEOGRAPHIC MAPS

The tide is out for the owners of these boats in the city of Sanya. Like many small fishermen, they are left with dwindling catches near shore as larger boats pursue fish with sonar and bigger nets.

With so much up for grabs, the ten Asian nations that crowd the sea's coastline view these waters and its prizes as a source of national pride—and survival. In 1995 the Association of Southeast Asian Nations (which includes all the littoral states except China, Cambodia, and Taiwan) pledged to "refrain from taking actions that destabilize the region." But as Lee Lai To, former chairman of the Singapore Institute for International Affairs, told me, "*no one* wants to make any concessions."

Exactly what China intends, meanwhile, is anybody's guess, but there is little doubt about how most Chinese feel when it comes to questions of ownership. During my travels I stood on the bridge of a pitching cargo ship while the Chinese second officer hovered over a nautical chart to give me a geography lesson.

"China owns all of this." His finger looped around the entire sea, including territory also claimed by Vietnam, Malaysia, the Philippines, Brunei, Indonesia, Taiwan, and possibly Thailand and Cambodia.

"What belongs to China's neighbors?" I asked.

"It's China! All China!" he said. His finger marched from the Paracel Islands in the northwest through the Spratlys in the southeast. It paused over a jot of land near Luzon in the Philippines. "This might belong to the Philippines," he mused. "But probably China!"

To get a firsthand view of this disputed territory, I spent three months hopscotching the region, traveling north to south, down the coasts of China and Vietnam, then east to west, around the horn to Thailand and Singapore. I shuttled between the sea's two great port cities, Singapore and Hong Kong—aboard a Chinese freighter and again as a guest of a bristling U.S. Navy aircraft-carrier battle group. By the time the journey ended, I had viewed a scuttled pirate ship in the milky green waters off Indonesia's Riau islands, survived nerve-racking climbs up and down ships' ladders in heavy seas, and tasted the combative spirit with which the peoples of the South China Sea attack their fate.

It began one steamy evening as the sun dropped behind the green cone of Hong Kong's Victoria Peak and I hauled my duffel bag along the dock toward a boxy cruise liner called the *Star Pisces*. On the bridge Captain Peder Nilsson, blond and gruff, looked radioactive in the gilt-edged twilight as he eased the stern away from the Ocean Terminal. Freighters, hydrofoils, water taxis, ships of every size and type moved in all directions at once as their lights—amber, hot white, and red—streaked the viscous waters.

Below him the decks of the *Pisces* throbbed with nervous energy. Layered like a wedding cake, with staterooms, a beauty salon, a nightclub, and three casinos, the ship bustled with 1,977 prosperous middle-class Hong Kong residents bound for an island off China's southern seaboard. Squealing teenagers mobbed a fragile-looking Cantonese pop singer. Younger kids made a beeline for the huge video arcade, while grown-ups, pushing their way into the ship's five restaurants, ignored pleas for a "mandatory" life jacket drill.

Such restlessness had helped transform Hong Kong from a desolate rock into the free-market dynamo that now glided past the *Pisces*' picture windows, its office towers blazing with light. But now my fellow passengers faced a new element of risk: Four days earlier, amid skirling bagpipes and booming lion drums, they had watched Hong Kong revert to Chinese sovereignty after 156 years of British rule.

To unwind, the passengers headed for the casinos. In a big L-shaped room furious with sound and motion, they elbowed for space at crap tables, baccarat tables, and tables for games I did not know, slapping down big Hong Kong notes as they went.

"Aiya!" cried a bespectacled matron, smacking her forehead as a blackjack dealer drew 21 to her 18. Undaunted, she inched her last chip forward—then turned up a winning hand.

Such gutsiness paid off for her and struck me as symbolic too. While for 1.2 billion mainlanders the British handover was a source of soaring nationalistic pride, the 6.5 million Chinese residents of Hong Kong, who had prospered over the years precisely by not being

SOUTHEAST OF HONG KONG

Showered with abundance by China's experiments with capitalism, residents of Hong Kong pay $1,300 each to rough it on an Outward Bound voyage featuring saltwater baths. Ferrying between two of China's laboratories of free enterprise—Haikou and Beihai—workers sleep away a 12-hour journey that costs six dollars—three days' pay at minimum wage.

NORTH OF HAINAN

Would the new China, now freed from its colonial past, prove a political heavy or an enlightened landlord? . . . It was too early to tell. . . .

in China, viewed events with mixed emotions. "When I saw the new flag go up," a Hong Kong businesswoman in her late thirties told me, recalling the ceremonies on TV, "I felt this intense fear deep inside."

Would the new China, now freed from its colonial past, prove a political heavy or an enlightened landlord? Since it was too early to tell, she suggested a strategy: Keep the upper lip stiff, in the British tradition, and a shrewd eye peeled for new commercial opportunity.

NEXT MORNING we put in at Haikou, on China's Hainan Island, where a commercial gamble of major proportions revealed itself. From the quay the distant city appeared as a gleaming, elongated cluster of big buildings splashed with turquoise and silver light that reminded me of the Emerald City in *The Wizard of Oz*. But cruising the sun-fried streets in a taxi, I saw that many of the structures were weirdly empty—gray skeletons of rusting steel and crumbling concrete, with no glass in the windows.

Such were the ruins left behind by the "overheated economy," Yao Fan, a local economist, told me when I visited him at the city's Expert Building. Problems grew when Hainan was declared a special economic zone in 1988. With few rules to regulate commerce, the island attracted freebooting foreign investors, mainly from Hong Kong and Taiwan, who pumped cash into real estate and even planned a Club Med. But when the speculation had run its course, ornate but unsellable resort condos littered the palm-fanned coastline, and Hainan was hit by bankruptcies, unemployment, and rising crime.

Yao was willing to bet that once the Chinese exercised greater control over Nanhai, as they call the South China Sea, with its oil, natural gas, and fish, their troubles would be over. Hainan, China's smallest province, became its biggest when the South China Sea was included. "Our exploitation of Nanhai resources," he explained with pride, would in turn help China "regain control" of its historical domain.

His passion for Nanhai, understandable from the Chinese point of view, struck me as ironic. During the Ming dynasty (1368-1644) traveling there had been a capital offense. It was only when rulers ran low on incense and other luxury imports that an intrepid eunuch, Admiral Cheng Ho, set sail on a series of voyages (1405-1433) that passed through Nanhai to India and Africa. But as John Miksic, an archaeologist at the National University of Singapore pointed out, imperial China set up no official trading centers in Southeast Asia. Later "they burned their boats and hemmed themselves in," says Miksic.

Such arguments undermine China's sweeping claims in the eyes of many non-Chinese, but they cut little ice in China, where more than a billion people with rising free market expectations refer to Nanhai as *shengtun kongjian*, or "survival space."

AFTER 50 YEARS of communist rule, old ways of defining survival are themselves undergoing revolutionary change. I discovered this on board the *Zhong Hai No. 3*, Hainan's overnight ferry to the old coastal city of Beihai. Next to me at the rail was a grinning young man in a flamboyant sport shirt.

"I like Hollywood movies!" he volunteered. "I like Arnold Schwarzenegger!"

Then, moodily: "America has two big oceans! That is unfair!" As if in agreement, the South China Sea walloped the creaky hull, dousing us with spume.

"China was a great country but became weak," the man plunged on. "We need money! We need Taiwan! We should take it!"

But when I raised my eyebrows (it was little more than a year since China had lobbed missiles toward Taiwan in military exercises suspiciously coinciding with presidential elections there and putting U.S. Navy aircraft carriers on alert), he added, "But it won't happen."

Looking out over the darkening waters,

XIAMEN, CHINA

Tending to their own businesses, oyster farmers in Maluan Bay cultivate private profits. China's pursuit of "market socialism" has spawned similar opportunities in Xiamen, the special economic zone on the horizon, where workers compete for attractive jobs in Taiwanese-owned factories.

where a string of illuminated squid boats began to flash in the night, my friend grew gloomy. "I hate the communists!" he said.

Having reported from China in darker times, I looked over my shoulder to see if anyone was eavesdropping. But few people seem concerned about the party line. In the new China citizens were wheeling and dealing with the gutsiness I saw earlier in Hong Kong. Another young passenger explained how she had gone from selling black-market gasoline to selling sea snakes. She bought them in Beihai and sold them in Haikou for a tidy profit. Her dream was to get ahead of intensifying local competition by marketing Nanhai products in Beijing. Something as exotic as sea snakes, I suggested, might make a splash in the faraway capital.

"Do you think so?" Her face illuminated in stages, like a three-way lightbulb. "Or coconuts!" Click. "Or mangoes!" Click, click.

FARTHER SOUTH, Vietnam has equally big economic dreams. Things would go much more smoothly there if only Bien Dong, or the East Sea, as the Vietnamese call it, would yield more oil. Disputes with China over offshore drilling rights have hampered Vietnam's efforts to turn its communist past into a more open-market future. But the real problem is that years of costly exploration have produced exasperatingly little oil.

"It all boils down to luck, luck, luck," said Quang Le, Mobil Oil's chief representative in Vietnam, as we rode a helicopter out into the south Con Son Basin, 190 miles southeast of Vung Tau, Vietnam's major oil and gas port. On the drilling deck men in hard hats and greasy overalls wrangled lengths of pipe down the drill shaft amid a noise that sounded like prehistoric animals fighting for turf.

When a gusher of mud blurted out, the men danced away, laughing and shouting. After only four days of drilling, Quang explained, they were 2,600 feet below the seabed, with 10,400 to go and 56 days left on an 11-million-dollar drilling contract to get there. "It's once down, once to the side," said Quang. "Find out what we have and we're out."

The rig had a fantasy-camp wildness about it that appealed to me. The crew—mainly the Europeans and the Filipinos—wore fantastical walrus mustaches, tattoos, and flowing, shoulder-length hair. When I asked what had attracted them to life on the rigs, they said that it was the good wages and the adventure. "The economy in Vung Tau goes up a few notches when we hit the bars and open our wallets," said one Australian with a gap-toothed smile.

Despite difficulties in the search for fossil fuels, plenty of dreams do pan out in the South China Sea. In Singapore I met Dorian Ball, a South African salvage diver, whose tortuous six-year search for sunken treasure on the *Diana*, a British sailing ship that went down near the mouth of the Strait of Malacca in 1817, nearly wrecked his personal life and finances, until he finally found the ship and its 3.5-million-dollar cargo of Chinese porcelain. In the Philippines I met Richard Gordon, a local politician, whose vision turned the abandoned U.S. Navy base at Subic Bay—once famous for brothels and clip joints—into a burgeoning special economic zone that has generated thousands of jobs, a billion dollars in foreign investment, and enough public acclaim that, when we spoke in Manila, Gordon was considering a bid for the country's presidency.

EVERY SOLITARY SOJOURNER hits a low point, when the fabric of romance refuses to stretch over the day-to-day realities of travel. Mine arrived mid-journey, in Bangkok. A ship that would have fetched me to Singapore had burnt to the waterline and sunk. Lead gray and car-infarcted, the city, its infamous bars decorated with Christmas lights in July, held little glamour for a marooned, middle-aged hack.

I decided to hire a fishing boat to take me down the Chao Phraya River where it empties into the Gulf of Thailand. Maybe I could find the spot where the captain in *The Shadow-Line*, my favorite Conrad tale, his ship fatefully becalmed, falls prey to deadly currents that move, mysteriously, "with a stealthy power made manifest by the changing vistas of the islands fringing the east shore of the Gulf."

As if from central casting, my skipper, Somsak, steered his crumbling red-and-white craft down the Chao Phraya. He sat cross-legged on the engine cowling, a gnarled big toe—its nail opaque as a shrimp cracker—turning the wheel. To my delight the clutter of factory chimneys, cargo cranes, and

RIAU ISLANDS, INDONESIA

Hiding out near Singapore, pirates fashion hooks to board ships (above). When darkness falls, they will zoom close on a speedboat (below), board over the stern, and, armed with knives, rob the crew. As the American and Russian naval presence in Southeast Asia has declined, pirate attacks have soared: Some gangs steal whole tankers with the help of corrupt local officials.


壹公分

HAINAN, CHINA

A tourist approaches China's southernmost point, traditionally considered the end of the civilized world. Spurred by Hainan's governor, China is extending its reach beyond this once peripheral island toward what it hopes are billions of barrels of untapped offshore oil.

SENTOSA ISLAND, SINGAPORE

Under a captive bounty, visitors to Underwater World (above) gaze at marine life of the South China Sea, source of a tenth of the world's annual ocean harvest. In Taiwan's main harbor (below) a refrigerator ship unloads tons of fish caught off Indonesia and frozen for transport. Experts warn that too many boats are chasing too few fish for such catches to continue.

KAOHSIUNG, TAIWAN

Now too many fishing boats and toxic runoff from factories and shrimp farms have depleted what was, until only recently, one of the world's most abundant fisheries.

steel-hulled warships riding at anchor opened to reveal glimpses of the "great gilt pagoda" at Paknam and other landmarks from the time Conrad knew the river a hundred years ago.

"Ah, the romance," I thought, my mood soaring.

Somsak, who didn't know Joseph Conrad from Conan the Barbarian, alerted me to a special buying opportunity: His friend, right around the next bend, just happened to have a catch of fresh lobsters for sale.

"No lobsters," I said.

Somsak chuckled piratically at my refusal as the wind kicked up and we juddered through mud-colored waves like an eggbeater in a bowl of gravy. Minutes later, he pointed a finger, alluvial with grime, toward pincer-like headlands that crimped the channel, shouting, "That is the outer bar!"

With a sidelong glance Somsak said, "The lobsters are very delicious."

"No lobsters," I said.

But I couldn't blame him. In his late 40s, he had spent his life fishing in the gulf. Now too many fishing boats and toxic runoff from factories and shrimp farms have depleted what was, until only recently, one of the world's most abundant fisheries.

"The gulf is basically finished," Wicharn Sirichai-Ekawat, chairman of the National Fisheries Association of Thailand, told me when I met him in Bangkok. "We're trying to reduce the number of boats, ban certain types of fishing, protect areas for reproduction and spawning," he said. But he thinks such measures will slow the decline at best.

To survive, Thai fishermen now venture farther and farther out, into waters claimed by Vietnam, Indonesia, and Burma. Some have died in shoot-outs with border patrols, and many more languish in jails around the region.

Somsak, too, had harbored dreams of filling his boat with Vietnamese fish. "We got within 50 miles of the coast when we got caught in radar," he said, recalling his brush with a border patrol there several years ago. "We tried to get away, but our engines overheated. So we took the ice off the fish and threw it on the engines to cool them down!"

How had he escaped? Somsak tapped his temple. "We steered for a slower boat, and the Vietnamese caught them instead!"

Such cutthroat competition is spreading throughout the region as fish stocks dwindle and prices go sky-high. "The sea is already being fished at more than twice the level it should be," said John McManus, a marine ecologist I met in Manila. "Perhaps half its reefs have been damaged by fishermen using cyanide to stun fish or dynamite to kill them."

THE ANCIENT PRACTICE of piracy is one industry that isn't suffering in the South China Sea, where, in 1997, 105 of the 229 shipboard attacks reported worldwide took place. Today's sea robbers use speedboats, radar, and ship-to-shore radios but still rely on the time-tested element of surprise, zipping from hidden coves to hit cargo ships as they navigate tricky passages. Most stop at thievery, grabbing cash from the captain's safe or stealing videotape recorders, personal computers, or other luxury goods from the hold. But there is occasional violence. In an incident off Singapore shortly before my arrival there, a distraught crew, still reeling from attack, hurried to their master's cabin to find him, according to one report, "bound hand and foot . . . dead with a gaping bullet hole in his head."

So it was with reduced zeal that I found myself the lone American on board the *Pacific Mercury*, a 50,000-ton Chinese bulk carrier, as it rode at anchor far out in the Singapore Strait, taking on fuel as the sun went down. Sitting across a table from me were Captain Lu Xun Kun, who shuffled papers, setting his chop to various official documents, and a boarding agent with puffy, bloodshot eyes. "There was a vessel just like this one off Singapore six months ago," the agent said in hushed tones.

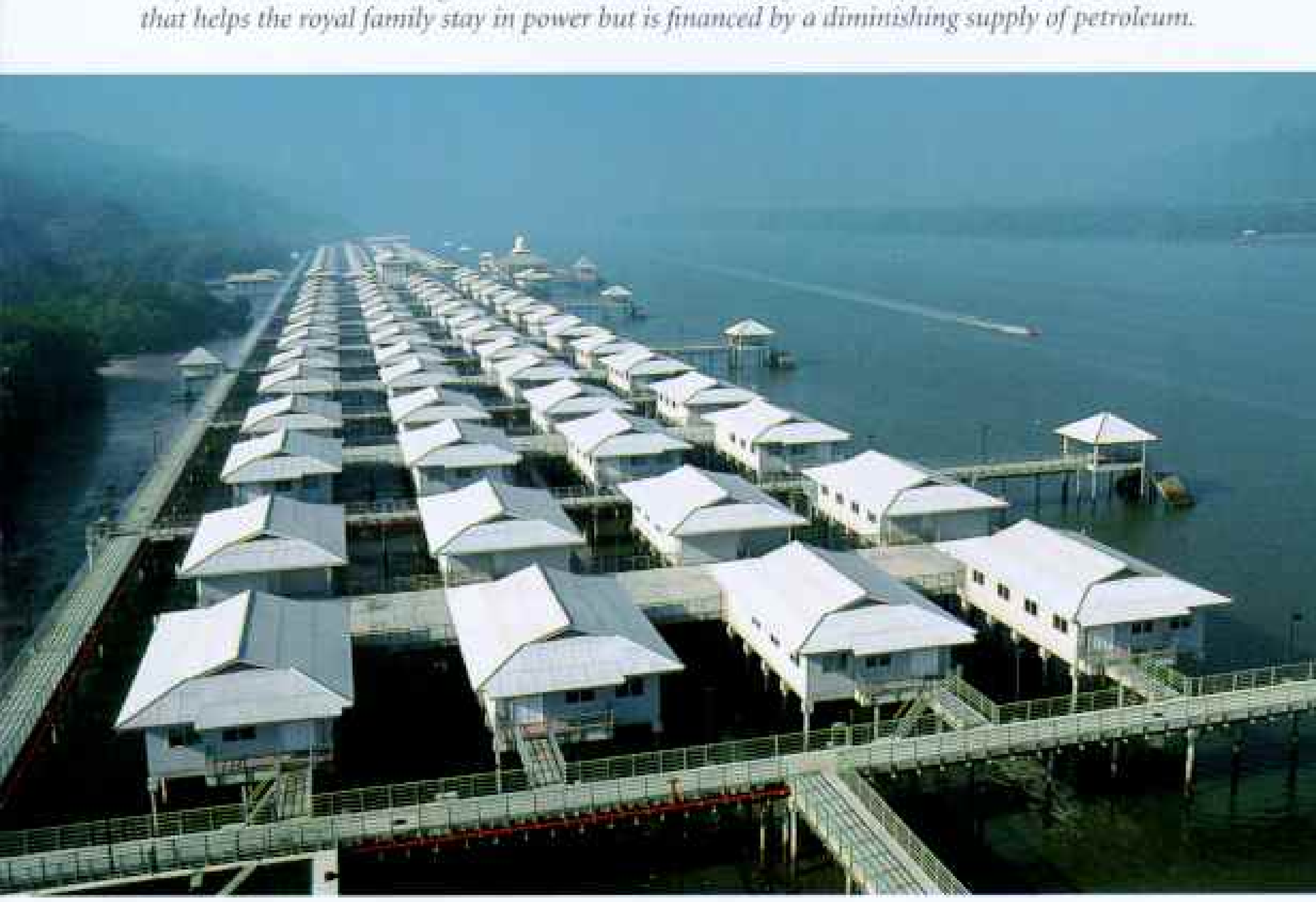
"We finished bunkering her in the evening,

BANDAR SERI BEGAWAN, BRUNEI

State-owned oil raised the gold domes and granite minarets of Omar Ali Saifuddien mosque in this delta capital and lifted the country's per capita income to among the world's highest. Now, eyeing his neighbors' faster growth, the ruling sultan is encouraging private enterprise.

KAMPONG AYER, BRUNEI

Two girls walk home from school in "water village" (above), where 10 percent of Brunei's 300,000 citizens live in houses erected over rivers. If residents lose their homes to fires, they may move downstream to government-subsidized housing (below), part of a welfare system that helps the royal family stay in power but is financed by a diminishing supply of petroleum.



just about this time," he said, giving me a searching look. Two hours later, he said, "she was boarded by pirates.

"That ship was going to Hong Kong too."

When that stirred no reaction, he said: "You know, pirates like these big carriers when they're fully loaded because they're so low in the water" and easy to board.

Captain Lu, a steely product of the China ports, raised his head from his paperwork. "*Meiyou!*—No pirates!" he said, with a sweep of his hand. "If anybody tries to board, we'll hose 'em off!"

When we sailed that night in near-total darkness, Singapore was a wafer of light on the far horizon. On the bridge the big radar screen emitted a greenish glow, reflecting the face of the *Pacific Mercury*'s watchful master. Fore and aft, spectral plumes of water looped over the side—the fire hoses going full throttle to keep pirates at bay.

Locking myself in my cabin, I consulted my copy of *Pirates and Armed Robbers: A Masters' Guide*. Sure enough, fire hoses were an approved but not foolproof antipiracy precaution. If pirates did manage to board, the manual advised: "Don't be heroic—[they] may be armed."

The night passed without heroism becoming an issue, but next morning the look on the chief officer's face signaled fresh peril. "Typhoon developing here," he said, in halting English, pointing to a weather map curling off the ship's fax machine. From the panorama of the bridge, the skies sparkled like polished chrome, but it was late July now, typhoon season, and a disturbance named Tina, with winds whipping toward a hundred miles an hour, was headed our way.

"My vessel moving here," said the officer, his "typhoon" hand converging with his "ship" hand at a point south of Hong Kong. It was in that vicinity, in 1835, that Thomas Jefferson Jacobs, an officer aboard the American clipper ship *Margaret Oakley*, glimpsed the beast the Cantonese called *tai feng*, or big wind. "A terrible crash was heard!" he wrote. "The vessel trembled like an aspen-leaf . . . with the sea pouring in over the bow, and the topsails shivering like so many rags."

Thankfully, modern radar makes typhoons relatively easy to avoid. Tina spun harmlessly up toward Japan. Typhoon Victor clobbered Hong Kong, causing mudslides and death, but left us alone.

"Everything's gone space-age," said Captain Duncan Tefler, when I visited the Hong Kong offices of the China Navigation Company, Ltd., a proud old name in the region's nautical past. A voluble Scotsman, Tefler directed piercing blue eyes at the large V-shaped room beyond his glass cubicle, where technicians leaned into computer screens, as into a stiff wind. They were keeping tabs on company cargo vessels by means of e-mail that whistled back and forth through the circumambient cyber seas.

"Gone are the days," said the former steamer captain, "when ships could disappear and the master report to the owners once a year."

Old sea dogs like Clifford Royston Rankine aren't impressed by such innovations. That was obvious the night I prepared to leave Muara in the tiny Islamic sultanate of Brunei on Borneo's serrated northern coast. I stood at the rail of Rankine's freighter, the M.V. *Straits Star*, listening to him cluck his tongue at the slow stevedores, impatient to get under way for our run to Kota Kinabalu in East Malaysia.

"Restrictions! Paperwork! You don't have time to train people!" he grumbled. "Oh, there is no romance left to this sea life!"

Rankine, a tall, bluff Eurasian in a crisp white uniform shirt with gold braid, had been on the China Sea for 43 years. In lilting English he recalled for me the days when his employer, the Straits Steamship Company, had been the seaborne railroad of empire. Ships with teakwood decks carried live monkeys, orangutans, and snakes in the hold, British grandees in first class, and servants in steerage. "Oh, there were famous storms," Rankine crooned, like the one that chased him from Borneo to Singapore 25 Christmases ago, keeping him 57 hours on the bridge.

In the nail-biting days before commercial vessels routinely carried global positioning systems, Rankine had sailed from Bangkok to Borneo as first officer on a ship blinded by bad weather. "I went below for dinner when we synchronized with a swell," he recalled. "One, two, three—the portholes were in the water! All lifeboats broke loose." Rankine's fleshy hands flew apart, signifying total chaos. What happened? "We altered course and reached

NHA TRANG, VIETNAM

Following peacetime rhythms, locals flock each morning to a beach in the city where the first U.S. servicemen sent to Vietnam arrived in 1952 to fix airplanes for French forces. Today the victorious communists are deferring to the economic know-how of the once capitalist south.

Singapore safely," he said nonchalantly, adding that a crewman blamed the captain for almost getting everyone killed and went after him with an ax.

"Passenger service was killed off by airplane travel," said Rankine. Then, three decades ago, container cargo came along, making sea transport cheaper, faster, and more efficient by packaging goods in waterproof, tamper-resistant steel boxes that can be quickly loaded and unloaded. That saves labor costs and prevents theft and damage but also cuts days once spent in exotic ports of call to only hours. Gone are the ships with magical names—the old M.V. *Rajah Brooke* and the S.S. *Kajang*—the seven-course breakfasts, and the men who stuck with a ship for 20 years or more.

"Oh, there are no real seamen left in this world," Rankine said, waving his hand. "Everything is in the books, not in people's heads!"

Rankine, anxious to get out of port, shouted "Where's that pilot?" into his walkie-talkie. In a flash a small, petrified man was on the bridge deck, bowing ferociously and offering excuses in Malay. "He doesn't want to take her out," snorted Rankine. "Pilots today have no experience," he muttered, preparing—not unhappily, it seemed to me—to do the job himself.

"Oh, the last of the Mohicans!" cried the old captain, as the 258th container swung over the side and banged into place and he was finally free to head his ship for the Brunei cut and the darkness of the open sea.

SUCH ADVENTURES appeased the eternal adolescent in me but made my inner reporter skeptical. By my third call at Singapore, where I waited for a final run up to Hong Kong on the aircraft carrier U.S.S. *Constellation*, I had concluded that the glory days of Conrad were pretty much finished. With its mix of Chinese, Malays, and Indians, Singapore was full of "the glitter, the colour of an Eastern crowd" that the old master had described—women in saris of red and purple silk or hooded in black Muslim chadors, men wearing turbans or laced prayer caps. But more than anything the city-state resembled a shipshape Los Angeles, with immaculate sidewalks lined with McDonald's, Häagen-Dazs, and Toys "R" Us.

I was also having serious doubts about the idea that a rising China might use military

Women swaddled against the sun paddle ocean water into ponds where it will evaporate, leaving salt behind. Plans call for increasing such production by half, so Vietnam can have a new export.

force to turn the entire South China Sea into a national lake. For one thing, the U.S., which patrols the sea like a cool-eyed town marshal, takes a dim view of anybody who might obstruct the free flow of maritime traffic through international waters.

That was the situation aboard the *Constellation* when I stood on the bridge with Capt. Rocklun Deal, watching a jet fighter scream off the flight deck every 90 seconds, laying a trail of exhaust fumes over the sundown waters somewhere to the west of the Spratlys.

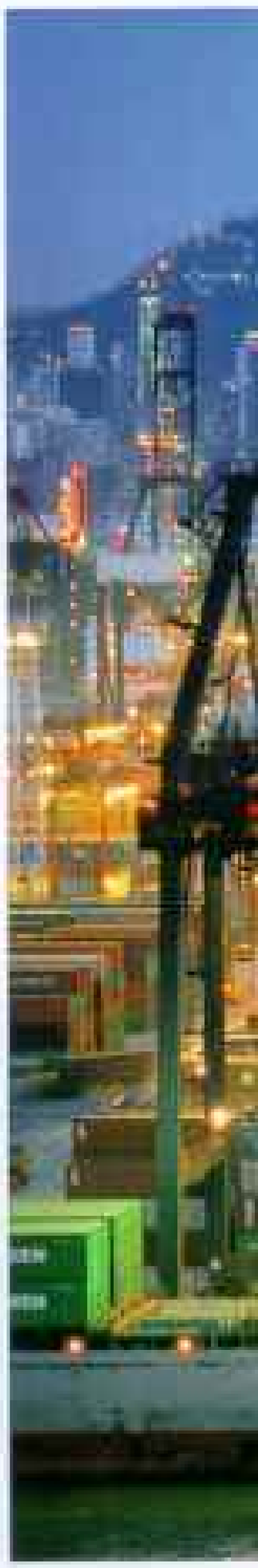
With 4,700 souls on board, the carrier seemed more densely packed than my neighborhood in Manhattan. Walking through the bulkhead doors, lined up in diminishing perspective down the side of the long, gray hull, was like walking toward a mirror. The effect was disorienting to me, but Captain Deal knew exactly where he was going.

"Technology lets us survey the airspace out to hundreds of miles and tell who's friendly and who's not," explained Deal. That would come in handy if China ever did flex its military muscle. So would America's huge material edge: The U.S. outguns China in aircraft carriers (12 to 0) and ballistic submarines (18 to 1), as well as in most sea fighting basics.

Suddenly a disembodied voice from the ship's Combat Defense Center belowdecks reported: "CNN aircraft declaring emergency." A news helicopter, presumably American, had wandered into a potential showdown over "disputed islands" between countries code-named "purple" and "orange."

But this was a war game, not a real war, so the Navy would not be forced to get involved. I wanted to know if one of the color codes stood for China. Offering me a chocolate chip cookie, Deal said they stood only for hypothetical antagonists. I understood his reticence: What could be gained from fingering China as the potential bad guy? Diplomatic talk, backed by the admonitory presence of technology-packed mountains of steel like the Connie, might well solve any crisis before it started.

"What people want here and on the mainland is the same thing—economic progress. . . . Governments should listen to the voice of the people."



Moreover, it wasn't at all clear how eager the American public would be to prosecute a war in a place that few voters—even educated ones—could readily locate on a map.

But I didn't give up. The next day I flew off the decks of the Connie with Vice Adm. Bob Natter, commander of the U.S. Seventh Fleet. The eyeball-popping impact of g forces that crushed us into our seat cushions as the Connie catapulted our aircraft out over the sea was not conducive to conversation. But over breakfast in Hong Kong, when gravity had returned to normal, I asked him how he assessed the Chinese threat.

Natter, a lean, handsome man who fought as a Navy commando in Vietnam, thought for a moment as he buttered his toast, then said that it stood to reason "the Chinese will try to impose their influence on the region"—just as the U.S. tries to "impose our will out here too." But he wanted to be optimistic. "China has the economy as priority one," he said. "It's in their interests to maintain stability."

Natter's biggest worry was Taiwan, and China's insistence on seeing the island of 21 million reunited with the motherland. He hoped that peaceful evolution, not confrontation, would resolve the issue. "I'd hate to see two powerful militaries get involved there," he said, "because then we'd have to get involved too."

TALK OF A POSSIBLE SHOWDOWN in the Taiwan Strait reminded me that my mental picture of the China seas had not been molded exclusively by Joseph Conrad. One of my most vivid memories rises from the Cold War autumn of 1958, when the U.S. drifted close to war there.

Mao Zedong had threatened to invade Taiwan, but when the Eisenhower administration sent in the Seventh Fleet and hinted at the use of the atomic weapon, the Great Helmsman had settled for shelling the bejesus out of tiny Quemoy, a Taiwanese possession hard by the mainland. A third-grader at Brighton Elementary School in Seattle, Washington, I had done my bit by fetching two slightly dented cans of Chef Boyardee spaghetti to a PTA food drive for Quemoy's beleaguered children.

As my journey drew to a close, I flew to Quemoy, or Kinmen, as it's now known, where by chance I met one of those children, now a taxi driver named Chen Kuo-chuo. A rugged man of 47, with close-cropped black hair and aviator sunglasses, he drove me to the labyrinthine tunnels where he had cowered under that long-ago autumnal fusillade, sustained in part by relief packages from the U.S. ("No spaghetti, thank heavens!" he joked.)

But even as we stared into the bluey haze where, 3,000 yards ahead, rose the green hills of the place we had both feared as Red China, old Cold War currents seemed to be dramatically reversing themselves. Chen, some of whose ancestors left the mainland centuries ago, said that relaxed restrictions on travel from Taiwan to the mainland free him to visit relatives in Xiamen, today a thriving port. Meanwhile fishing boats smuggle peanuts, pistols, VCRs, and watermelon seeds across the narrow channel. And soon freighters may well travel directly—and legitimately—between the two sides.

"The communists aren't like before," explained Chen Suei-chai, Kinmen's first popularly elected mayor, when I sat with him at city hall sipping a cup of jasmine tea. A group of high-powered consultants from Taipei lingered at one end of the big room around a wall map of the Taiwan Strait. Heady talk was circulating among Taiwan's savvy capitalists about the emergence of "China, Inc.," a bloc made up of China, Hong Kong, and Taiwan that, old political barriers notwithstanding, might in the new century lead the world and exert a strong pull—political as well

HONG KONG, CHINA

Lit up like a show window, a port displays goods risk-taking entrepreneurs sell the world at huge profits. Renewed boom times in the South China Sea will require regional cooperation as much as cutthroat competition.

as commercial—all along the rim of the South China Sea.

"What people want here and on the mainland is the same thing—economic progress," insisted the mayor, a formal man in a luminous sharkskin suit. "Governments should listen to the voice of the people."

Mayor Chen pumped my hand and thanked me for coming: "We still remember your kindness in sending that canned food!" Frankly, as I stood there, clutching a plastic artillery shell I had bought, a replica commemorating Mao's famous pounding of Quemoy, I was a little sorry I had mentioned that part.

"Yes," teased city official Li Si-heui, "we'll look for the guy who got your spaghetti!"

But as I left city hall and walked toward the sea, my shoes sticking to asphalt sproingy with heat, the kid in me felt badly let down: I mean, the China seas seemed to be well on the way to being annexed by the Home Shopping Network. Was romance completely dead?

Hopping a cab, I headed for the island's spartan airfield. Meditating on the waters of the strait, which shimmered in the late afternoon sunshine, the reporter in me had a small epiphany: However devoid of old-time swashbuckle, this eagerness to embrace the global economy, with its successive waves of consumer goods, was the latest but surely not the last of the mysterious forces to swirl through a sea of unruly, complicated dreams. Where, I had to wonder, would they carry so many tough, contentious dreamers? □

DINOSAUR EMBRYOS

UNSCRAMBLING THE PAST IN PATAGONIA

By LUIS CHIAPPE
Photographs by BROOKS WALKER
Art by MICK ELLISON

More than 70 million years ago this square inch of skin covered part of an embryonic dinosaur, perhaps its spine, as it lay in its shell. My team made the astonishing find in an Argentine landscape (below) rife with eggs and embryos, where I search for more of these rare pieces to prehistoric puzzles.

Walking on Eggshells

On the second day of our search for fossils in a corner of Patagonia's vast Río Colorado formation (bottom right), team member Carl Mehling handed me a porous gray rock. I realized immediately that I held a dinosaur eggshell. It turned out to be one among thousands strewn across nearly a square mile and layered in mudstone 16 feet deep.

As we explored the site, we were less stunned by its immensity than by its rarities. It has yielded the first embryonic dinosaur skin, the first dinosaur embryos found in the Southern Hemisphere, and the first eggs that, because they contain embryos, can conclusively be identified as sauropod, a group of long-necked, elephant-legged dinosaurs.

RESEARCH PROJECT

Supported in part by your Society

The site—christened Auca Mahuevo after the area's volcano, Auca Mahuida, and its glut of eggs, or *huevos*—is 55 miles from the nearest town and is as rough as it is remote. "There's no water, no shade," says my colleague, Argentine paleontologist Rodolfo Coria. "Just us, the badlands, and, if we are lucky, a dinosaur coming out of the ground."

At Auca Mahuevo, our 12-person team has had the kind of luck most paleontologists only dream about. In the hillside quarry (above), Coria, at right, field technician Pablo Puerta, at left, and I unearth whole eggs, carefully opening the shells to reveal tiny embryos.

LUIS CHIAPPE is a paleontologist and MICK ELLISON is a senior artist at the American Museum of Natural History in New York City. This is photographer BROOKS WALKER's first assignment for NATIONAL GEOGRAPHIC.

On the surface, shell fragments are so abundant that we can hear them crunching under our boots. Eons of wind and rain have swept away the soil surrounding the top layer of shells, exposing them (right). "The eggshells are just sitting there saying 'turn me over, look at me,'" says photographer and amateur fossil hunter Brooks Walker. Thus far, for unknown reasons, only the eggs on the surface have held traces of skin, adhering to the insides of the shells.

Preservation and Preparation

A life-size illustration shows what the embryos found at Auca Mahuevo may have looked like as they grew. Their skin was scaly, like a modern-day lizard's, and they may have had nasal openings at the top of their heads, as some adult sauropods did. The thin eggshells, five to six inches in diameter, have airholes like chicken eggs, permitting an exchange of gases that allowed the embryos to breathe.

Early evidence shows that the embryos may have perished in a flood that quickly buried the eggs in a layer of silt and mud. This made it possible for the soft tissues to fossilize before decaying, an extremely rare occurrence.

To protect the fragile eggs, we coated both single specimens and egg clusters in plaster that hardened into rigid jackets. Then we hauled them by truck from Auca Mahuevo to the Carmen Funes Museum in Plaza Huincul, about 130 miles away. Safely delivered, the egg clusters became the responsibility of museum preparator Sergio Saldivia (right), who painstakingly scraped away clay and silt.

My work with fossils has taught me that without the right specimen preparation you can lose a lot of information. In fact, I couldn't see the eight embryonic teeth preserved in one of the eggs we brought back to the United States (below, in a highlighted grouping above the point of a common pin) until Marilyn Fox, a preparator at Yale University's Peabody Museum of Natural History, had spent about 40 hours cleaning the fossil. The teeth, each less than a tenth of an inch long, provide the most persuasive evidence that these dinosaurs were probably titanosaurs, a far-flung subgroup of sauropods.

Most sauropods had wide, spatula-shaped teeth, but a handful had thin, pencil-shaped teeth like those found at Auca Mahuevo. Among this group, titanosaurs stand out because they are the only sauropods found thus far in the Río Colorado formation and they are the only ones known to have lived during the late Cretaceous, a geologic period that spanned about 32 million years, including the time when these eggs were laid.

Reconstructing Past Habitat

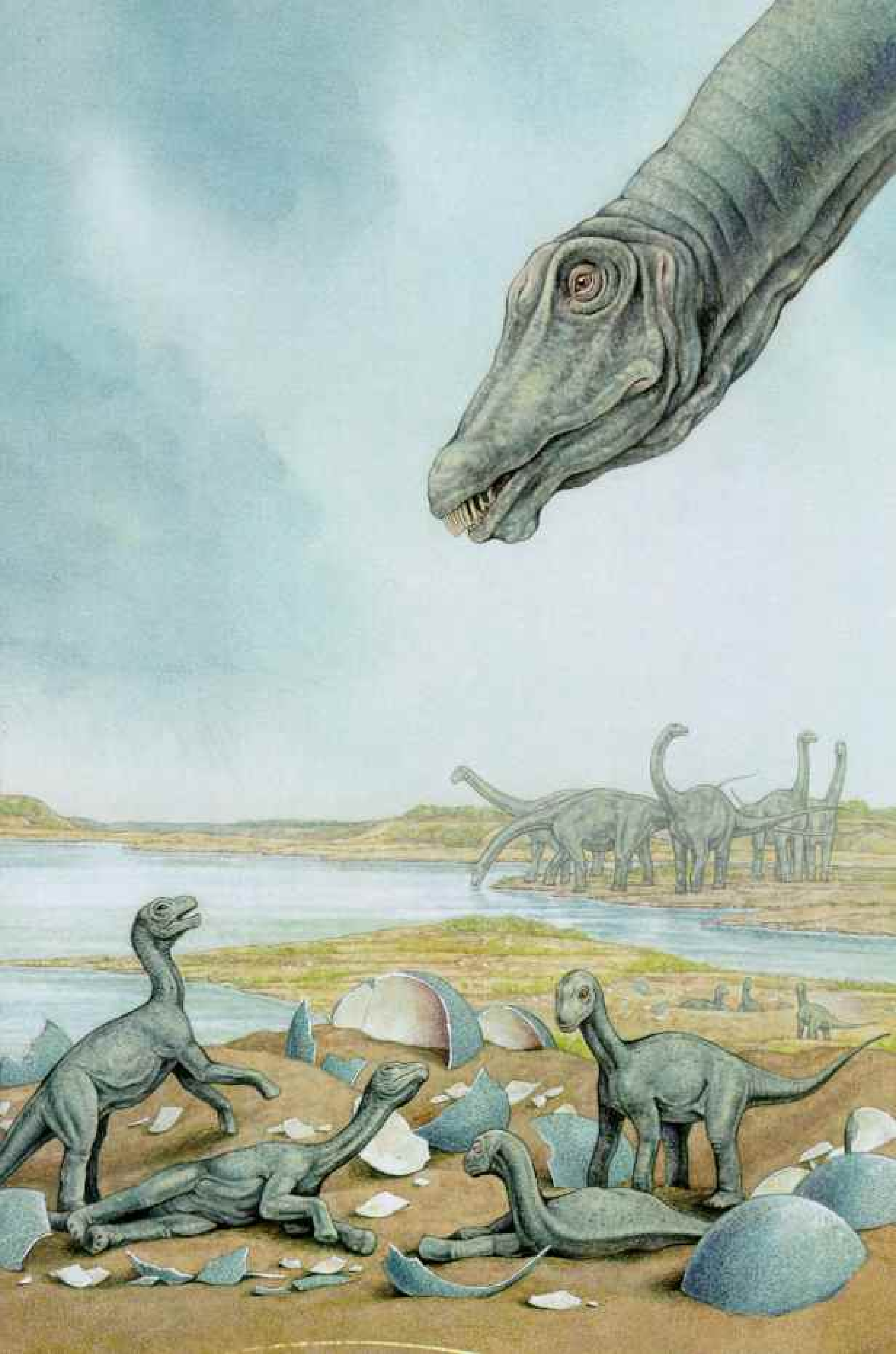
"This is what paleontologists live for, walking into an area that's never been prospected and finding it littered with extraordinary fossils," says paleontological geologist Lowell Dingus (above). He pens reference notes on a rock that he will test to find out how old the site is. Previous dating put it at 89 million to 71 million years old. However, through paleomagnetic analysis, which determines if a rock formed when Earth was magnetically oriented to the North Pole or the South Pole, Dingus hopes that he can narrow the range by about six million years.

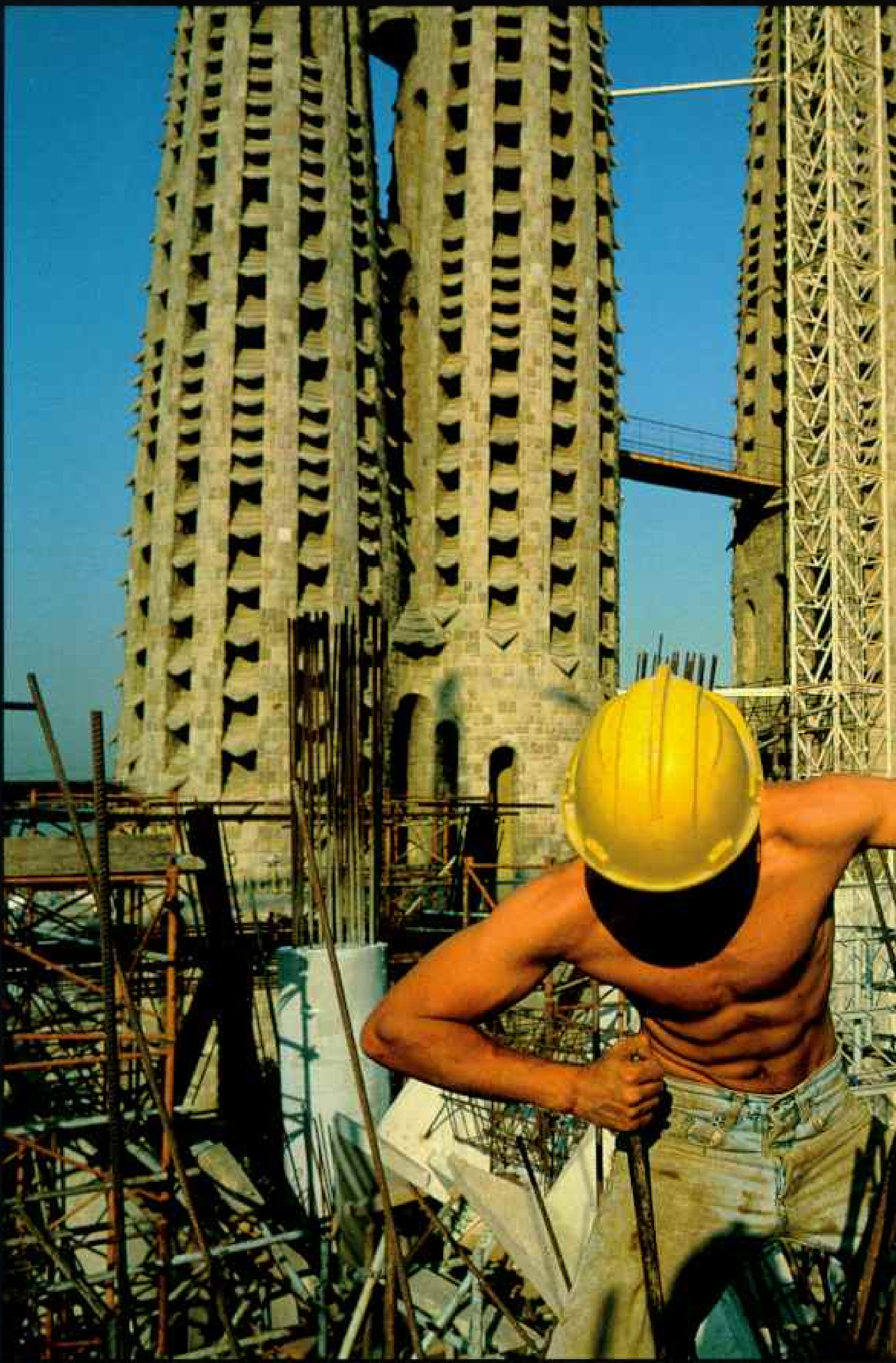
The rocks also give us a rough idea of how these badlands looked during the late Cretaceous. Egg clusters, like the nearly five-foot-long grouping below, rested on a gently sloping floodplain (opposite). In some years streams probably topped their banks, drowning the embryos. In other years the dinosaurs survived to become hatchlings about 15 inches long, growing into adults that were up to 45 feet long.

As Coria points out, "behavior rarely gets fossilized," so we don't know if the hatchlings relied on adults for care, but we do know what they probably looked like, thanks to the rare fossils found at Auca Mahuevo.

Future expeditions to this enormously rich site will help complete the picture that we have only begun to draw. □

These dinosaurs and many more can be found at *www.nationalgeographic.com/dinorama*.





BARCELONA

Star of the New Europe

Yellow

By **T. D. ALLMAN**
Photographs by **DAVID ALAN HARVEY**

A daring work in progress, like the city it presides over, the Sagrada Família church symbolizes the muscle and imagination that have lifted Barcelona to new heights as a Spanish economic and cultural leader.

IN BARCELONA the Catalonians call them *castells*, but these aren't stereotypical castles in Spain. These castles are made up of human beings, not stone. The people who perform this agile feat of acrobatics are called *castellers*, and to see their towers take shape is to observe a marvel of human cooperation.

First the castellers form what looks like a gigantic rugby scrummage. They are the foundation blocks of the castle. Behind them, other people press together, forming outward-radiating ramparts of inward-pushing muscle: flying buttresses for the castle. Then sturdy but lighter castellers scramble over the backs of those at the bottom and stand, barefoot, on their shoulders—then still others on theirs, each time adding a higher "story."

These human towers can rise higher than small apartment buildings: nine "stories," 35 feet into the air. Then, just when it seems this tower of humanity can't defy gravity any longer, a little kid emerges from the crowd and climbs straight up to the top. Arms extended, the child grins like a gargoyle while waving to the cheering crowd far below.

Dressed in their traditional blouses, black cummerbunds, and white pantaloons, the castellers seem to epitomize an easier time, before Barcelona became a world metropolis and the Mediterranean's most dynamic city. But when you observe them up close, in their street clothes, at practice, you see there's nothing easy about what the castellers do—and that they are not merely reenacting an ancient ritual.

"I fell and broke my leg two weeks ago," Silvia Verdugo, a pretty and talkative 17-year-old, tells me when I visit the clubhouse of Castellers de Barcelona to observe a practice session. "I'll climb again because I love it." The clubhouse—a combination sports club, office, and tapas bar—is located in a nondescript section of Barcelona, but the castellers rebut the notion that this is something only working-class people do. Montserrat Costa, another female casteller, is a textile designer; Dani Codina is a photographer. Toni Caus, the team leader, teaches at a private school.

None of them can give a logical answer as to why they love doing this, but Victor Luna, 16, touches me on the shoulder and says in English: "We do it because it's beautiful. We do it because we are Catalan."

BARCELONA'S MOTHER TONGUE is Catalan, not the Castilian Spanish standard for most of the country, and to understand Barcelona, you must understand two words of Catalan: *seny* and *rauxa*. Seny pretty much translates as common sense, or the ability to make money, arrange things, and get things done. Rauxa is reminiscent of our words "raucous" and "ruckus." "It's our redeeming touch of madness," says Xavier Corberó, a sculptor whose basalt monoliths combine solidity with absurdity.

What makes the castellers revealing of the city is that they embody rauxa *and* seny. The idea of a human castle is rauxa—it defies common sense—but to watch one going up is to see seny in action. Think of Madrid and Castile, or of Seville and Andalusia, and the stereotypes of flamenco and the bullfight come to mind. The castellers, in contrast, are neither showy nor macho. Success is based on everyone

Limb by limb a human castle rises as *castellers* engage in a Catalan sport from the 1700s. Capital of Catalonia, an independent-minded region, Barcelona revived along with Catalan culture in the 1970s at the end of the repressive regime of Francisco Franco.

Skilled negotiators of traffic—a Barcelona constant—businessmen rev their motorbikes at rush hour. Members of the café society idle in Plaça Sant Josep Oriol in the Barri Gòtic, where a passing fire-eater encourages their thirst. In the early 1900s a young Pablo Picasso painted at studios in this quarter, inspired by the city's sharp Mediterranean light and shadowy street life.

working together to achieve a shared goal.

The success of Carlos Tusquets' bank, Fibanc, shows seny at work in everyday life. The bank started as a family concern and now employs hundreds. Tusquets said it exemplifies how the economy in Barcelona is different. "Profits are generated by medium-size firms, usually self-financed and family owned."

Fibanc's new headquarters on the Diagonal—the great boulevard that, just as its name implies, cuts a diagonal swath across the city—also shows Barcelona's knack for combining tradition with innovation. It is located in an old palace. "We chose to preserve the palace, while creating modern office space behind and below it," Tusquets said.

Entrepreneurial seny demonstrates why Barcelona and Catalonia—the ancient region of which Barcelona is the capital—are distinct from the rest of Spain yet essential to Spain's emergence, after centuries of repression, as a prosperous, democratic European country. Catalonia, with Barcelona its dynamo, has turned into an economic powerhouse. Making up 6 percent of Spain's territory, with a sixth of its people, it accounts for nearly a quarter of Spain's production—everything from textiles to computers—even though the rest of Spain has been enjoying its own economic miracle.

Barcelona's hundreds of small family-owned restaurants, each offering its own homemade dishes of the day, also epitomize seny. They play a key economic role, for one secret of Barcelona's prosperity is that people actually have two workdays every day. The first begins in the morning, when possibilities are discussed and paperwork is gotten out of the way. Then, after lunch and into the evening, the creative work gets done, which is why people eat dinner so late.

Hand in hand with seny goes rauxa, and there's no better place to see rauxa in action than on the Ramblas, the venerable, tree-shaded boulevard that, in gentle stages, leads you from the center of Barcelona down to the port. There are two narrow lanes each way for cars and motorbikes, but it's the wide center walkway that makes the Ramblas a front-row seat for Barcelona's longest running theatrical event. Plastic armchairs are set out on the sidewalk. Sit in one of them, and an attendant will come and charge you a small fee. Performance artists throng the Ramblas—stilt walkers, witches caked in charcoal dust, Elvis impersonators. But the real stars are the old women and frolicking children, millionaires on motorbikes, and pimps and women who, upon closer inspection, prove not to be.

T. D. Allman's work as a reporter for such publications as *Vanity Fair* and the *Guardian* has taken him to nearly a hundred countries. This is his first article for National Geographic. David Alan Harvey's photographs have illustrated more than 30 articles in the magazine, including "The New World of Spain," which appeared in the April 1992 issue.

KEY: #1 CATEDRAL DE BARCELONA #2 MONUMENT A COLOM #3 PALAU GÜELL #4 PALAU NACIONAL #5 ESTADI OLÍMPIC #6 FUNDACIÓ JOAN MIRÓ #7 PARC DE LA CIUTADELLA #8 ARC DEL TRIOMF #9 PLAÇA DE TOROS #10 CASA MILÀ (LA PEDRERA) #11 CASA BATLLÓ #12 LA SAGRADA FAMÍLIA #13 COL·LEGI DE LES TERESIANES #14 PARC GÜELL #15 FINCA GÜELL

Aficionados of Barcelona love to compare notes: "Last night there was a man standing on the balcony of his hotel room," Marianna Bertagnolli, an Italian photographer, told me. "The balcony was on the second floor. He was naked, and he was talking into a cell phone."

There you have it, Barcelona's essence. The main is naked (rauxa), but he is talking into a cell phone (seny).

WHEN I TOOK my first evening stroll down the Ramblas, back in 1973, Spain was still in many ways a Third World country. Generalissimo Francisco Franco's profile was on the coins, with the legend: "By the Grace of God, Caudillo of Spain." Franco was an uncrowned king, and for most of his nearly 40 years as Spain's dominant personality, cultural differences and political dissent were crushed.

One memory typifies for me how much Spain has changed. I was at the Café de l'Opera, the fabled artists rendezvous on the Ramblas, and a beggar approached me. When I showed him that the points of light sparkling in my glass were the same ones glittering in the street lamps—that my glass was an optic lens—he was stunned silent. He crossed himself.

Today such people are a rare sight in the central city, where the affluent and well-educated crowd the Ramblas. Since Franco died in 1975, the number of university students in the region has more than doubled, while the number of doctors, in proportion to the population, has nearly tripled. Catalonia's infant mortality rate has been reduced by

Grand boulevards such as Passeig de Gràcia (right) radiate from the center city. Most were laid out in the 1800s when Barcelona expanded beyond its medieval core. Spain's second largest city after Madrid and home to 1.6 million people, Barcelona cleaned up to host the 1992 Olympic Games, adding plazas, gardens, and sculpture and restoring its long-neglected seafront.

more than half, and the life expectancy slightly exceeds the European Union average of 77.

Before Franco, Barcelona was one of the most creative cities on Earth. In Franco's waning days it started thriving again by doing what it still does best—filling unnoticed niches in the market. Everyone knows French champagne, but for people all over the world today the first glass of bubbly they drank was probably Freixenet, shipped out of Barcelona. A corporation owned by the Puig family has made Barcelona a major center for the perfume industry. "There are great places to work and great places to live," Enrique Puig told me. "But I don't know anywhere else where it's better to live and work."

Today Barcelona's economic horizons are not limited to Spain; they encompass Europe and the world. Since the 1992 Olympic Games, a turning point for Barcelona, tourism has become a fast-growing industry. The new airport already needs expansion, and the old freight port is now a modern cruise-ship terminal. Tourists can step off the boat and walk straight to the Ramblas.

IN BARCELONA geese live in the cloister of the Gothic cathedral (the Catedral de Barcelona); art hangs in a museum in the soccer stadium; castellers have medical insurance; and on the new facade of the Sagrada Família (Holy Family) church, one of the city's biggest tourist attractions, the centurions look like Darth Vader's stormtroopers in *Star Wars*. Every Sunday in front of the cathedral, people gather to perform the *sardana*, the Catalonian folk dance. As the dancers form circles, they pile shopping bags and attaché cases in the middle. That's Barcelona: people keeping an eye on their property while they dance.

I started collecting such incongruities one night when, from my room in the Hotel Colón overlooking the cathedral, I found myself observing brightly colored artificial creatures the size of pickup trucks surging through the streets spewing smoke and cinders at people. Why were these fire-breathing monsters rampaging on the loose? When I asked that question, everyone laughed.

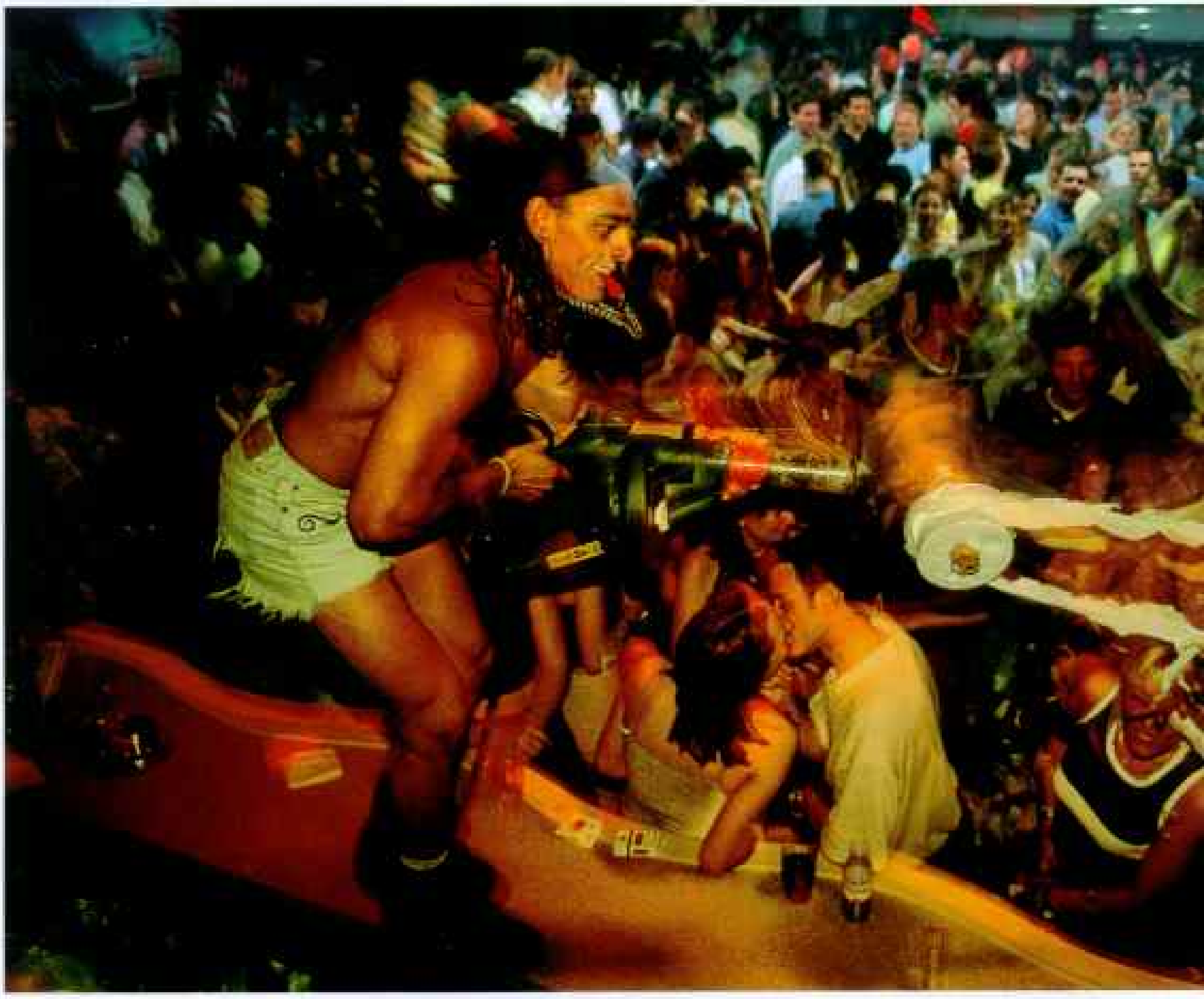
"Because of St. George," Xavier Corberó, the sculptor, explained. I already knew Sant Jordi (St. George) was Catalonia's patron saint. But I still didn't get it.

"And the dragons," he elaborated and then, pausing for effect, asked rhetorically: "Why should St. George have all the fun?"

The whole of Barcelona becomes a playground during the feast of Sant Jordi every April and then again in September as the city, with typical incongruity, celebrates one of the greatest military defeats in its history—when Bourbon armies crushed Catalan liberty in 1714—as Catalan National Day. During such festivals every corner of the city pulses.

Bathed in bubbles, children play at a party in the Sants neighborhood. Barcelona entertains itself with

some 140 yearly festivals, celebrating everything from saints' days to a historic defeat in battle.



Then, at the very moment the nightly festivities end, street cleaners swing into action. Seny takes over from rauxa, in the form of an army of smartly uniformed, efficient municipal employees and their garbage trucks and water hoses. Right now it's 7 a.m., a few hours after dragons rampaged through the streets. The square is empty. Barcelona is sleeping; it won't really begin to hum again much before noon, but the square is spotless.

A successful city, like a successful actor, must constantly invent new roles for itself. A good way to get an idea of the different roles Barcelona has played is to ride the Ferris wheel in the Tibidabo amusement park. The shape of the streets beneath you shows how Barcelona has been reinventing itself for a thousand years. The original streets of the old city twist around each other like strands of DNA.

It took Barcelona 850 years to form this pulsing nucleus of commercial, ecclesiastical, and administrative power where Spain, Europe, and the sea come together. Then, nearly 150 years ago, mutation occurred. The city burst out of its medieval walls. It surged outward, upward, covering mile after mile with rectilinear urban planning. Yet slicing across this neat rectilinearity is the Diagonal, connecting the Iberian hinterland, via Barcelona and its port, to the seacoast roads to France and the rest of Europe.

Spain, Europe, the sea: The nexus of all three is what makes Barcelona Barcelona. A century and a half ago, thanks to the arrival of the industrial revolution, that nexus generated unprecedented wealth. Until then, all the gold of the Americas and all the captains of Castile had not made Spain rich. But then Barcelona pioneered a degree of popular affluence previously unknown on the Iberian Peninsula. Resourceful citizens of Barcelona built Spain's first railroad and set up textile mills. They created wealth instead of consuming it.

It's 5 a.m. at the Baja Beach Club, and patrons can barely hear themselves kiss as a barkeep handy with a blower sprays toilet paper into an all-accepting crowd. "We don't quit until breakfast," boasts a regular. Dozens of clubs cater to the hedonistic night shift. While revelers sleep it off, workers at nearby car and chemical plants keep the region's industrial reputation intact.

WHAT DID BARCELONA do once it got rich? It created a whole slew of crazy objects that, like the castellers and their castells, turned out to be surreal, even scary. The work of Barcelona's most famous architect, Antoni Gaudí, epitomizes this fusion of virtuosity and delirium. Gaudí designed apartment houses that look like emerald-studded albino iguanas. He built oozing colonnades that might have been molded from dinosaur dung. In a certain light Gaudí's Casa Batlló looks less like an apartment house than a concrete-encrusted, multimouthed invertebrate that just might suck you in and eat you.

Gaudí is also the one who designed the inescapable towers of the Sagrada Familia that seem to appear on every Barcelona postcard. When George Orwell first saw them in the 1930s, Gaudí's towers reminded him of bottles of German hock. That was no compliment, since Germany then was Nazi Germany, and Orwell had come to Barcelona from England to fight fascism, the experience that ultimately produced *Homage to Catalonia*, his account of futility and suffering during the three-year Spanish Civil War.

While Barcelona's architects were changing what we see, the city was nurturing three painters—Joan Miró, Salvador Dalí, and Pablo Picasso—who changed our view of the world.

In his painting "The Farm," Miró distilled the seny of Catalan peasant life, then infused it with the rauxa of specific objects. Agricultural implements and livestock populate his canvases with the same quirky individuality that oddballs and outcasts bring to the Ramblas. Yet here's the incongruity: When he painted "The Farm," peasants were abandoning their farms for Barcelona's factories.

Salvador Dalí, with his waxed mustache and madcap glare, is like the Sagrada Familia. Loathe him or love him, there's no escaping him. For decades he marketed his product (initially his art, later his belabored eccentricity) as insistently as Barcelona marketed itself for the 1992 Olympics.

Though born in Málaga, Pablo Picasso wound up in Barcelona because his father, like migrants today, was drawn to the city in the hope of finding work. Barcelona's influence is written all over Picasso's two most famous paintings. The title of "Les Demoiselles d'Avignon" refers to the Carrer Avinyó, or Avignon Street, where Picasso used to observe the girls in the whorehouses. "Guernica," Picasso's passionate evocation of the firebombing of that town, depicts the independence of spirit and love of freedom he absorbed while hanging out around the turn of the century at the Four Cats, rendezvous of Barcelona's most influential artists and thinkers.

BARCELONA'S greatest incongruity is that this marvelously civilized city is a place where, within living memory, civilization broke down.

"Of course we ate rats," Nicolau Casaus, vice president of Futbol Club Barcelona, told me. Casaus, now 85, is one of that diminishing number of people who can describe what Barcelona was like during the Spanish Civil War. The war, a military revolt against Spain's democratically elected civilian government,

"A successful city, like a successful actor,

Suntans and sun hats enliven the revived downtown waterfront (above), a former warehouse district the city redecorated with palms and sand. Perhaps the most design-conscious European city, Barcelona first won aesthetic notice in the late 19th century with its lush modernista architecture, a variant of art nouveau. Antoni Gaudí led the way

must constantly invent new roles. . . .”

with dreamlike creations like Casa Batlló (above). Playful, innovative designs rule at a local fashion academy (below), where a student models a bold outfit. Beyond love of fashion is the city's devotion to Catalan autonomy. Eager to wrest more power from archrival Madrid, citizens parade the once outlawed Catalan flag (below left).

Designer skyline with glowing pillars and a sculpturesque telephone tower, seen from the Olympic

esplanade, reminds strollers of the city's adventurous, multibillion-dollar makeover for the '92 games.

began in July 1936 with an uprising in Spanish Morocco and ended on April Fools' Day, 1939, with victory for Franco's Falangists, the military rebels. Following his victory, Franco crushed Catalan autonomy and banned official use of the Catalan language.

"The Catalan spirit couldn't be crushed," said Casaus. "Repressing it forced it into different forms of expression—including football."

To see the Catalan spirit, I went to a neighborhood near the Gràcia section of the city. At a garage door I pressed the buzzer, and eventually the door opened. I was ushered up a narrow staircase into the presence of Antoni Tàpies, Catalonia's most eminent living artist.

An unhistrionic man, whose art nonetheless has excited flamboyant controversies, Tàpies is to contemporary Catalan painting what Futbol Club Barcelona is to sport: a focus of Catalan pride, a national institution for a people long denied the traditional political and military expressions of nationalism. One of his most famous works is "The Catalonian Spirit."

For someone who's never lived under a dictatorship, it's hard at first to see why it aroused such a furor. It's just a canvas on which Tàpies painted a Catalan flag, then scribbled over it the names of famous Catalonians. Yet until Franco's death police prevented art galleries in Barcelona from exhibiting such work.

In Orwell's time Barcelona was a model of Europe—a model of all the horrors to come. Spain was to Europe then what the former Yugoslavia is to the continent today, and Barcelona—as a focus of European barbarity—was its Sarajevo.

"Yes, once we were the Sarajevo of Europe," Pedro Durán, a prominent Barcelona entrepreneur, said as we discussed his many financial and aesthetic ventures. At 77, Durán, like Nicolau Casaus, remembers Barcelona during the Civil War.

"And what are we now?" he asked.

He thought for a second, then said: "We're the Barcelona of Europe."

One of Durán's multibillion-dollar projects connects gas fields in Algeria with Spain through underwater pipelines traversing the Strait of Gibraltar. "We planned it all here in Barcelona," he told me. He added: "You can always borrow money and buy technology; it's people who count."

Durán, too, had his theory as to why the Catalan spirit survived. "Madrid was built by the state, but Barcelona was built by its people. Barcelona has always been built by its people's own work, without the intermediary of the state." For hundreds of years Barcelona was the victim of history because Catalonia was not a nation-state; it lacked an army, its own king, and national borders. Now the city seems on the right side of history for the same reason. Barcelona is pioneering a new kind of European identity in which global sophistication and economic reach combine with newly restored regional power and pride.

"We've learned the most important lesson," Durán said. "Never violence. Never again."

"You've got to see the Plaça Sant Felip Neri!" Albert Montagut, editor of the Catalonia edition of *El Mundo*, one of Spain's popular newspapers, said one day as, befitting professional colleagues, we enjoyed a three-hour lunch.

I'd just mentioned the lesson of history

Above the cares and temptations of the worldly city at her feet, eight-year-old Elisabeth Haro Gómez caps her first Communion day with a visit to an amusement park on the Montjuïc heights. Barcelona itself sits on a lofty threshold, poised to assume a new identity as a great European capital and first city of the Mediterranean.

Durán recounted. Suddenly Montagut was on his feet, grabbing the bill. Before I knew it, we were dashing through the backstreets of the Gothic Quarter, or the Barri Gòtic. I followed him into an alley—suddenly all the bustle of Barcelona was gone.

The plaza was actually a mottled stone circle, formed by the curved facades of old buildings. One of them was a church. We were not entirely alone under the blue circle of sky. Two men in their mid-20s were standing in front of the church. They were looking at something.

"The last bullet holes in Barcelona," Montagut told me. "Once they were all over the place, but gradually they've disappeared."

Though Spanish, the two young men, who came from outside Catalonia, were dressed like tourists, in bright T-shirts. "It's hard to believe things like this once happened in our country," one of them said. Then the other said the same thing Pedro Durán had: "Never again."

I asked them to write down their names: Miguel Pollon Quintero, Luis Siquea Fuentes. I also asked what they did for a living. "We make and sell T-shirts," one of them answered.

Merchandising T-shirts doesn't compare with the "heroism" Europeans have shown for centuries as they bounded across Europe and the world, killing and being killed. But those two T-shirt guys are deserving of homage. As they prove, the essential thing is people, and people's understanding of themselves. Sarajevo, too, had its Olympic Games. But something was missing in the soon-to-become ex-Yugoslavia: an essential understanding.

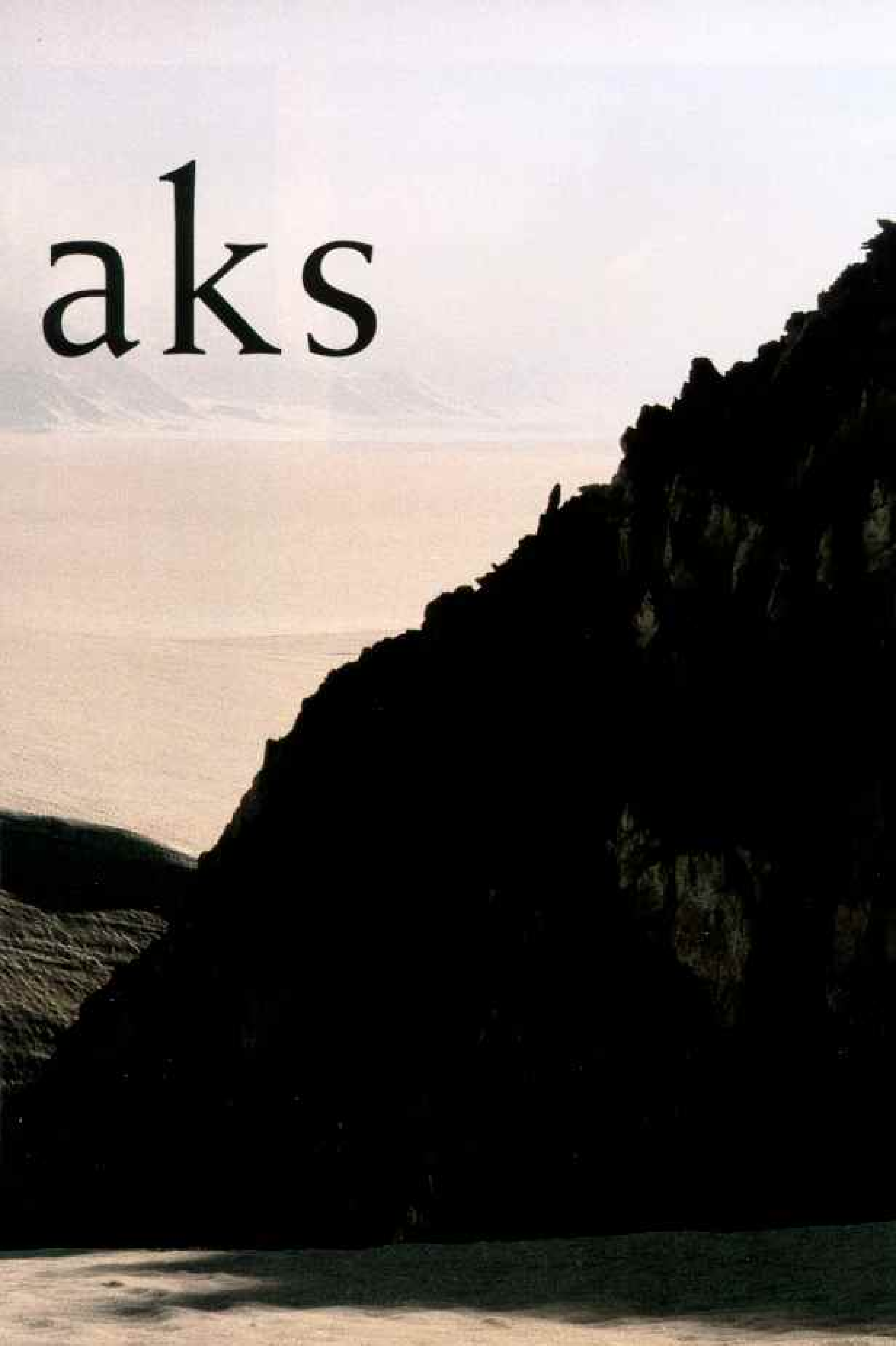
"The dragons are inside ourselves," Jordi Pujol, Catalonia's president, likes to say when the subject of St. George comes up. Once you realize where the dragons are, anything—even a new Europe, no longer soaked in blood—is possible, as Barcelona shows. □

Icebound Islands of Life

Nunat

Where glaciers meet mountains in Canada's Yukon Territory, some peaks jut from the ice like islands in a frozen sea. These crags, called nunataks, may appear barren, but biologist David Hik, the skier at far right, has discovered that collectively they harbor hundreds of species, from delicate alpine forget-me-nots (inset) to foraging mammals.

aks



By KEVIN KRAJICK
Photographs by ROBERT CLARK

ON THE GLACIERS of the Yukon Territory's St. Elias Mountains, winter temperatures hit 40 below, driven by hurricane-force winds. Even a full summer sun can turn in an instant to freezing fog and sleet. "In its eternal solitude, its awful silence, its absence of any forms of life, vegetation, or running water, one sees a picture of the utter desolation which once existed during the great glacial periods," wrote H. F. Lambart, one of the first recorded explorers of the region.

Lambart was wrong. This seeming wasteland does hold life—on small, sharp tips of mountains that poke through the sea of ice. They are called nunataks, an Inuit word meaning "land attached." Archipelagoes of them, most no bigger than a few acres, are scattered across Earth's polar regions and tallest ranges.

Since the 1800s scientists have speculated that many of today's mountains were nunataks during the ice ages, serving as arks from which

"CLIMBING these rocks is no walk at the beach," says Hik (above). After scrambling up an unstable slope, he finds his quarry: a tiny meadow on a ledge. Plants drive nunatak ecosystems. The sedges Hik collects feed guinea-pig-size animals called pikas. Moss campion's dense network of shoots allows less hardy plants to gain a foothold (above left).

KEVIN KRAJICK often writes about the natural world for magazines such as *Natural History*, *Smithsonian*, and *Discover*. This is his first story for NATIONAL GEOGRAPHIC. ROBERT CLARK's photographs of the excavation of French explorer La Salle's ship *Belle* appeared in our May 1997 issue.

plants and animals spread when the climate warmed. But little was known about nunatak ecology until David Hik, a biologist from the University of Toronto, began a long-term study in Canada's Kluane National Park Reserve. There, in the midst of 16,000 square miles of ice fields that stretch into Alaska, Hik has discovered flower meadows no bigger than blankets hosting spiders and rare insects; eerie graveyards of migrating birds that lost their way; and collared pikas, small mammals that somehow navigated across crevasses, melt streams, and the sheer unsheltered vastness of the ice to dwell amid nunatak boulders.

Since 1991 Hik and his colleagues have cataloged 158 species of lichens, mosses, and plants, as well as a lifetime's worth of weird wildlife observations. All the species appear to have come from the outside world—insects and seeds, for example, are blown by the wind. Along with Eliot McIntire, an ecology student, and Merav Ben-David, a wildlife biologist from the University of Alaska, Fairbanks, I joined Hik not long ago to discover how life hangs on in such pitiless conditions.

Hik loves his job. "Glorious summer, good as it gets!" he cried gleefully, sweeping his arm in a circle to show off the Seward Glacier, a 400-square-mile rolling plain of ice believed to average a half mile deep. "Welcome to my office!" We were headed toward an island of shattered rock rising 300 feet out of the ice. Around it, swirling winds had scooped a moat that plunged through the ice and bottomed out in a maze of gurgling melt streams. A high tongue of the Seward lapped up its far side,

UNLIKELY SKYLINE, a groundsel flower and the red stalks of fruiting mountain heather form a four-inch-high canopy. Most high-altitude vegetation hugs the ground to avoid battering storms. A shallow depression shelters this patch, allowing these self-pollinating plants to raise taller advertisements to flyby bumblebees, whose attentions may increase seed count.

THE DIVERSITY OF SPECIES on nunataks takes patience to grasp. Only the showiest, such as moss campion and orange lichens, grab the eye. Wait and you might glimpse an alert wolf spider or resting butterfly. How did life reach these isolated peaks? Winds bore most pioneers over the glaciers. Plants were carried as seeds. Young spiders sailed in on strands of silk.

providing a ramp onto a steep heap of razor-edged boulders. As we gingerly ascended, every rock seemed on the verge of tipping over. We just had to move slowly and carefully.

At the summit we saw the first signs of life. A gray Bohemian waxwing with delicate white-and-yellow feather tips had wedged itself into a cold crevice and died. These lovely songbirds like to winter as far south as Texas. This one must have taken a wrong turn. A single life-form from the outside world sometimes has a powerful effect on the scant nunatak ecosystem. Directly below the waxwing a small moss bed had sprouted—its spores perhaps blown in from outside or brought by the bird that was now nourishing the moss with its decaying body. We turned the waxwing over, and its body squirmed with larvae.

In succeeding days we found dozens more pitiful corpses curled into cracks or laid out on high rocky pallets—sparrows, thrushes, warblers, and the skeleton of a solitary sandpiper. A Kluane park warden once came across a nunatak snowbank whose side had peeled off to reveal a layered cross section of many years' accumulation of ice and snow. Interspersed among the layers, like raisins in a cake, were generations of dead birds. A helicopter pilot reported seeing a whole flock of swans crash into a nunatak cliff during a snowstorm.

How do so many birds end up here? More than a hundred species migrate to low-lying Arctic or subarctic breeding grounds north and east of the ice fields. Some decide to take a shortcut over the mountains; others get lost. Above the glaciers birds are probably forced down by wind, iced-up wings, or exhaustion. "I think the nunataks must look like oases to them in all this snow," said Ben-David. "They land here, but there's not enough for them to eat, no way to get warm. That's the end."

On almost all the nunataks, we found signs of an end use for the birds: finger-size pellets of scapulas, beaks, claws, and other indigestibles regurgitated by ravens that live on the ice field edges and scavenge the corpses.

In the deep, dark interstices between boulders we found something equally macabre: little piles of birds neatly stacked like cordwood, as if something was collecting them. Something is. Collared pikas, which use the space between rocks as tunnel complexes, had brought the corpses back to feed on. In the world beyond the nunataks, pikas are vegetarians. Here plants are so scarce it appears that the pikas supplement their diet with meat. They are the only mammals able to live off such a meager food supply. Weasels and wolverines venture by, but they quickly flee or die.

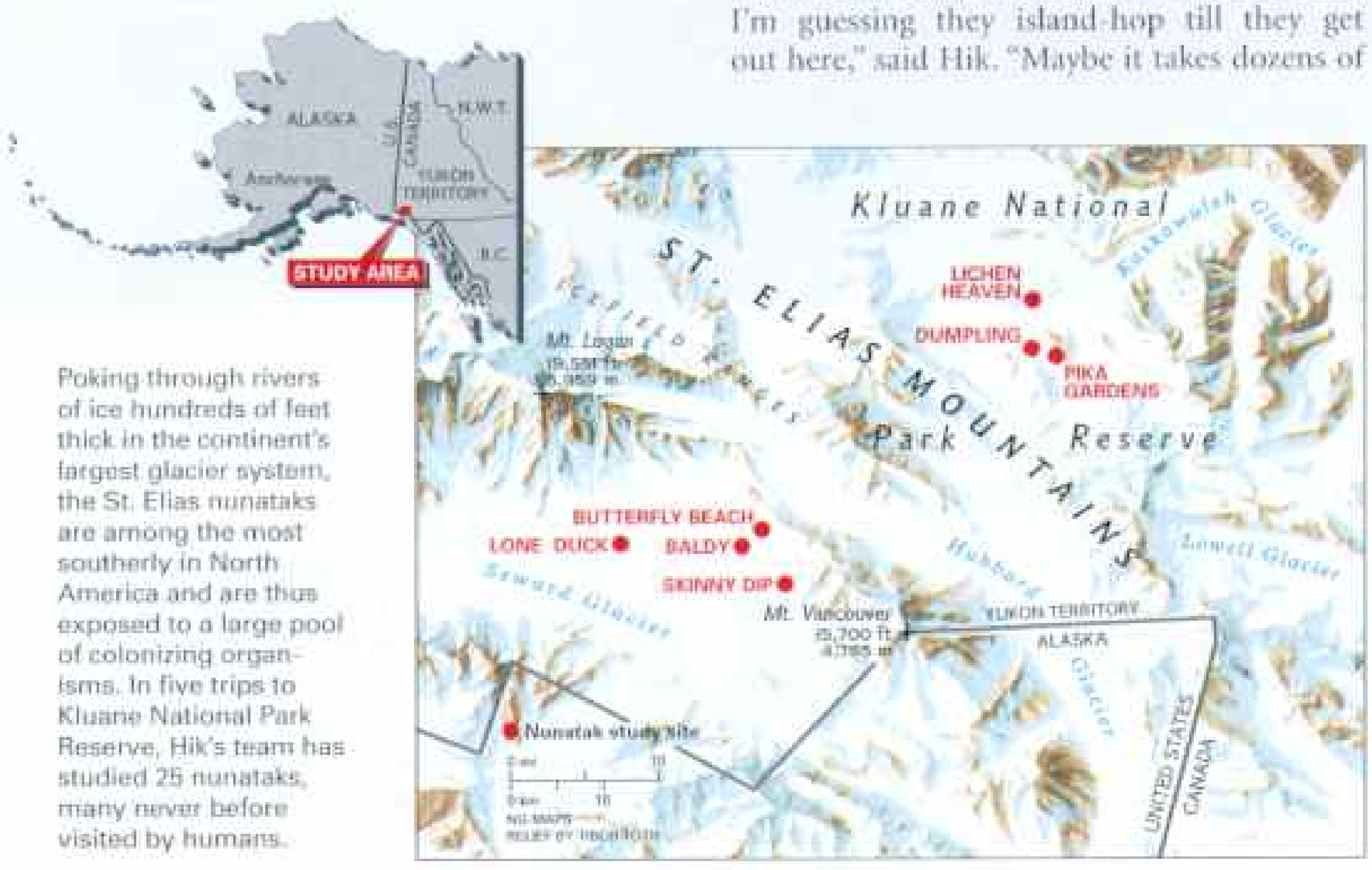
The pikas sometimes chew a hole through the delicate bird skulls to get at the brain, leaving the rest. "By the time the birds die, there's not much a pika could digest. They're down to feathers, bones, and a few tendons," said Hik. But brains are like pâté—pure, digestible protein and fat. "If I were going to slice and dice a bird, that's the part I'd choose. Even if they get

just a few a year, it may make the difference between surviving or not."

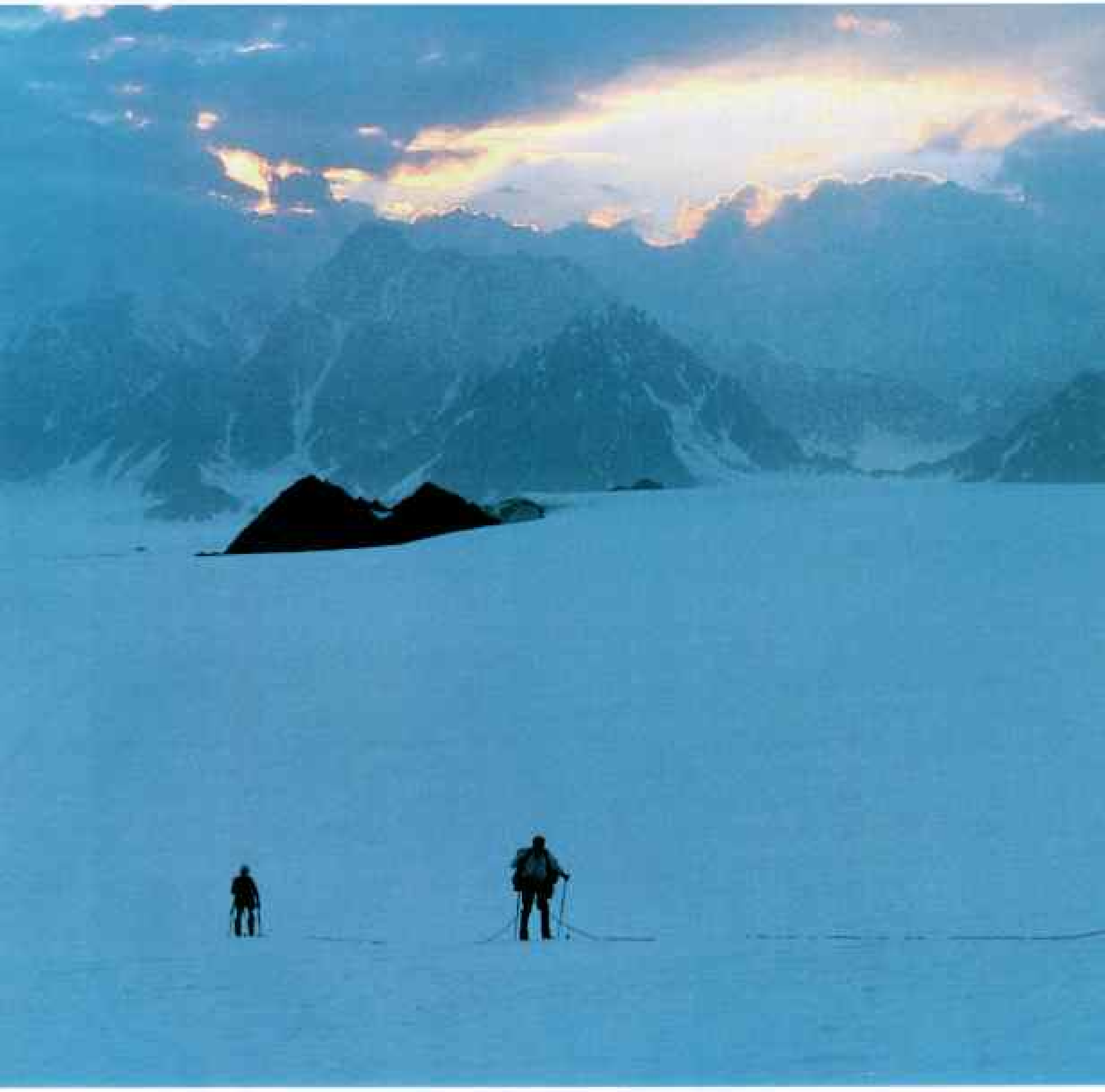
Pikas also harvest plants during summer and pile them up in their dens like haystacks to help survive winter. In the same crevices with the mangled birds we found a few withered handfuls of grass and flower heads. They smelled like the dried grass my father-in-law lays up in the loft of his sheep barn every fall. But there were no pikas.

Hik figured bad weather or the rare predator had killed them. But later when he was off collecting plants, I glanced up to see something that looked like a furry hot dog regarding me from a rock. It snuffled its whiskered nose, gave a bathtub-toy squeak, and disappeared down a hole. "You sure it was a pika?" asked Hik, who sprinted back when I hollered. Soon the six-foot-three, basso-voiced biologist was crawling around the rocks doing a poor pika imitation in a bid to draw the critter out. It answered but refused to show itself.

I wondered how this creature, or its ancestors, arrived here. "I haven't a clue," Hik admitted. With legs as short as a joint or two of your little finger, pikas are not good travelers. Normally their territories are measured in yards. They rarely emerge from their dens for more than a few minutes because direct sunlight easily overheats them. Yet at least one pika was on this nunatak, 75 miles from the nearest "mainland" pika colony. "Since some of these nunataks are only a few miles from each other, I'm guessing they island-hop till they get out here," said Hik. "Maybe it takes dozens of



Poking through rivers of ice hundreds of feet thick in the continent's largest glacier system, the St. Elias nunataks are among the most southerly in North America and are thus exposed to a large pool of colonizing organisms. In five trips to Kluane National Park Reserve, Hik's team has studied 25 nunataks, many never before visited by humans.



generations to get a population out this far. But of course I'm just guessing."

How pikas find mates is another mystery. Most nunataks seem to have only two or three pikas. Do brothers, sisters, and parents perpetuate a slim family tree, or do they disperse to other nunataks? No one knows.

"Poor little things," said Ben-David. "They are just little bags of skin and bones." We were lying on the glacier one morning, pressing our faces to the snow to get a pika's-eye view of the world. At this angle a nunatak a mile distant disappeared behind the rolling ice—pikas can't depend on vision for navigation. "Maybe they smell flowers," Hik mused.

He could be right. On the sere ridges we sometimes came across a few square yards where pulverized rock had managed to settle in a relatively level spot with a southern exposure. Here, seeds of typical alpine plants from surrounding unglaciated mountains created minuscule, sweet-smelling flower gardens: nitrogen-fixing oxytropis with delicate purple petals, tiny poppies, daisies, Jacob's ladder,

CHILLED by creeping darkness, the team slogs home from nunataks called Baldy, far left, and Butterfly Beach, the dark ridge at right. A rope binds them for safety. "We can see big holes," says Hik. "We can't steer clear of snow-covered cracks." A thousand yards ahead lie camp, dry clothes, and the end of a 16-hour workday.

dandelions, potentillas, and saxifrages, all blooming together in a summer day's 22 hours of sunlight. Many plants have hairy leaves to hold heat, and some have flexible horizontal stems, a dozen feet long or more, that hug the terrain and can slide along with moving rocks. One ledge protected by an overhang held a mattress of sedges and grasses watered by a terraced waterfall, and in its trickle a huddle of tiny brown mushrooms. McIntire, our botanist, spent his days scrambling on his knees with a magnifying glass and plant handbook trying to keep up with the variety.

Hik and his colleagues have christened these lonely hills with names like Lichen Heaven, Baldy, Pika Gardens, Lone Duck, Butterfly Beach, and Skinny Dip—the last for a brief swim we dared in a turquoise moat pool. One called Dumpling, on the 35-mile-long Kaskawulsh Glacier, jutted 300 feet up. Its southern slope was dotted with rich miniature meadows, where we saw insects—dragonflies, bumblebees, moths, butterflies, and black-and-white striped flowerflies—milking nectar or otherwise making a living. Waiting in the rocks for them were black wolf spiders, which dwell in silken lairs with eyelike openings. Their long legs carry them in pursuit of prey high across stony ground. These predators may sail many miles from lowlands on special threads and subsist on insects rained down by the wind.

Many of these insects are typical alpine and arctic varieties. But some are unexpected finds. A few years ago Hik collected a half dozen butterflies. One was a hairy, purplish black creature with a greasy sheen. Don Lafontaine, an entomologist with the Canadian government, recently identified it as the extremely rare *Boloria natazhati*, known from only six other areas in northwestern Canada—most of them former nunataks that became freestanding mountains after the last ice age. Two others turned out to be an equally rare patterned moth, *Xestia maculata*. "That's three out of six," Lafontaine said. "If you went and did a thorough survey, there's no telling what you'd find."

The more we looked, the more life was revealed to us. As soon as we reached Dumpling, two pikas greeted us with squeaks. Within minutes, Hik was doing his pika imitation again—this time with greater success. Soon the pikas scrambled onto rocks and looked us up and down. When Ben-David turned her back, one scampered out and lapped at a novel nutrient source: the sweat on her backpack straps. These pikas, isolated from predators,

seemed easily fooled. Ben-David baited some wire traps with flowers and soon caught one. She cradled it in her hand, clipped a few hairs from its back for later tests, and set it free. The hairs contain stable isotopes of carbon and nitrogen that signal what proportion of plants and animals the pikas eat—the main question Ben-David has been studying.

That same day a pair of snow buntings whirled into the Dumpling meadow in tandem and began picking insects off plants. These black-and-white, robin-size birds are among the few that breed here. They sang merrily as they worked their private kingdom, then headed over a ridge behind a sheer cliff—a typical nesting spot. The previous year Ben-David and Hik had seen a pair of snow buntings here—perhaps the same two—and then a few days later two newly fledged buntings bumbling over the meadow. We also saw a horned lark, another nunatak nester, snatching flowerflies blown off the rocks onto the ice, where they were too chilled to move. One evening I heard a whirring above my head and looked up to see a rufous hummingbird. It hovered high over the meadow, then disappeared over a ridge on some unknown journey.

How long has such life been here? It depends partly on the age of the nunataks. Gerry Holdsworth, a University of Calgary glaciologist, thinks most St. Elias nunataks probably emerged from the ice about 12,000 years ago, shortly before the end of the last ice age. No one has yet found endemic species on nunataks, which supports the idea that their history has been too short for evolution to take place, though there may also be too much contact with the outside gene pool. Comparing the DNA of nunatak pikas with that of mainland pikas will reveal whether they have been isolated long enough to diverge genetically.

WE LIKED TO IMAGINE we were the first to climb these nunataks. Indeed, we never saw another person. Native groups like the Southern Tutchone, who live in wooded valleys to the east, have largely avoided the ice fields, which in their legends harbor giant snakes and owls.

But we know humans have visited at least one. On Hik's first trip he stumbled across a reddish brown hunk of fur at the base of a Kaskawulsh nunatak. It was clinging to a stone just melted out of the glacier. Archaeologists later identified it as a thousand-year-old fragment of bearskin. On its edge someone had cut slits and attached a leather thong, perhaps to use as clothing or as a container. "I was absolutely floored," said David Arthurs, a Parks Canada archaeologist who has examined the skin. "It's the only human artifact ever recovered from the St. Elias ice fields."

The bearskin's owner would have traveled through a maze of cliffs, icefalls, moulins, and melt streams. The legends of several native peoples, including the coastal Tlingit, speak of trade routes across smaller glaciers farther south. Or maybe the nunatak had spiritual significance. We will probably never know.

On our last day Hik, McIntire, and I skied into the dawn to revisit the discovery site, several miles away. The place had a deathly grandeur—a towering central column surrounded by billions of rock shards, underlain by a sloping layer of ice that made climbing out of the question. No bird sang, no lichen grew. The only whispers of life were a few fossil clams scattered among the rocks.

The Southern Tutchone have stories about two men who dared enter the ice fields. One fell into a hole and landed on a dry island; the other fled home to get help. The man in the hole survived more than ten days by wearing a succession of pelts—beaver, moose, gopher. Finally his friends struggled back, weeping, to retrieve his body. Finding him alive, they fed him, warmed him, and carried him until he could walk. The man told his rescuers he had had a vision of them mourning him at a potlatch—which indeed they had.

I thought of this story and of the traveler with the bearskin. What had he endured on this barren island on the ice? We were leaning, dead tired, on the rocks when an icy wind suddenly roared down the Kaskawulsh. It brought a solid wall of crystalline fog that blotted out the sun and everything more than a few feet away. Soon it would turn to whipping snow and sleet. We had little food and the temperature was dropping. But unlike the ancient traveler, we had tools to guide us. Hik calmly pulled out his compass and took a reading. As we skied into the whiteness, I glanced back at the island one last time. It had already disappeared in the mist. □

QUEEN OF HER HILL, a newly tagged pika bolts to freedom. Pikas are the only year-round mammal residents here. Many birds are doomed strays, grounded by storms during migration. Chemical traces in pika hairs and the hole on the other side of this dead sparrow's head suggest that pikas supplement their diet with high-protein brains. On nunataks the tough survive, but only the adaptable prosper.

With all eyes astern, a young crew skips over choppy seas in "Breezing Up," one of Winslow Homer's most beloved oil paintings. Completed during the centennial year of the United States in 1876, the work reflects the nation's mood—a burst of exuberance following the turmoil of the Civil War.

Respected as a chronicler of war and admired as an observer of post-war life, this largely self-taught painter set an independent course for his career, which lasted 50 years and ranged over many moods, from tranquil to stormy. "To look at him, one could not imagine him painting," said a friend, who thought the dapper Homer seemed more like a successful stockbroker (overleaf).

Homer was a bundle of contradictions. A blunt, practical loner, he rebuffed inquiries about his personal life. But his small circle of friends and family knew him as generous and kind, with a dry Yankee wit and keen interest in people that still shine through his finest work.

American Original

By ROBERT M. POOLE
ASSOCIATE EDITOR

Photographs by SAM ABELL
NATIONAL GEOGRAPHIC PHOTOGRAPHER

TWO STRANGERS MEET walking the ragged cliffs of Prouts Neck, Maine, where the Atlantic pounds the resisting granite so hard that conversation is often shouted.

"I say, my man," says one of the two, obviously fresh from the city, "if you can tell me where I can find Winslow Homer, I have a quarter here for you."

The other man, a Yankee fisherman with a drooping mustache, wears an old felt hat and rubber boots. He is small and weather-beaten, with the skeptical look of a terrier, and just as quick to pounce: "Where's your quarter?"

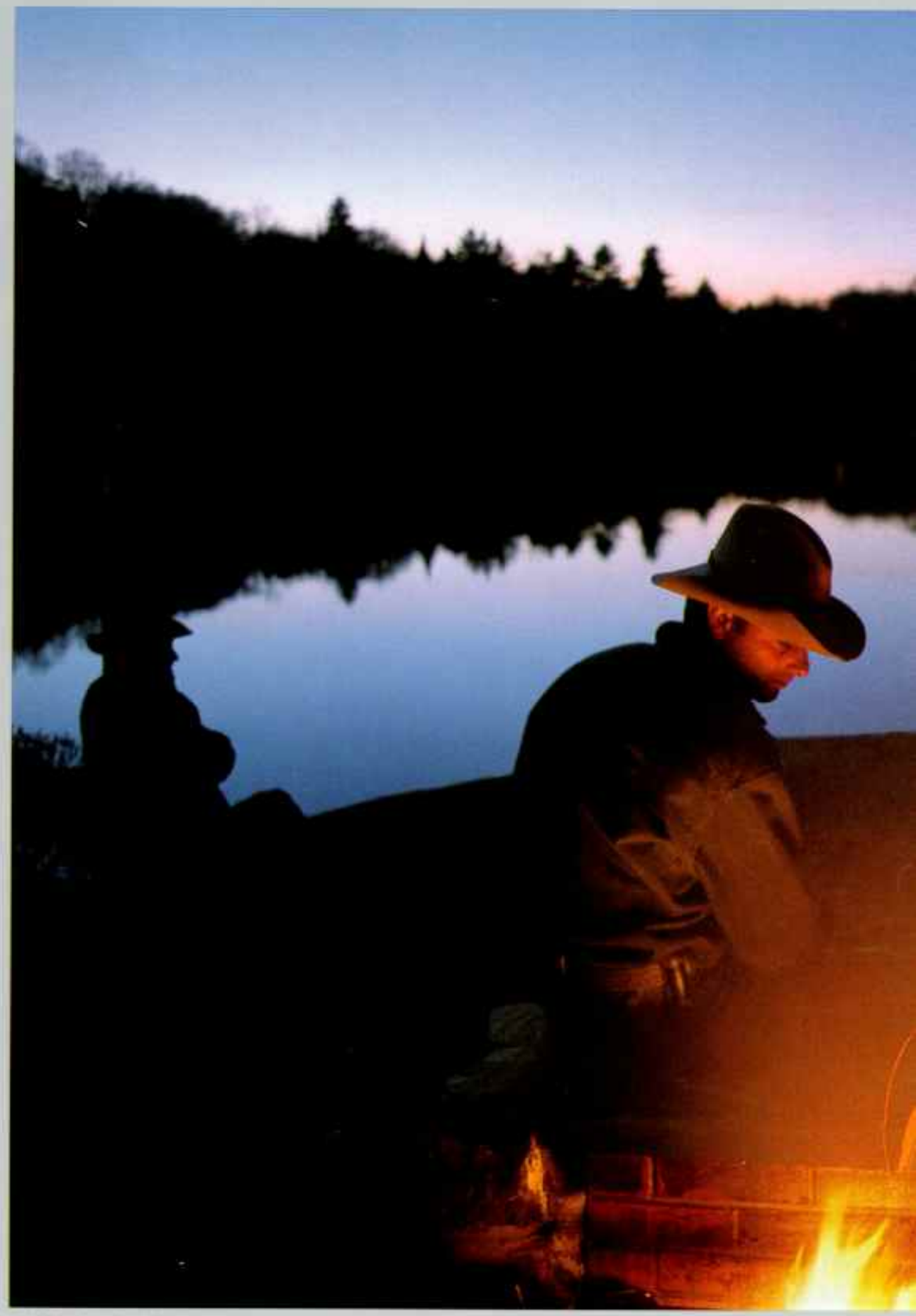
PHOTOGRAPH OF WINSLOW HOMER BY NAPOLEON SARONY, BOWDOIN COLLEGE MUSEUM OF ART, BRUNSWICK, MAINE

The stranger hands it over.

"I am Winslow Homer," says the fisherman, taking the money.

He is also the most famous American artist of his day, which spanned the 19th and 20th centuries. Although largely self-taught, Homer became a master of etchings, oils, and watercolors. On his own he developed Impressionist techniques like those Monet and Renoir perfected years later. He changed the way Americans saw watercolor, elevating an amateur form to a serious art. He influenced generations of artists, ranging from Rockwell Kent to Edward Hopper to N. C. Wyeth, who named a house Eight Bells after a Homer painting.

Homer's vision, like the man behind it, was unique to the point of stubbornness. Others painted indoors. Homer painted in daylight long before it became standard practice. Others painted blue skies. "It looks like the devil," said Homer, who avoided them, filling his skies with gray, yellow, pink, white—anything but solid blue. Others depicted the horizon with a straight line. "Horrible," said



TIM BRUNE WATCHES SPARKS FLY AT THE NORTH WOODS CLUB IN NEW YORK'S ADIRONDACK MOUNTAINS, WHERE

HOMER OFTEN FISHED FOR TROUT AND ABSORBED LANDSCAPES HE WOULD RE-CREATE IN IMAGINATION AND PAINT.

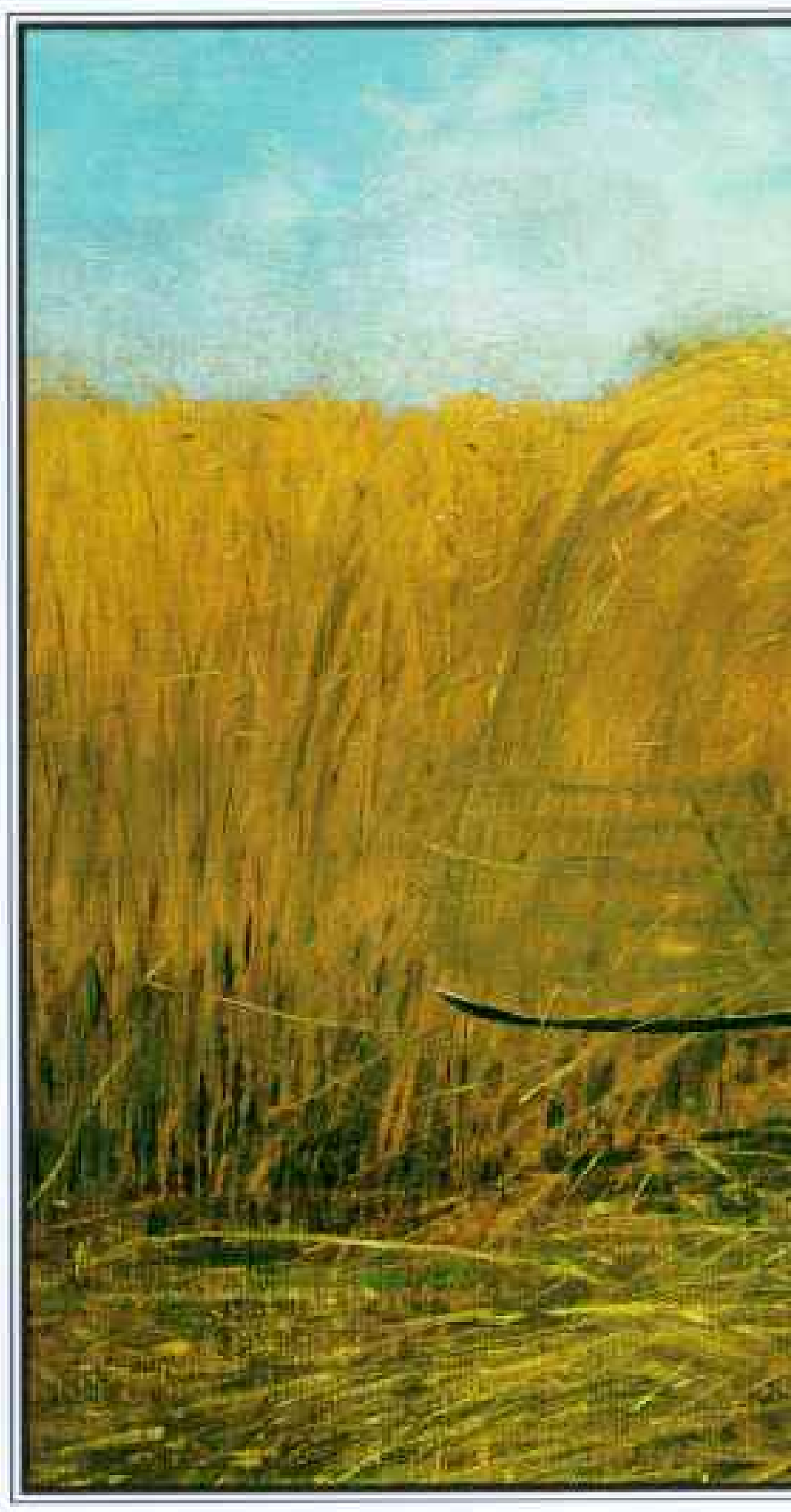
PORTLAND MUSEUM OF ART, PORTLAND, MAINE

"I've seen them pick a man off who was a mile away," said a Confederate officer harassed by Union marksmen as in Homer's first oil painting, "Sharpshooter." Years after the war Homer continued to draw on the mortal themes he had learned, as in his stark rendering of the man scything grain in the painting "Veteran in a New Field." The reaper, just home from killing fellow countrymen, recalls a lesson from Psalms: "As for man, his days are as grass."

Homer. He broke his horizons with dots of light, giant waves, plunging boats, and mountains. Others treated subjects romantically, bathing their canvases in golden light. Too easy for Homer, a pioneer in realism. He got at the underlying truth of a subject, even if it meant hours of waiting for the right light or torturing his neighbors at Prouts Neck.

To catch the look of rough seas, he posed one of them, Henry Lee, in oilskins for hours on a cold day, in a boat propped on shore at a steep angle. Homer doused him with a bucket of water, apparently without warning, to complete the effect. "You never heard such profanity in your life," according to a witness who was there for the genesis of "The Fog Warning."

Such attention to reality was at odds with artistic convention in Homer's time, as was his choice of subjects—barefoot boys, farm girls, working men, freed slaves, North Woods guides, ordinary soldiers, and women of leisure, all of whom represented everyday life in America. Early critics complained about it, grumping that Homer's pie-fed maidens were unfinished and rough, like his painting style. But like other American originals of his time—Walt Whitman and Mark Twain—Homer kept to his own path. Although he was overshadowed by more modern artists in this century, the Old Yankee's timeless themes and enduring style won out. In 1998 one of his marine oils, "Lost on the Grand Banks," sold for more than 30 million dollars, breaking all records for an American painting. The buyer was Bill



Gates, whose name is synonymous with ephemeral communication. Yet when he sought something of permanent value, Gates turned to old-fashioned oil on canvas. Homer might have had a good chuckle at that one.

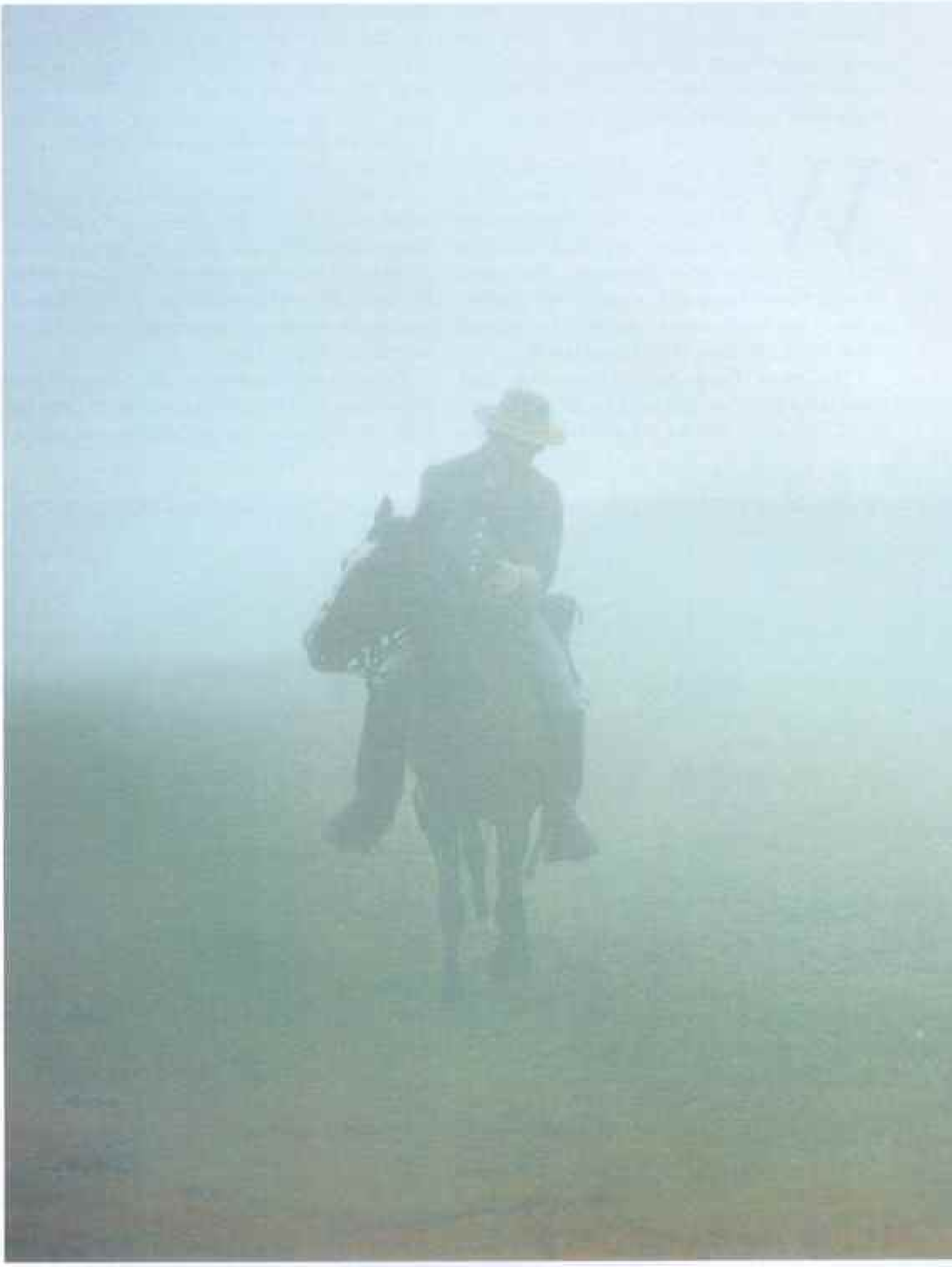
"WINSLOW HATED a lie," said one of his relatives, summing up the essence of an unpretentious man who persisted, through trial and error, in an artistic career that lasted 50 years and produced some 2,000 known works. That legacy leaves admirers like Nicolai Cikovsky, Jr., shaking their heads in awe.

"The great thing about Homer is that there is no point in his career when he falters," says Cikovsky, a Homer scholar who is senior curator of American and British paintings at the National Gallery of Art in Washington, D.C. "He just gets better and better almost until the moment of his death. This is very, very rare. So many painters give up in their later work, have nothing new to show. Homer never had that problem."

He found fame early, but that drew unwanted attention to this shy and modest man, who hated explaining his pictures, giving autographs, or receiving visitors who interrupted his work. He withdrew deeper within himself, eventually earning a reputation, not entirely warranted, as a recluse.

Homer's insistence on privacy has made him a hard case for biographers, who have been left with no diaries; a pile of largely unrevealing

THE METROPOLITAN MUSEUM OF ART, NEW YORK CITY



A fog of uncertainty hung over the Union when soldiers—like this horseman in a reenactment near Cedar Mountain, Virginia—returned from the nation's bloodiest war. Would thousands of armed Rebels and Yankees resume their fight? Or would they look to a peaceful future? The peace held, and artists like Homer filled their work with children, symbol of the nation's hope for a fresh start.

"Homer was the boy who never really grew up," says David Tatham, a scholar sizing up the man who was still playing with slingshots and scribbling on walls in his 30s. Homer toyed with his art as well, moving mountains and characters in and out of versions of works like "Snap the Whip."

Such paintings established Homer as an artist with a distinctively American eye, "as Yankee in character as the 'stars and stripes,'" wrote a contemporary reviewer, "but without a particle of vulgar forcing of that idea."

letters, and very few interviews by contemporaries who knew the man.

What we know is sketchy: Born in Boston in 1836, Winslow was the second of three sons of Charles Savage and Henrietta Benson Homer. She was sensitive and kind, an amateur watercolor painter who encouraged young Winslow's artistic leanings. Charles was a hardware merchant, full of energy and bluster, a dreamer who lost much of the family's money in the California gold rush of 1849.

Homer started work for a Boston lithographer at 19, then moved to New York City as a freelance illustrator for *Harper's Weekly* and other magazines. *Harper's* assigned him to cover President Lincoln's Inauguration, then the Civil War. The war gave Homer his first great subject, which eventually set him on an independent artistic career.

He left New York in the early 1880s, and except for seasonal forays to the Adirondacks, Quebec, and the tropics, he lived alone in Maine with a terrier named Sam. He never married, preferring the company of working stiffs to genteel society. If he felt pressed by a social engagement, his response could be graceless:

"No, thank you," he said when asked to dine with a new neighbor in Prouts Neck. "I never dine out and I never accept invitations. I am perfectly satisfied with my own cooking." Pause. "On second thought, the fish man didn't come today. I will stay," he said to the hostess, now probably aghast at the prospect of a whole evening's conversation with the man.

"Well, he was not the person you'd invite to a party expecting him to be the spark plug," says David Tatham, a Homer scholar at Syracuse University. "He was the quiet guy in the corner. He was *extremely* nonverbal—he would point at things instead of talking about them. On the other hand, when he was with people he knew and knew well, he was very much liked for his quietness and was known to them as kind, generous, and gentle."

This other Homer, the private one, was devoted to family and friends. He looked out for their business interests in Maine, sent them paintings for Christmas, and showed them a keen wit. He mailed cartoons poking fun at himself and his pompous father. "Everything is quiet here but Father," he wrote to a cousin, "and he is like Wall Street on a 'black Friday.'" But Homer almost never initiated correspondence, was tardy acknowledging letters, and sometimes explained his lateness in deeply eccentric terms: Didn't have any paper, too far from the post office, the wind was blowing too hard, was building a doghouse.

According to a friend, who may have been

METROPOLITAN MUSEUM OF ART

joking, Homer's four favorite words were "Mind your own business." It was not a joke for would-be biographers. "I should not agree with you in regard to that proposed sketch of my life," he told one in 1908. "I think it would probably kill me to have such [a] thing appear. . . ." With another applicant he was more brusque: "I do not wish to see my name in print again."

But there it is, still in print, in letters four feet tall, rippling across a flag high above Fifth Avenue in New York City, announcing a retrospective at the Metropolitan Museum of Art. The Met show was the last stop on a three-city tour, which took Homer's work to the National Gallery in Washington and the Boston Museum of Fine Arts, drawing more than 600,000 visitors in 1995 and 1996.

I join a crowd sizzling on the museum steps in the July sun, waiting for opening time. We file inside and squeeze into a room that seems too hot and small, but Homer soon casts his spell, drawing people out of themselves and into the Civil War, where the exhibit begins.

Precious little bloodshed darkens Homer's war. Instead of guns and masses of soldiers, Homer focuses on individuals, behind the lines and around the corners of the action: Union soldiers listening to camp music and thinking of home, an officer sizing up captured Rebels, troops trying to get warm around a meager fire that you can almost hear hissing in the rain.

And over here a Union sharpshooter sits in a pine tree, taking aim on the enemy. His shooting eye, open wide, sights down the barrel. This new kind of warfare—impersonal, modern, chilling—allows combatants using telescopic rifles to kill one another at great

distances, up to a mile away. Homer immediately understands the implications of the technology and depicts it in "Sharpshooter." Only years later did he reveal his views.

"I looked through one of their rifles once when they were in a peach orchard in front of Yorktown in April 1862," Homer wrote to a collector, sending along a sketch with a victim caught in the crosshairs. "The above impression struck me as being as near murder as anything I could think of. . . ."

Homer's mother said the war changed him so that his best friends did not know him. "He suffered much, was without food 3 days at a time & all in camp either died or were carried away with typhoid fever," she wrote to Winslow's brother Arthur.

When the smoke had settled, Homer had grown up, and his reputation for unwavering honesty was established. "Mr. Homer is the first of our artists . . . who has endeavored to tell us any truth about the war," a reviewer wrote in 1863. His paintings are "signed all over with truth." Homer never abandoned that Yankee virtue.

HOMER'S TIME, like ours, was full of turmoil and change. The bloodiest war in American history, followed by uncertainty over whether the nation would survive. Women moving into jobs once held by men. Slaves free. Tourists venturing into the wilderness. Loggers chopping woods. Electric lights appearing, along with a new notion called Darwinism, which held that all creatures, humans included, engage in a constant struggle for existence, ruled by a natural order over which they have no control.

All of these subjects appear in Homer's work, which grows bolder as we move through the show. The watercolors throb with life and feeling. The oils get larger.

The early works shine with unblemished optimism, where youths sail under clear skies and play snap-the-whip in green fields. Later canvases show the despair of man beset by nature, as in "Lost on the Grand Banks." There two gaunt fishermen strain to see a way home in killing fog. And toward the end of Homer's career, people gradually disappear, replaced by sea and rock, wind and water, light and dark.

Homer's range covers a whole world of emotions, like those of an accomplished actor, and the New York crowd warms to him. They point. They smile and poke their noses into the paintings. They notice the hundreds of little details Homer sneaks in—the golden glow of a duck's eye, the distant blink of a lighthouse, the sunlight warm on a farmer's back, the translucent green of an ocean wave, the forgotten dog showing through thinning pigment, reunited with his master after all these years.

Homer still speaks to people across the years, but how? It may be his seeming simplicity, so forthright and easy to approach. But there is more to him than that, an intangible I'm still brooding over hours later, walking alone in New York.

Night eases down. People rush by on Park Avenue, trying to get home. A black man too old for such work pedals like mad on a bent bicycle, delivering prescriptions, encircled by cars that threaten to devour him like sharks. The Darwinian struggle persists here, along with other reminders of Homer's work.

Two women approach from the opposite direction. One lifts her face to the sky and smiles so radiantly that I spin around to see what caused it, and there it is: a yellow half-moon climbing into a black sky and, below it, lights winking on like stars. "Look at it!" she says to her friend, both smiling now under the spell of the moon. It's an urban version of Homer's "A Summer Night."

It's all here on the street, and it's all there in Homer. He endures because he painted the things that matter most: friendship, war, healing, courtship, beauty, love, the fight for survival against an uncaring nature.

THE WILL TO SURVIVE works a strange magic on some men in their 40s. They buy loud ties. They change jobs. They wear gold chains and disappear with exotic dancers. Anything to postpone the inevitable. Homer's big move came in the early 1880s, when he suddenly withdrew from New York after more than 20 years of living there, vanishing into a self-imposed exile. He was in his mid-40s, well liked and socially active. He had "the usual number of love affairs," according to a friend. A photograph from the period shows him looking sophisticated in a clipped handlebar mustache, a boldly checked suit, and flowing silk

cravat. And the eyes—dark, deep, liquid, steady, full of confidence, belying any crisis boiling beneath the surface. But not all was well.

"Something happened," says Cikovsky, a barrel-chested man with a shock of white hair and an easy grace Homer might have envied. "But we'll never know exactly *what* caused this extraordinary break. I think it was a romantic rejection, but art was involved too. You have to be cautious about blaming it all on a cruel woman who broke his heart."

Perhaps Homer felt stale artistically and needed to go away to find fresh subjects. Generations of Homer scholars have also wondered, as Cikovsky does, about the romantic angle and have looked for clues to a "mystery woman" who may have accelerated Homer's retreat. A redhead appears in several of his postwar pieces, as do other elegant ladies who stroll the beaches, teach drawing, walk little dogs, or pose from windows. We do not know the identity of any.

All except for Helena de Kay, the rare subject of a portrait Homer painted sometime between 1871 and 1872. "We know the woman," says Cikovsky, studying the painting with me in New York, "and we know that she and Homer had some relationship, a certain closeness. We know from the bare walls and floor in this painting that it was done in Homer's Tenth Street studio."

She is dressed in black, seated on a settee, holding a closed book. Her chestnut hair neatly coiled, she looks down, as if lost in a moment of reflection. A pink rose lies on the floor behind her. What does it all mean? We don't know. And even if it were possible to ask Homer himself, he would very likely tell you that it means whatever you want, if he responded at all.

His last recorded comment about Miss de Kay comes in 1872, when he offers to return the portrait. With what has been described as "unconvincing breeziness," he asks: "Why don't

Caught in a pensive moment, Helena de Kay, a socially prominent friend from Homer's New York days, seems to brood over a closed book. Symbolic of lost love? "Since it's Winslow Homer we're talking about," says Nicolai Cikovsky, Jr., a leading biographer, "we'll never know for certain." But romantic disappointment may have sent Homer fleeing New York to remain a bachelor the rest of his days.

MUSEO THYSSEN-BORNEMISZA, MADRID

WITH CHAMBER WILLIAMSON GALLERY, SCRIPPS COLLEGE, CLAREMONT, CALIFORNIA

Homer's wanderings led him to Cullercoats, an isolated English fishing village where the North Sea serves up regular thrashings of wind and storm. Sturdy women, who might have been chiseled from basalt, walk through watercolors like "Four Fisherwives." His nearly two years in Cullercoats also gave Homer one of his great themes—the bravery of humans against cruel odds. In the same village today a view from the lifesaving station reveals an empty beach, all that remains of the fishery.

you limp into my studio . . . and take it." Then he speaks as if trying to reassure her: "I am very jolly, no more long faces. It is not *all* wrong."

Two years later she married Richard Watson Gilder, a poet who was then managing editor of *Scribner's Monthly*. She keeps the painting until her death.

"End of story?" I ask Cikovsky.

"That's it," he says, staring at the canvas for a long moment. "Very sad."

Whatever prompts it, Homer disappears from New York in 1880, when reviewers first note his tendency to reclusiveness. He goes to Ten Pound Island, in the harbor of Gloucester, Massachusetts. There he spends the summer and sees few people. He works feverishly, experimenting with watercolors, turning out more than a hundred of them. Few characters inhabit the pieces; garish seascapes described by contemporaries as "wildly impressionistic" works of "fervid, half-infernal poetry."

Cikovsky says: "He never painted anything before or after of this intensity. They are inescapably *charged* with emotional feeling of the most intense kind."

Homer plunges into this new rhythm of life, working hard, trying new things, withdrawing even farther afield. In 1881 he pops up in the isolated English fishing village of Cullercoats on the North Sea.

During nearly two years there Homer discovers the mature subject he will explore for the rest of his life—the place of humans in a hostile natural world, fighting big seas and threatening skies. Dories struggle out to sea, ships wreck on the rocks, rescuers row out to help them. The Cullercoats women, big and beefy and nothing like the delicate women of Homer's earlier work, dominate the scene. They haul baskets of fish to market, mend nets, and look stoically to sea, which could swallow their husbands without a burp.

Homer returns home with a bulging portfolio of new work, and his claim on the subject is fixed. "Mr. Homer," writes the Boston *Transcript*, "is both the historian and poet of the sea and sea-coast life."

To get closer to this new subject, Homer settles on the secluded coast of Maine at Prouts Neck in 1883. It proves a wise choice, which frees him to do the best work of his life. Few neighbors, simple living, and a most dramatic setting where nature rules with a vengeance. The rocky peninsula thrusts into the North Atlantic, as if daring the sea to take a swing at it. Winslow's whole family builds homes there: Father and Mother Homer summer at Prouts Neck, along with brothers Charles and Arthur, their wives, and children. Winslow bunks for a spell in the Ark, the big house his parents share with Charles Jr. and his wife, Mattie. But Winslow finds the social requirements too demanding and is soon refitting a nearby stable for his home and studio.

"The Studio will be quite wonderful," he writes to Mattie Homer in June 1884. "It's very strong. The piazza is braced so as to hold a complete Sunday school picknick. Charlie will be very much pleased with it."

You could pass by Homer's studio today without noticing the squat green-and-white building hugging the Maine cliffs. But with the

With a stroke of his fly line, a fisherman parts the morning mist on Mink Pond, where Homer often fished for trout. His Adirondack excursions produced creelfuls of fish—and a hundred watercolors, which testify to Homer's work habits. "Talent!" he scoffed to an admirer. "What they call talent is nothing but the capacity for doing continuous hard work in the right way."

MUSEUM OF FINE ARTS, BOSTON

"My grandfather knew the man well," says Leila Wilson, nodding toward trout likely caught and mounted by Homer. In the Adirondacks he produced lyrical watercolors. "The Blue Boat" captures the perfection of a summer's day. Homer's idylls left behind some yarns: about his fondness for strong drink, the inevitable fish tales. "Everyone has a story," Mrs. Wilson recalls. "I don't know if my Uncle Roy really baited Homer's hooks, but he certainly liked to say he did."

help of Phil Beam of Bowdoin College and Doris Homer, a niece still living at Prouts Neck, I find the old stable on a September afternoon that gives a foretaste of winter. The weather shifts through several moods, sending shadows and sunlight tumbling across Winslow's lawn. The salt air smells of driftwood and seaweed from the beach, where crows swing out of the junipers and sail off gossiping on a stiff wind.

"From here," says Beam, "Homer could see for miles across the ocean, all up and down the coast."

This was Homer's world, a place that became for him what Yoknapatawpha County was for William Faulkner, a postage-stamp universe distilled and brought to life by the artist's imagination.

"That I am in the right place at present there is no doubt about," he wrote to his brother Charles in 1899. "I have found something interesting to work at, in my own field, & time & place & material in which to do it."

Homer spent hours walking the coast in all kinds of weather, accompanied by Sam the terrier and watched from a distance by his father, who trained a spyglass on the artist and reported his movements to anyone within hearing.

Winslow loved it best when winter came barreling in and forced the summer people to leave. That meant fewer distractions from work, and he kept busy building fires, tromping in the snow, watching the temperature drop, and cheerfully reporting on the rigors of winter in the north country.

"I have been free here for four days," he wrote in December to M. Knoedler & Co., his art dealers in New York, "the last tenderfoot having been frozen out, & now out of gun shot of any soul & surrounded by snow drifts, I again take up my brush after nine months of loafing."

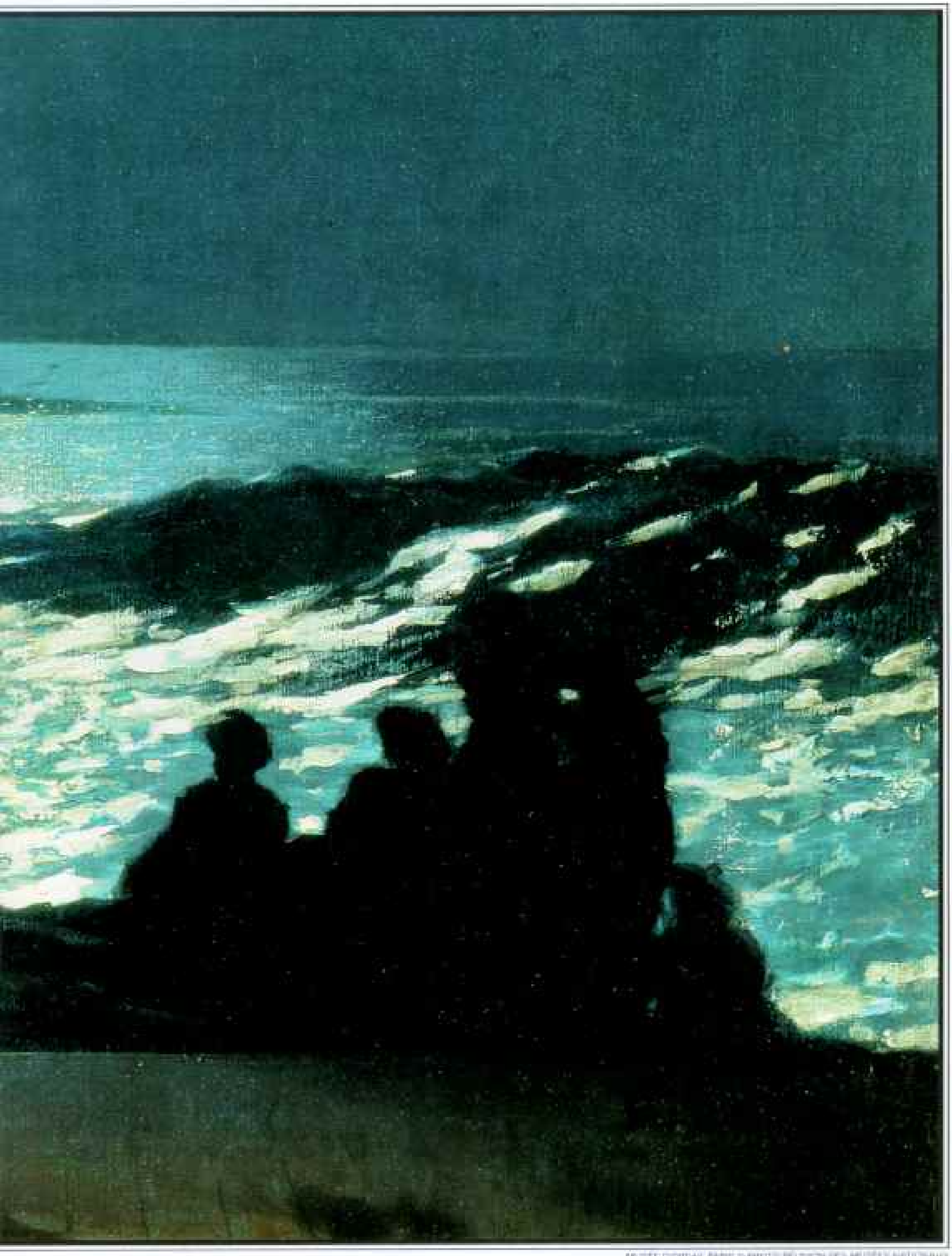
FAMILY AND FRIENDS gave Winslow a wide berth when he was working, knowing how single-minded he became in the grip of an idea. He kept the studio door shut, ate alone, took long walks, and paced his porch like Captain Ahab, "wearing out the balcony," as one of his brothers put it.

"All of the Homers lived within spitting distance," recalls Doris Homer, who was married to Charlie Homer, son of Winslow's brother Arthur.

"I think they enjoyed each other very much. They fished together and kept in touch. It was a close family," says Doris.

"How do you think Winslow would like all this new attention?" I ask, noting that hundreds of visitors came to see the studio in a recent year.

"Well, he liked his privacy," says Doris. "This is just a bachelor guy who lived the way he wanted. So I think the attention would bother him. But he would appreciate the recognition. People tried to make him out as an ugly old man, but I've always heard them say his manners were as fine as silk."



MUSÉE D'ORSAY, PARIS © PHOTO © RÉUNION DES MUSÉES NATIONAUX

Homer had a front-row view of the eternal war between sea and shore at Prouts Neck, Maine. Yet peace broke out when girls danced under the moon in "A Summer Night." Other paintings originated under the influence of moonlight—sometimes abruptly. His nephew Arthur recalled an evening when Homer, sitting outside with an after-dinner cigar, jumped to his feet and announced: "I've got an idea! Good night, Arthur!"

We're sitting inside the studio in a boxcar-size room Homer called "the factory." It seems quite dark inside, but Doris reminds me that Winslow started most of his pieces outside in the sunlight, using this room to complete them. The place was spartan, almost barren. He cooked meals over a fireplace in the next room, using old-fashioned kettles. He scribbled notes to himself on the walls.

"What a friend chance can be when it chooses," says one such note, scrawled in pencil.

Although Homer lived simply, he lived very well, shipping provisions up from Boston—Canadian mutton, chickens, Edam cheese, vatted whiskey, and, one of his favorites, Jamaica rum.

"You do not eat enough or drink enough," he once wrote to Charles, pointing out that it was cheaper to live in Maine than in New York. "[I have] all these good things . . . which you go without and eat corned beef and cabbage."

Living so far from civilization, Winslow kept supplies in quantity, so that he would never come up short. He hoarded crates of grapefruit and oranges, barrels of cider, bottles of ale, and kerosene stoves (he had five). He bought a new pair of pants every month. He ordered underwear by the gross—144 pairs of socks at a time. When one of his brothers questioned this practice, Winslow was ready with an answer: "When will you learn that the time to buy a thing is when you find what you want? If you go back the next year and try to get more, they will try to sell you something else."

Phil Beam, 88, is the same age as Doris, and one of the few living links to Homer. He takes me scrambling over the rocks to see where Homer painted—here Cannon Rock jutting out into the surf, booming when the tide rushes under it; there a frail boat with two fishermen pitching among the waves; here the white foam tickling a submerged bar; there the

"My home here is very pleasant," Winslow wrote to brother Charles in 1898, describing the stable he had converted into living quarters and studio at Prouts Neck. "I do not wish a better place." Bathed in thin winter sunlight, the place appears today much as it did in Homer's time. He found sanctuary there, lavishing hours on projects like "The Gulf Stream," a 15-year venture seen in this rare photograph of Homer at work. During his Maine years Homer spurned unwanted visitors and earned his reputation as a recluse. He was unapologetic. "This is the only life in which I am permitted to mind my own business," he wrote a friend. "I suppose I am today the only man in New England who can do it."

COLBY COLLEGE MUSEUM OF ART

rafts of black ducks huddled in swells as the weather closes on them.

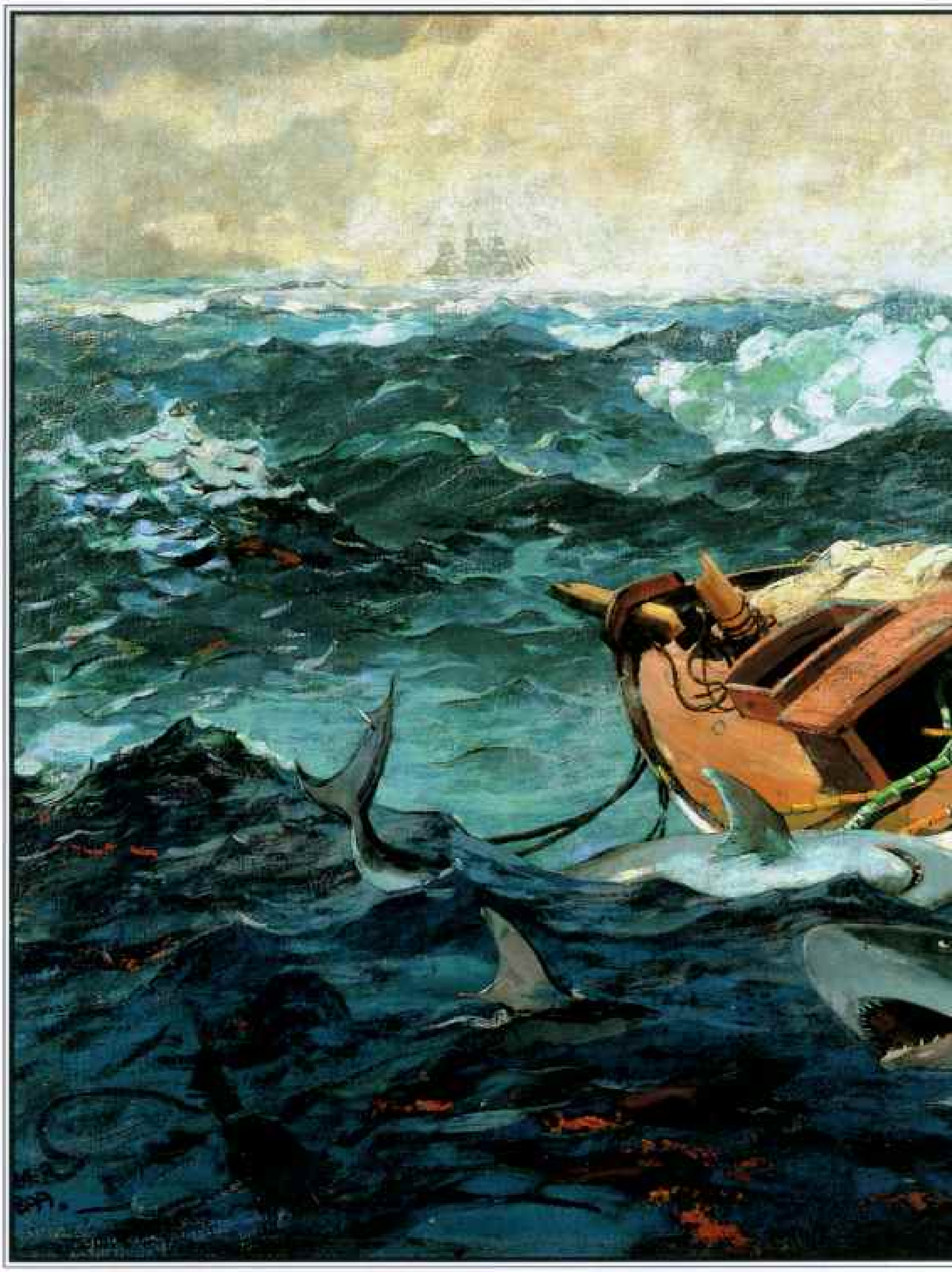
"He would work at a painting in stages, turn it over in his mind, work at it some more," says Beam. "If it didn't come out right, he'd drop it for a while and wait. He was persistent and patient. I'll tell you what," he says, giving me a friendly punch on the shoulder, "he didn't leave a lot of unfinished work behind."

One of Homer's most famous oils, "The Gulf Stream," was 15 years in the making. Other works waited for months or years, as Homer noted in 1902, writing to his art dealers in Chicago: "It will please you to know that, after waiting a full year, looking out every day for it . . . on the 24th of Feb'y, my birthday, I got the light and the sea that I wanted; but as it was very cold I had to paint out of my window, and I was a little too far away,—and although making a beautiful thing—it is not good enough yet, and I must have another painting from nature on it." Eight months later, he finished the long-awaited work, "Early Morning After a Storm at Sea," and shipped it.

Such carefully thought-out paintings seem effortless and simple today. But the more time you spend with Homer's work, the more complex it becomes, full of details you didn't notice the last time. You get the feeling that you are walking into the middle of an unfolding tale and find yourself filling in the next stage, off the canvas.

What happens to the brook trout leaping clear of the water? Does the hook give way? Or the deer swimming across a blue pond on a glorious October day, pursued by hunter and hound. Does the buck escape? What did that guide hear that caused him to turn his head away from the viewer?

"The outcome is always in doubt," says David Tatham of Syracuse University. "Homer



METROPOLITAN MUSEUM OF ART

"The *Gulf Stream*," completed in 1899, based perhaps on a derelict sloop Homer had seen in the Caribbean years before, stands as a bookend to the sunny optimism of "Breezing Up," painted early in his career. Homer's later works dwell on weighty concerns, which the artist faces with detached clarity, like the unfortunate sailor who, dismasted in a sea of sharks, regards his fate.

felt that viewers had an obligation to participate in the painting. So he resisted, sometimes very impolitely, requests to explain his paintings. His point was to raise more questions than answers."

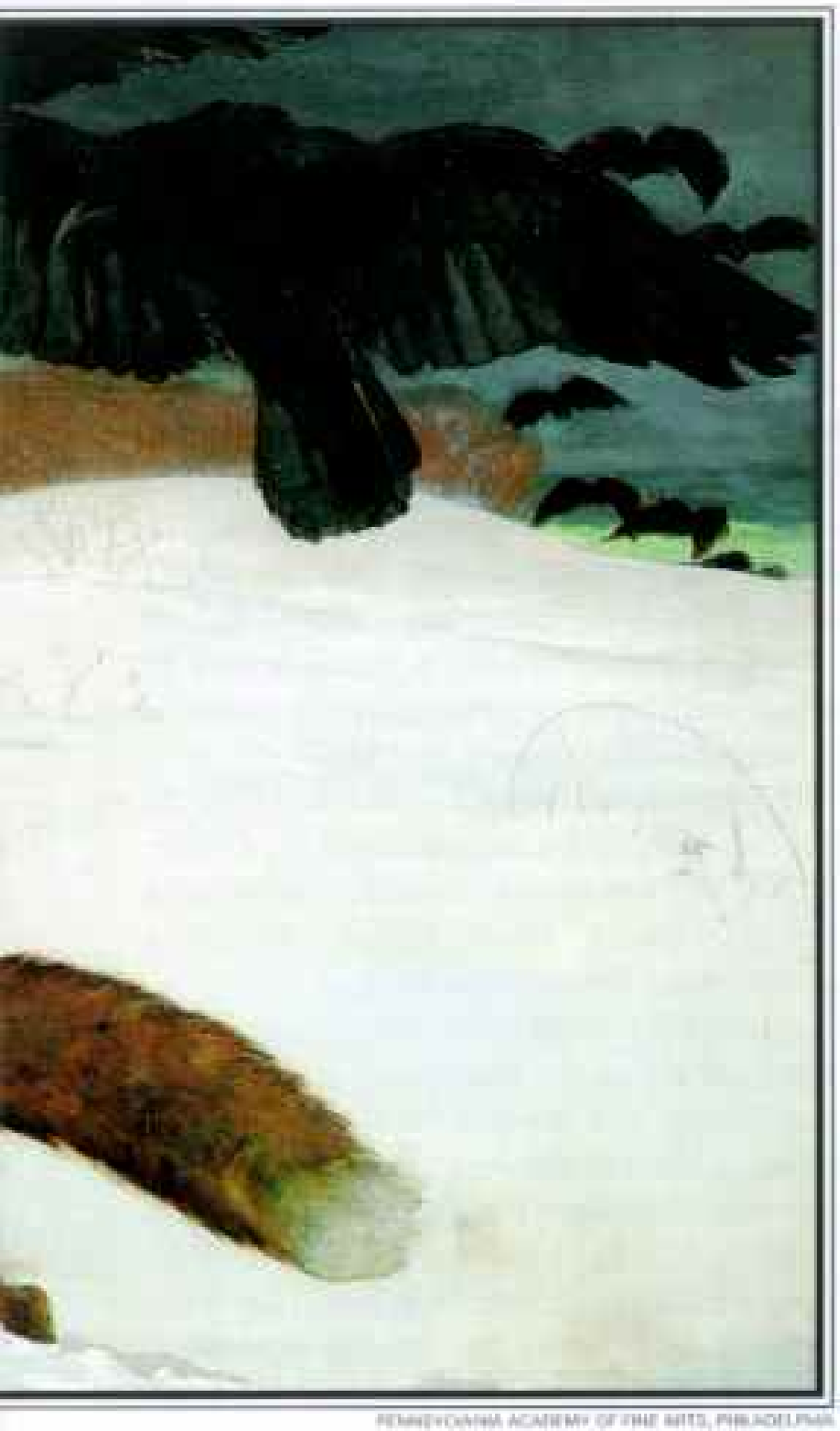
Homer was especially sensitive to questions about "The Gulf Stream," perhaps because he spent so long creating the piece. It depicts a black sailor languishing on the deck of a dismasted sloop, surrounded by sharks. The sea seems splashed with blood. When a dealer in New York asked for an explanation, Homer's response was unusually acerbic:

"Regret very much that I have painted a picture that requires any description. . . . You can tell these ladies that the unfortunate negro . . . will be rescued & returned to his friends and home & ever after live happily."

If this Homer was sometimes testy with strangers, the other Homer developed an easy relationship with his hardworking neighbors, whose lack of airs and native terseness matched the artist's style.

Homer often hired locals to pose for him. Will Googins, a Prouts Neck fisherman, rowed a dory out into rough water and fired a shotgun between the waves so that Homer could study how the blast would look from a duck's point of view. The result, "Right and Left," was one of Homer's last oil paintings.

A few natives were even trusted enough to visit Homer's studio, where they got the rare chance to criticize his finished work. Elbridge Oliver, the stationmaster at Scarborough, took one look at the birds in "Fox Hunt" and spoke right up: "Hell, Win," he said, "them ain't crows." Homer silently took up his brush, painted the birds out, and accompanied Oliver to the Scarborough train station, where they baited crows with corn for three days. Watching



PENNSYLVANIA ACADEMY OF FINE ARTS, PHILADELPHIA

Hunter becomes prey in one of Homer's great nature paintings, "Fox Hunt." Crows, pushed to desperation by a hard winter, drive a fox through deep snow on the Maine coast, tiring it to the point of exhaustion and death.

Homer identifies with the fox—he buries his signature deep in the snow, so that his name struggles like the doomed animal. Homer's works, at first glance so simple, gradually reveal such layers of irony, surprise twists, and new meaning—all reasons his art endures.

closely, Homer sketched the birds on telegram blanks and returned to the studio to try again.

Much of Winslow's time was taken up with the care of his father after his mother's death in 1884. It fell to Winslow, the family's only unmarried son, to look after the patriarch.

FATHER HOMER has views on everything and a tendency to press them on others. He grows his white hair in long curls so that he will look like an Old Testament prophet. He insists on shaving with rainwater from a special barrel. He makes a scene over the food served at dinner ("I had rather have a flogging than that!"). He fixates on the Spanish fleet, which he becomes convinced is about to invade the United States on the Maine coast, of all places. He bombards Washington, D.C., with warning cables until the Spanish-American War ends.

Winslow takes it all in good humor, even when his father begins preaching abstinence and joins a temperance group. Winslow's drinking habits include the tradition of a New England bracer at 11 a.m. each day. He invites his father to join in this morning drink, and each day brings the same routine:

"Now, Father, don't you think you'd better take this?" Winslow asks, offering a drink. "It will do you good."

"Any alcoholic liquor in that, Winslow?"

"Yes, Father."

"Well, I won't touch it then."

"Father, if you don't take it, I'll drink it myself."

"Well, Winslow, rather than have you destroy the tissues of your stomach by drinking this alcoholic beverage, I'll drink it."

As time goes on, the two aging bachelors find that they need each other. Father grows anxious when Winslow is out of sight, and Winslow worries about whether Father is eating properly. To his surprise, Winslow discovers what most sons eventually see—something of their fathers in themselves.

"I find that living with Father for three days, I grow to be so much like him that I am frightened," he writes to Mattie. "We get as much alike as two peas in age & manners."

Winslow's father dies at age 89 in 1898, leaving land (and precious little else) to the family. The land rentals supplement Winslow's income from art. And he makes a decent living by watercolors, which can be painted faster and sold more cheaply than oils.

"I will live by my watercolors," he once told a friend. Not only did they help pay the bills, but they also bought the time needed to treat bigger themes in oils.

Even after Homer settled in Prouts Neck for good, he continued to travel each year, visiting the tropics in winter and the North Woods in summer, fishing and painting in both places. Homer found good subjects on such trips and depicted them in watercolors, which were easier to handle for the traveling artist.

"All of the known techniques of watercolor painting he knew and mastered," says David Tatham, a precise, neatly pressed man who speaks in the frugal cadence of his native New England. Tatham recalled the ways Homer manipulated the medium. He would sand down the wash to show the pigment beneath, or use a sharp point to cut through paint to depict the arabesque of a fly line in the exposed white paper. He would wet a finished piece and blot the colors to create the look of a dense forest.

"No one in America had done many of these things before," says Tatham. "You might say he was at the cutting edge of technique."

AMONG THE BEST KNOWN of Homer's watercolors are works inspired by the Adirondacks, where the artist made frequent visits over 40 years. An avid fly fisherman, Homer often stayed at the North Woods Club, a 4,700-acre preserve in Essex County, New York. Even today, the years fall away as you drive along the shadowy road from Minerva to the North Woods Club.

"I don't think much has changed since Homer was here," says William H. Savage, a North Woods member who joins others in the old dining room at night to share a drink and tell stories about the day's fishing. The atmosphere is relaxed, the cabins rustic and without pretense, which Homer no doubt appreciated.

"He did his best work in places like the North Woods Club and Prouts Neck," says Tatham. "These were places he loved to be, secure among his friends and family."

Now as in Homer's day, you row out on Mink Pond through curtains of fog and see the distinctive Adirondack guide boats that skim through so many of Winslow's watercolors. One of the best loved, "The Blue Boat," captures the tranquillity of a perfect summer's day, when nature smiles on two guides drifting through a spattering of lily pads and pickerelweed, the mood so quiet that you can almost hear trout sipping flies in the next county.

Such works—striking in their vivid color and spontaneity—speak eloquently of nature's soothing power. But Homer's long years in the Adirondacks also taught him how hard life was in the mountains. The settlers here chopped trees, trapped animals, fished for meat, and hunted to feed their families. Starvation and death were never far away, so the people had to be resilient, the landlocked equivalent of the fishermen Homer so admired on the coast.

A sense of loneliness haunts many of his Adirondack works, the big woods and empty spaces dwarfing the humans, a reminder of man's place in the natural order. This idea comes into sharp focus in "Huntsman and Dogs," an oil in which Homer depicts a young hunter in a barren landscape, carrying a deer's skin and rack, surrounded by baying hounds.

"Every tender quality of nature seems to be frozen out of it, as if it were painted on a bitter cold day, in crystallized metallic colors on a chilled steel panel," wrote Alfred Trumble, a critic reviewing the work in 1892.

Despite such complaints, Homer continued his exploration of the Darwinian theme, portraying hunter and hunted, bird and fox, man and duck, man and fish, man and deer.

Ultimately, Homer himself yielded as well, pursued and hunted down by time. At 72 he suffered a mild stroke, which affected his muscle control and vision. He quickly recovered, resumed painting, and kept brother Charles apprised of his progress.

"I shall be able to shave very soon," he wrote a few weeks after the stroke. "I can paint as well as ever. I think my pictures better for having one eye in the pot & one in the chimney—a new departure in the art world."

The self-deprecation was typical, along with Homer's habit of assuring the family that he was thriving in isolation at Prouts Neck.

But Homer was ailing. By August of 1910 a visitor noticed that Winslow was in pain, from chronic stomach problems. His sight was failing. He stopped painting. He took to bed but remained ornery to the last, refusing to die "until he was good and ready," as one of his brothers put it. The end came on September 29, from a heart attack. He was 74. Charles and Arthur were with him in the place he loved most, at the best time. Winter coming, tourists gone, and just down the lawn, ocean and rocks starting another noisy argument that might have been worth painting. □

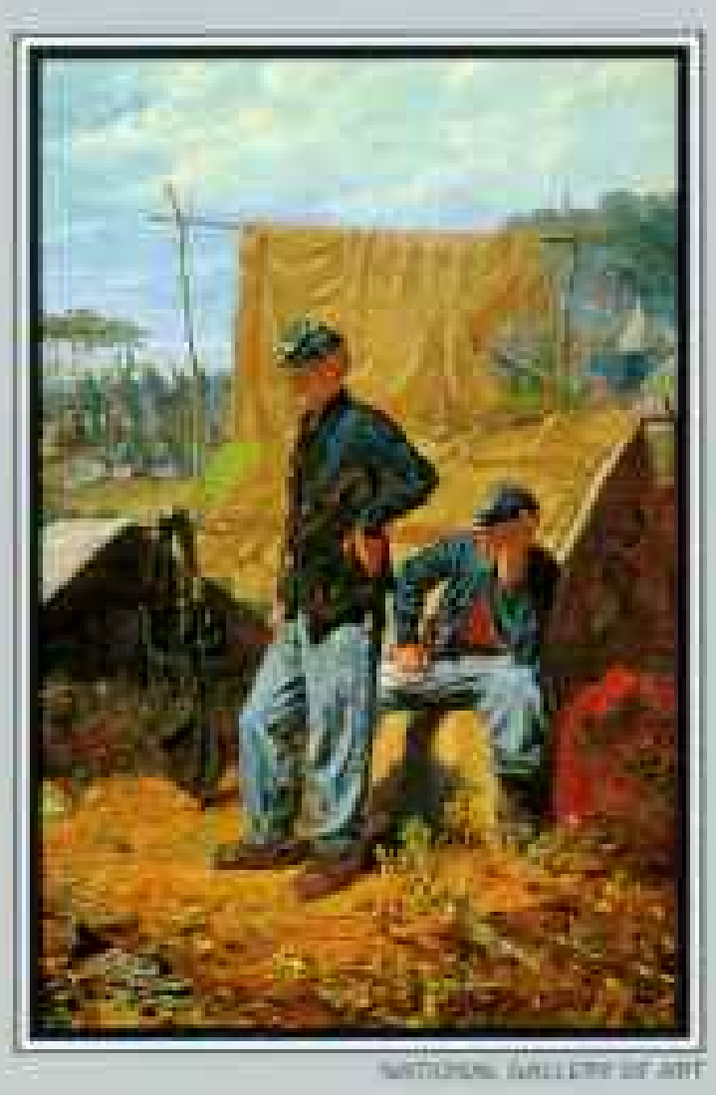
Winslow Homer's Enduring Value

When Homer began his career as an independent artist, he offered two Civil War oils for sale, but there were no takers. So Homer's brother Charles secretly bought both, reportedly paying a modest sum and hiding them so that Winslow would keep painting. A few years later Winslow discovered his brother's deception and refused to speak to him for weeks. By then, though, the young artist was on his way. His works were selling steadily. Watercolors brought a few hundred dollars each in Homer's late career, oils as much as $6,000.

Those prices have zoomed in recent years with renewed interest in Homer. "Home, Sweet Home," a Civil War oil (top), sold for 2.64 million dollars in 1997 to the National Gallery of Art.

That record was shattered in 1998 when Microsoft's Bill Gates paid over 30 million dollars for "Lost on the Grand Banks" (center)—making it the most expensive American painting yet sold and drawing skeptical fire from Doris Homer, a relative (bottom).

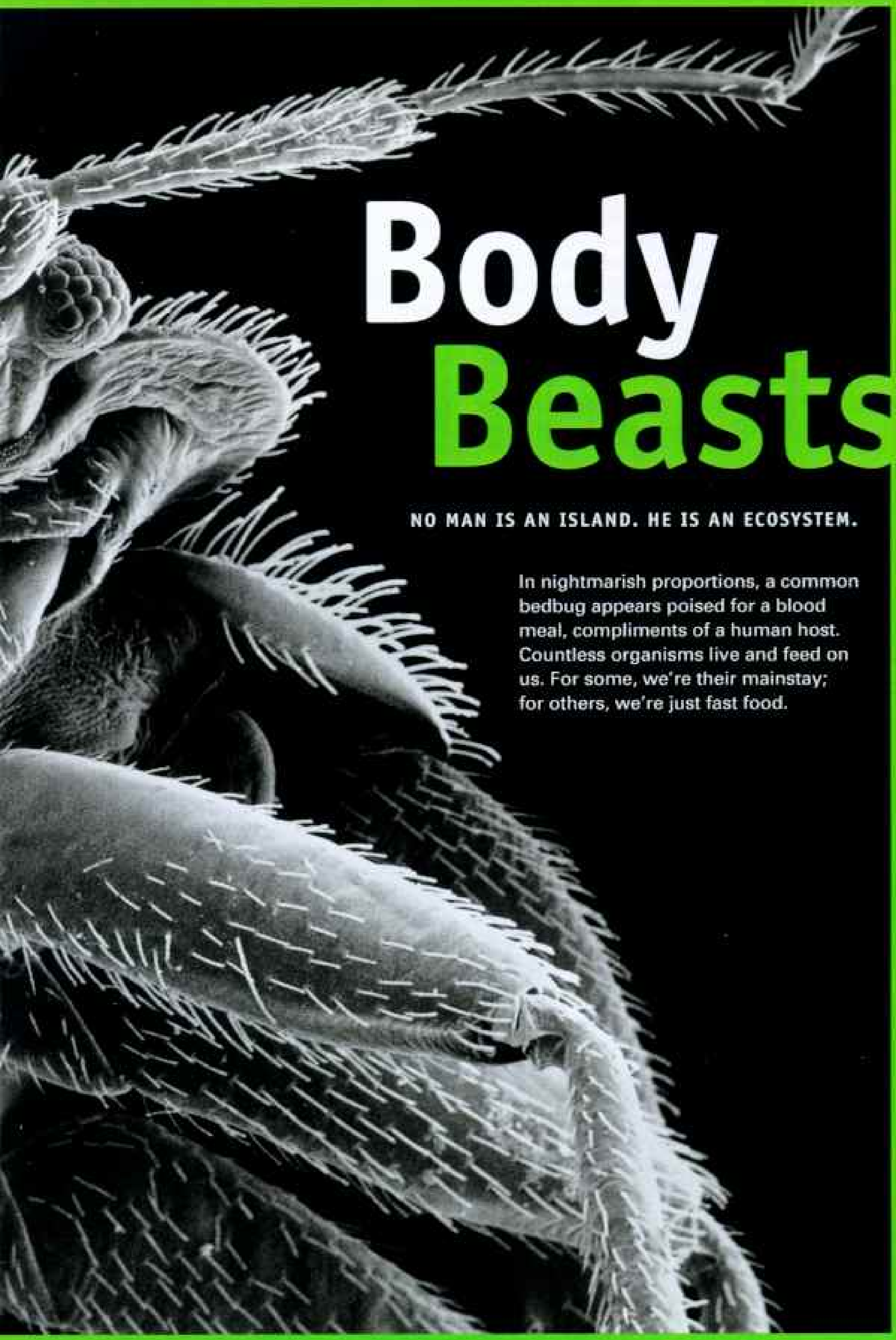
"Not worth it!" she says, proving that the family penchant for thrift and frank speech still thrives on the coast of Maine.



NATIONAL GALLERY OF ART

PRIVATE COLLECTION

CIMEX LECTULARIUS, MAGNIFIED ABOUT 90 TIMES.
PHOTOGRAPHED WITH THE ASSISTANCE OF THE
HARVARD MUSEUM OF COMPARATIVE ZOOLOGY



Body Beasts

NO MAN IS AN ISLAND. HE IS AN ECOSYSTEM.

In nightmarish proportions, a common bedbug appears poised for a blood meal, compliments of a human host. Countless organisms live and feed on us. For some, we're their mainstay; for others, we're just fast food.

The habitat was deeply inhospitable—a sheer bluff, knotted and furrowed by subsurface tremors, intermittently flooded, buffeted by winds, burned by the sun. My guide was Cliff Desch, a mild, likable University of Connecticut professor with unruly gray hair winging out over the tops of his ears. We were searching for life on the human body, or more precisely, on the hostile terrain of my own forehead. I took a bobby pin, as instructed, and scraped the crook of it hard across the skin in front of my hairline. Then, like a fisherman emptying his nets, I spread my catch on a glass slide.

The human body, especially the face, is the natural habitat for two species of mites, Desch said, as he placed the slide under a microscope. One species is minutely adapted to the hair follicle. The other ensconces itself in the microhabitat of the sebaceous gland, less than a millimeter away. Sir Richard Owen, better known for naming another buried life-form, the dinosaur, brought the follicle mite to the attention of the world in the 1840s. He called the genus *Demodex*, meaning "lard worm" (though mites are actually distant relatives of spiders).

By RICHARD CONNIFF Photographs by DARLYNE A. MURAWSKI

Desch peered through the microscope and said, "Oh wow" and then, *"Hunh!"* It appeared that my forehead was home to only one species of mite. But quickly, before I could become despondent about inadequacies in my personal biodiversity, he added: "You've got the best population I've ever seen."

It occurred to me first that Desch had spent an entire career looking at this sort of thing and second that I had stood under a shower just a few hours earlier, slathering my forehead with soap and blasting it with steaming water. "Look at 'em all," Desch was saying now, unable to suppress his delight. *"Holy moley!"*

Well, no man is an island. He is an ecosystem, though we studiously pretend otherwise. Our skin—two square yards of it on the average human body—is a habitat for roughly as many bacteria as there are people in the United States, for fungi and viruses, and on occasion for mosquitoes, fleas, bedbugs and kissing bugs, blackflies and botflies, lice, leeches, ticks, and scabies mites, which tunnel across the backs of an afflicted person's hands like moles burrowing in the front lawn.

In the developed world we like to think we have tubbed and scrubbed ourselves free of any overly personal connection to the natural world. Even mosquitoes stay mainly on the other side of our window screens. But this is a delusion, as follicle mites, which live on almost everyone, abundantly demonstrate.

Calling Humans Home

Permanent residents, these mites live mainly in the follicles of the eyelashes, forehead, and around the nose, their slender shape ensuring a perfect fit. Feeding on live skin cells, a single mite is about one-fourth the size of the period at the end of this sentence.

DEMODEX FOLLICULORUM, ABOUT 1,000 X

I stepped up to the microscope, and they came into focus, lying crisscross like sticks of wood. The adult mites were about a hundredth of an inch long. Their stumpy little legs wriggled and twitched as in a dream. They had tiny claws and needlelike mouthparts for consuming skin cells. Here and there were eggs shaped like arrowheads and juveniles with angled-back scutes on their underbellies, like fish scales, the better to anchor themselves in my skin. Desch eyed my forehead as if it were the Grand Banks in high season and said, "I think it's great." I smiled wanly.

Once upon a time we were all far more at home, though not necessarily any happier, with the idea of being infested. A 15th-century courtier once discreetly picked a louse off King Louis XI of France, and the king graciously remarked that lice remind even royalty that they are human. (Next day an imitator pretended to find a flea on the king, who was by then perhaps tired of being human. *"What!"* he snapped. "Do you take me for a dog, that I should be running with fleas? Get out of my sight!")

Dinner's on us

Bloodthirsty body lice vie for space on a bared wrist. Spread by human contact, body lice—a species different from head lice—are most often found on people who neglect personal hygiene.

PEDICULUS HUMANUS (3:0.9)

For almost all our history as a species, being infested was an inescapable fact of life, and our forebears achieved an intimacy with nature that we can scarcely imagine. European lovers of the 17th century sometimes wrote seduction poems about a girlfriend's fleas. John Donne once petulantly complained that a flea, having bitten boy and girl alike, "swells with one blood made of two / And this alas is more than we would do." A few gallant French lovers actually plucked a flea from their lady love and kept it as a pet in a tiny gold cage at the neck, where it could feed daily on their own blood. In Siberia, according to one story, an explorer was disconcerted to find that young women visiting his hut tossed lice at him; it turned out to be their way of expressing amorous intentions.

Clearly, this would not be a successful dating strategy today; for one thing, the human flea itself has almost vanished from modern homes. The hardier cat flea has replaced it, but only partly. Body lice, too, are far more scarce; they lay their eggs in our clothing, an elegant adaptation to human hairlessness, but have thus fallen victim to that environmental cataclysm, the rinse cycle.

THE MORE REMOTE our ectoparasites have become, the more horrifying they seem to be. Moreover, science has made this horror seem rational by demonstrating over the past century that several of our ectoparasites are the most dangerous animals on Earth. The diseases they carry have killed us by the hundreds of millions—fleas with bubonic plague, body lice with epidemic typhus, mosquitoes with yellow fever and malaria. They vex and panic us even in the most modernized countries with maladies like encephalitis, transmitted by mosquitoes and ticks, and tick-borne Lyme disease.

We go to sleep at night aware that our very pillows are home to thousands of dust mites—which, as it happens, help keep our homes clean by busily consuming the tens of millions of skin cells we shed each day. But the mites also cause asthma in some people, and when it comes to the beasts that live on and around our bodies, we tend to focus on the negative.

So it takes an almost unnatural objectivity to suggest that our ectoparasites can also be fascinating. Like any species colonizing difficult terrain, they have adapted ingeniously to our flesh. They use sophisticated chemosensors to find us; saws and scalpels to penetrate our skin; siphons and a small pharmaceutical warehouse, including anesthetics and anticoagulants, to steal a blood meal and get away undetected. If we can suspend for a moment the uneasy awareness that all this evolution is geared to extracting our blood, and if we can forget that our parasites mostly use this blood to produce the eggs for their future pestiferous generations, then it is possible to regard them with awe.

They are capable of extraordinary subterfuge. For example, the adult botfly of Middle and South America manages to parasitize us quite gruesomely without ever actually making physical contact. To avoid being swatted by some balky human or other host, she captures an insect, a mosquito for example, glues her eggs to her prisoner's abdomen, then sets it free.

The mosquito ignores the eggs (as will we for a moment) and goes off to employ subterfuges of her own. Many mosquitoes feed at night, for obvious reasons ("Consider the outcome if you were to approach an elephant with a syringe," one entomologist says). But this mosquito is a day feeder, finding a victim with her eyes and with sensors attuned to carbon dioxide, warmth, lactic acid, and other bodily emanations.

Having deftly touched down, the mosquito stabs and saws her way into the

RICHARD CONNIFF, a frequent contributor, is the author of *Every Creeping Thing: True Tales of Faintly Repulsive Wildlife.* DARLYNE A. MURAWSKI, who enjoys photographing very small creeping things, is a research associate at Harvard University.

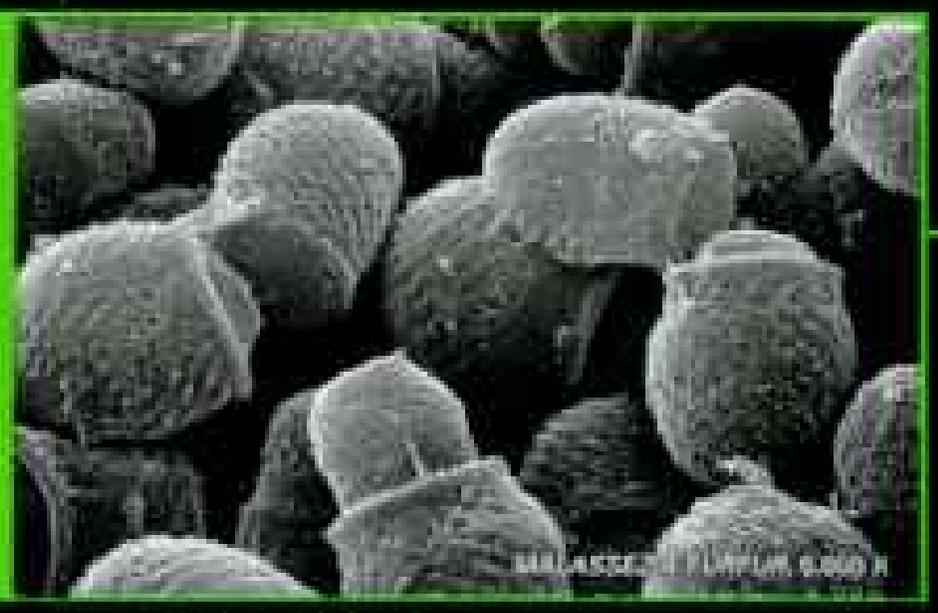
Marvels and menaces

Once used for treating everything from laryngitis to obesity, medicinal leeches (left) are back. Doctors use them to help establish circulation after limb reattachments.

Ready to attach itself to a nearby leg, an American dog tick may carry the bacteria that cause Rocky Mountain spotted fever.

DERMACENTOR VARIABILIS, 33 IN

FUNGUS



This oil-loving yeast causes pityriasis versicolor, scaling and discoloration of the skin and scalp.

The Human Habitat

A landscape of skin, hair, and nails, our bodies harbor a population of parasites that evolved along with us. Adapted to specific body regions, some are so benign as to go unnoticed. Other more harmful organisms must continue adapting to survive our efforts to destroy them.

SCANNING ELECTRON MICROSCOPE IMAGES PHOTOGRAPHED WITH THE ASSISTANCE OF THE HARVARD MUSEUM OF COMPARATIVE ZOOLOGY

CRAB LOUSE

PTHIRUS PUBIS; ABOUT 30 X

Spread mainly by sexual contact, this insect uses crablike claws to move through coarse hair, usually in the pubic region.

FUNGUS

Thriving in the warm, moist environment created by shoes and socks, this fungus is a common cause of athlete's foot.

NATIONAL GEOGRAPHIC PHOTOGRAPHER MARK THIESSEN

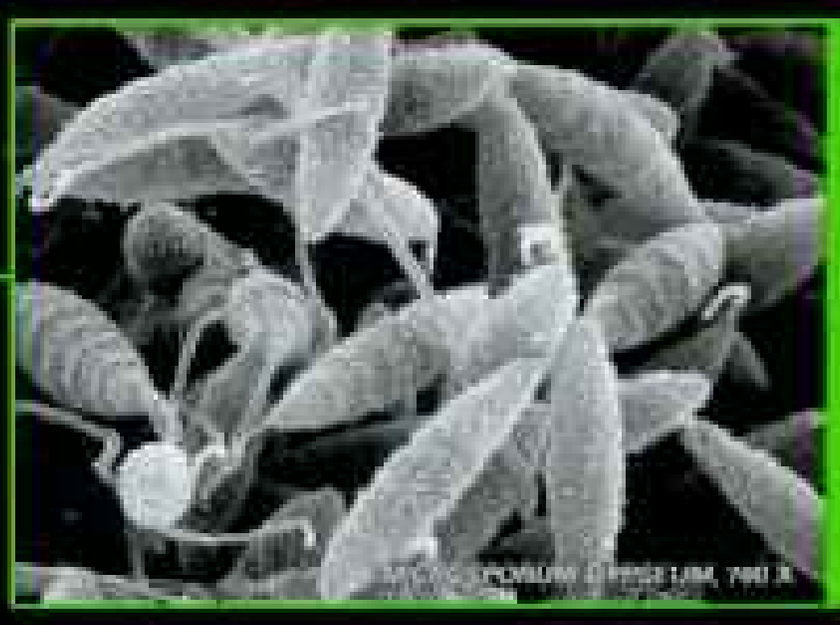
Stealthy opportunists

Thousands of emerald eye facets give the greenhead fly a visual advantage in tracking its target. It then strikes the victim with scissor-like mouthparts that tear flesh and suck blood.

Chemical detectors and sensitivity to motion help the leech locate its host, suction itself into place, and, with three cutting plates, withdraw a blood meal.

GREENHEAD FLY

LEECH



FUNGUS

Found in keratin-rich soil throughout the world, this fungus produces an infection called ringworm on smooth areas of skin and on the scalp.

fine web of blood vessels in the skin. The damaged vessels instantly attempt to plug their leaks with aggregating platelets in the blood. But host and parasite have evolved together, with all the one-upmanship of any arms race. So the mosquito is equipped with a powerful enzyme in her saliva to disable the platelets. The more saliva she pours down one tube in her proboscis, the faster she can suck up blood through another. Humans in turn have an immune response to the saliva, which alerts us with itching and swelling, but only after about a minute. We swat ploddingly—and are likely to kill only the slowest feeders. Thus we do our bit for natural selection, helping ensure that future generations come only from mosquitoes that are quick enough to get away with our blood in a minute or less.

BUT THE CO-EVOLUTIONARY arms race on the human ecosystem is even more disheartening than all this might suggest. The mosquito may leave behind other gifts, along with her saliva. After having been driven out in mid-century, malaria and dengue fever have lately begun to reappear in the United States and other developed nations. Insect-borne diseases are on the increase worldwide, largely because so many species have developed resistance to insecticides and their pathogens have developed resistance to our best medical therapies.

In the New World tropics the insects may arrive bearing not just agents of disease but at least one other gift: Let's say we get bitten by the mosquito that was briefly held prisoner a few days earlier by a botfly. As the mosquito feeds, our own body heat triggers the botfly eggs glued to her abdomen to hatch. A botfly larva promptly crawls into the fresh bite wound, where it matures with time into the ripest sort of traveler's horror story.

The larva has a segmented, yellow-brown Michelin-man body, belted with rows of raked-back spines for lodging itself mouth first in the skin. It also anchors itself with two tusklike hooks sticking out from the mouth. Its tail is a breathing tube, which can lift up, periscope-like, just above the surface at the point of entry. As it develops, the larva wriggles visibly and painfully under the skin. Removing the botfly is relatively simple (one remedy involves applying bacon to the breathing hole,

Picking at a problem

A bubble of its own gas helps a head louse hatch from its egg, or nit, on a hair. Reports of infestations among children in school and day care are on the rise as lice seem to be developing resistance to treatments. For up to $50 an hour Boston nitpicker Mary Ward shows panicked parents how to get rid of the pests. "Combs can't do it all," she says. "I go after them one nit at a time."

PHOTOGRAPH BY CARMEN TAYLOR

so the botfly has to burrow up through it for air). But a Harvard biology student, curious about his own potential as an ecosystem, once nurtured a botfly in his flesh for six weeks. Finally a one-inch-long botfly larva, ready to move on to its pupal stage, started to emerge from his scalp as he sat in the bleachers during a Red Sox–Yankees game at Fenway Park. The Sox lost, and despite the biologist's heroic efforts to protect it, the botfly died.

But the beasts that live on our bodies are by no means all bad. A normal population of bacteria on the skin, for example, may actually benefit us by preventing infectious bacteria from gaining a beachhead. But if you tell people that a normal population can mean a hundred bacteria per square inch in the barren habitat of the shoulder blades (or millions in the sweltering armpit), they are liable to scrub themselves raw. In the extreme disorder called delusory parasitosis, victims can imagine they are under assault by invisible bugs that spill out of electric sockets, crawl from holes in concrete, and drop down from ceiling tiles. To stop the constant itching, they scratch themselves bloody. They bathe in gasoline and inundate their homes with pesticides. But the bugs keep coming. Such cases have sometimes ended in suicide and once in the murder of a doctor who tried to get his patient to see a psychiatrist.

When real infestations occur, even sensible people often behave irrationally. In the course of their recent evolution, for instance, head lice seem to have developed resistance to most conventional treatments. Distraught families of infested schoolchildren frequently resort to home remedies. Last year in Oklahoma a man applied a highly toxic cleaning solution to a six-year-old's scalp, causing cardiac arrest and permanent brain damage.

So it's important to realize that we aren't under assault, or rather, that the assault is limited and controllable. We possess the ultimate weapon, which is human intelligence—or, anyway, the opposable thumb. In New York City and Boston, professional nitpickers now charge up to $50 an hour to train parents in the most venerable treatment for head lice: removing the eggs, or nits, by hand, having first drowned them in a shampoo of olive oil. It is a very old idea of quality time. "It gives you a lot of bonding when you nitpick," says Mary Ward, a Boston nitpicker. "You *know* these people."

Our ancestors would regard our otherwise unpestilential lives with dumbfounded envy: We don't spend our days itching and fidgeting;

Scratch and sniffle

Skin-melting enzymes help a scabies mite (below) burrow in to lay eggs. Feces and saliva from the mites cause terrible itching that worsens when scratched.

Irritating in their own way, dust mites (left) can cause sneezing and coughing as they feed on the tens of millions of skin cells we shed every day.

we know which diseases our parasites carry and how to avoid them; and at least in the more temperate corners of the planet, we don't generally suffer from nightmarish stuff like botflies. Scientists have demonstrated persuasively that our ectoparasites do not transmit the AIDS virus. And though pathogens and parasites can adapt rapidly, our body beasts appear unlikely to cause new plagues in the developed world anytime soon. "We have better hygiene, screen windows, air-conditioning," says Duane J. Gubler, who heads the division of Vector-Borne Infectious Diseases at the U.S. Centers for Disease Control and Prevention. "Television has made us reclusive, at home at the time when we are at greatest risk of being bitten by mosquitoes."

We are spared by being couch potatoes, each of us a lonely and underpopulated habitat, perched before our television sets, with only our resident bacteria and those low-key hangers-on, the follicle mites, for company.

I thought about all this as I looked through the microscope in Cliff Desch's laboratory. I also thought, as so many of us do in moments of aesthetic and personal doubt, about Martha Stewart, who has written "I have always been inspired by nature." I asked Desch what sort of inspiring things the follicle mites might be doing on *her* forehead and by extension on riffraff like me.

These mites, he said, aren't much good at crawling to new territory. But they spread from person to person when we nuzzle, and because a population thrives in the area around the nipples, they also pass to newborns as naturally as mother's milk.

An immigrant mite makes itself at home on a fresh face almost instantly, crawling mouth-first into the nearest follicle, with its back to the hair shaft and its stumpy legs to the follicle wall. Since it has no reverse gear, Desch said, it may never come out again. Embedded upside down in our skin, it feeds by using those needlelike mouthparts to puncture epithelial cells and suck up the spilled fluids—with no apparent harm to us. It filters out solids even as small as the mitochondria of the cell, a feat Desch characterized as "near-perfect pre-oral digestion." The mite's digestive process yields so little waste that it doesn't even have an excretory opening. It need never get up to go to the bathroom. The follicle mite is, in truth, a couch potato's couch potato.

"And to reproduce?" I asked Desch, with some trepidation, thinking that a mite must get lonely tucked away somewhere out on the vast, windswept expanse of the forehead. The nearest neighboring mite population centers, around the wings of the nose and in the eyelashes, are as distant as oceanic islands.

The female, Desch said, may produce a first generation asexually, by parthenogenesis—that is, virgin birth. Then she mates with her sons to produce the next generation, up to a maximum population of about ten mites per follicle. ("Oedipus should have plucked out his eyelashes and left his eyes alone," I muttered.) All this passes utterly unnoticed, "the extreme," one biologist remarks, "of an exquisite adaptation in which each of us is infested right now, but asymptomatically." Some researchers theorize that follicle mites may even benefit us in ways we do not yet understand. In any case, there is nothing, from soaps to systemic medicines, that we can do about it.

I left Desch's lab thinking that follicle mites are precisely the ectoparasite we deserve—and that we are lucky to have them, riding on our foreheads, a living reminder that our flesh is merely a part of the natural world.

Back home I offered to write my wife an ode to her follicle mites. She handed me a washrag for my forehead and suggested curtly that I keep my infestations to myself. But I knew that in the nature of life on the human habitat, it was already way too late for that. □

Join the online forum on body beasts at *www.nationalgeographic.com/media/ngm/9812*.

PETRA

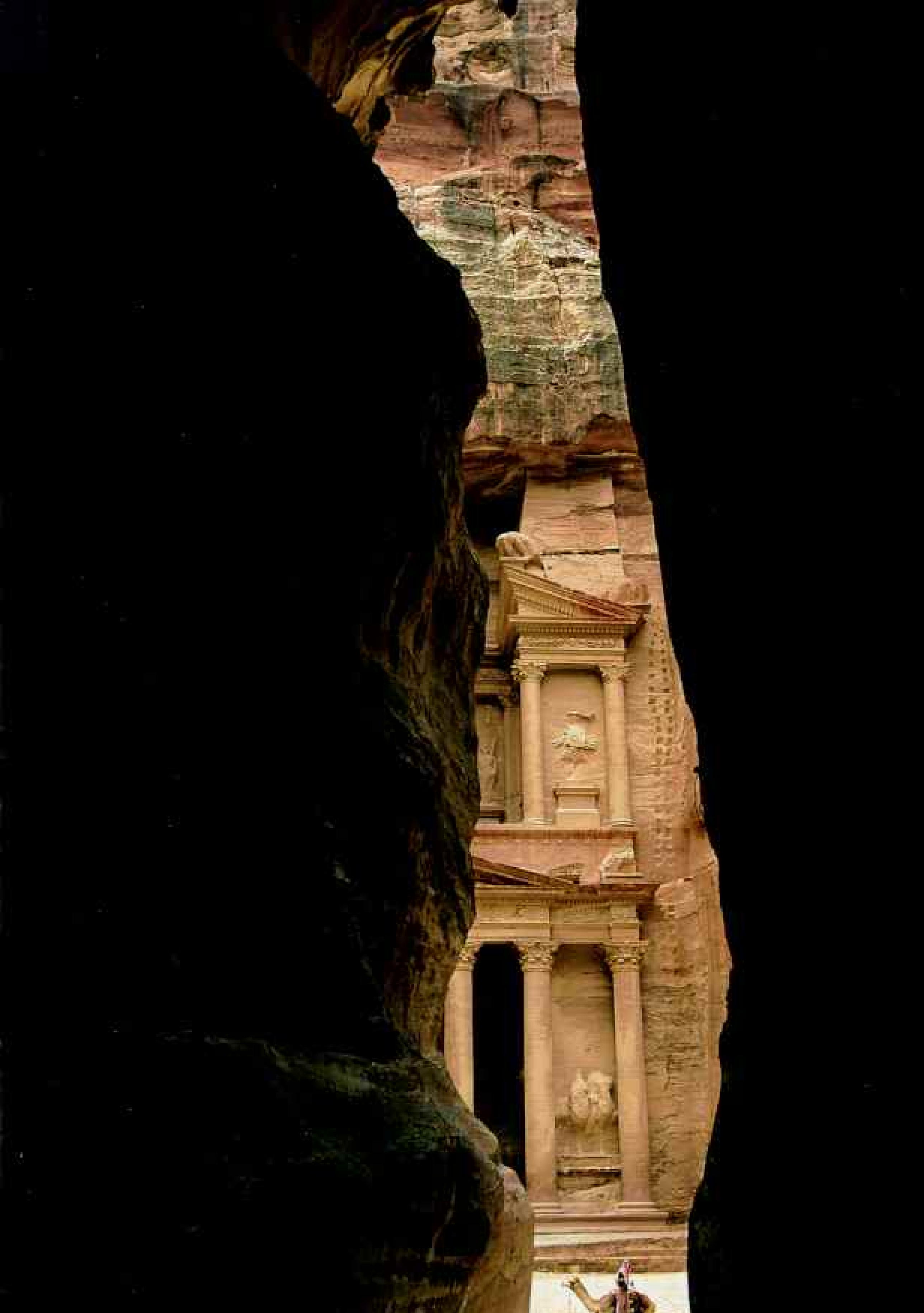
ANCIENT CITY OF STONE

BY DON BELT ASSISTANT EDITOR PHOTOGRAPHS BY ANNIE GRIFFITHS BELT

Reclining on a rooftop carved two millennia ago, a Bedouin surveys the realm of the Nabataeans, whose ancient capital beckons from the sands of southern Jordan. Forgotten for centuries, Petra still echoes with mysteries of the past; this immense building, Al Deir (the Monastery), was probably a Nabataean shrine.

Etched in a monumental landscape, the Monastery, like Petra itself, is anchored in the cliffs from which it was carved. Though rattled by earthquakes through the

centuries, many of Petra's buildings stood fast, even as the city declined and storms of windblown sand concealed its glory for another age.



It took 12 weeks to get here from the frankincense groves of Oman, once the camels were loaded and the campfires stamped out. Then the caravan, single-minded as a line of ants, would set out through the morning mist, guarding its precious cargo from bandits, and pass uneasily, single file, through the treachery of Yemen.

Later, if things were going well, the caravan would pause to trade at Medina, drinking from its brackish wells and gathering strength for the journey ahead. Then it would strike out north across the hellish, flint-strewn sands of western Arabia, living from one water hole to the next all the way to the capital of the Nabataeans, who ruled the lands east of the Jordan River. To the camel driver of two millennia ago, this city, Petra, beckoned like a distant star.

What a relief it must have been to see the guards on red sandstone ledges, and to be waved in after paying the toll, and to breathe the cool air inside the Siq (pronounced seek), the 250-foot-high crack in the rock that was, and still is, the main road into Petra.

For the thirsty there was water, lots of it, flowing down sinuous stone channels along the roadway; for the grateful and devout there were carved altars to Dushara, the head Nabataean god, on the chasm's sandstone walls. Boys on donkeys would dash by, shouting news of the arrival; the smell of cardamom, campfires, and searing meat promised hospitality just ahead. Finally, the caravan would swing wide around a bend to face Al Khazneh (the Treasury), that towering edifice carved from rose-colored rock, and plunge into the crowded marketplace beyond.

Two thousand years have passed, but shades of ancient Petra still endure in the desert of southern Jordan. The facades of its buildings peer out from banks of drifted sand, and you can wander freely among them, fingertips on chiseled rock. Delicate bits of Nabataean pottery lie scattered across the land like eggshells, so numerous at times that it's hard to avoid stepping on them. And if you're out early—before the first tourist bus pulls up just past daybreak—you might even hear echoes of the ancient city, as I have, in the local Bedouin drifting by on camels in the mist or in the murmur of voices over pots of steeping tea.

After dozens of visits I've come to recognize this immediacy of the past as Petra's surpassing charm. Yet it's also the site's most profound dilemma: A living antiquity presents problems to those who would preserve the past, or uncover its secrets, or package it for mass consumption.

Like other nomadic peoples who wandered through the spotlight of history, the Nabataeans left little behind to explain themselves.

Front door of the city, the Treasury (left) dazzled the first modern European to see Petra—Johann Burckhardt, a Swiss scholar who traveled here in 1812 disguised as a Muslim pilgrim. Meeting forebears of the Bedouin who live here today (above), Burckhardt recognized the ruined city as the Petra of ancient lore, which vanished from most maps in the seventh century.

They probably moved into Palestine from Arabia several centuries before Christ. By the first century B.C. their capital was a rich city shaped by the sophistication and wealth that Petra, a natural fortress on a pass through rugged mountains, acquired as a crossroads for trade.

Filling a power vacuum left by Greece's decline, the Nabataeans dominated this part of the Middle East for more than four centuries before being subjugated by the Romans, then eclipsed by the Byzantines, and finally dispersed onto the back lot of history. From sherds of their pottery we know they were artists; ancient manuscripts describe them as shrewd traders and merchants. Both qualities are reflected in Petra's public architecture, a dizzying array of temples, tombs, theaters, and other buildings chiseled out of russet sandstone. Scattered over 400 square miles and connected by trails and caravan roads, these buildings are monumental and dramatic even when judged against the Greek masterpieces of the day.

But their breakthrough achievement—the one that made all the others possible—came when the Nabataeans mastered their water supply, which enabled them to build a metropolis of 30,000 in a remote desert canyon that gets only six inches of rain each year.

Harvesting water like precious grain, the Nabataeans collected it, piped it, stored it, conserved it, prayed over it, managed it—by devising elaborate systems of hydraulics that make up, even now, the unseen musculature of Petra. Hundreds of cisterns kept Petra from dying of thirst in times of drought, while masonry dams in the surrounding hills protected the city from flash floods after bursts of rain.

That kind of planning is called for again today—as Jordan, for whom Petra is supreme in a collection of archaeological treasures, weighs decisions about how best to excavate and preserve the site while reaping economic benefit from the world's growing interest in it.

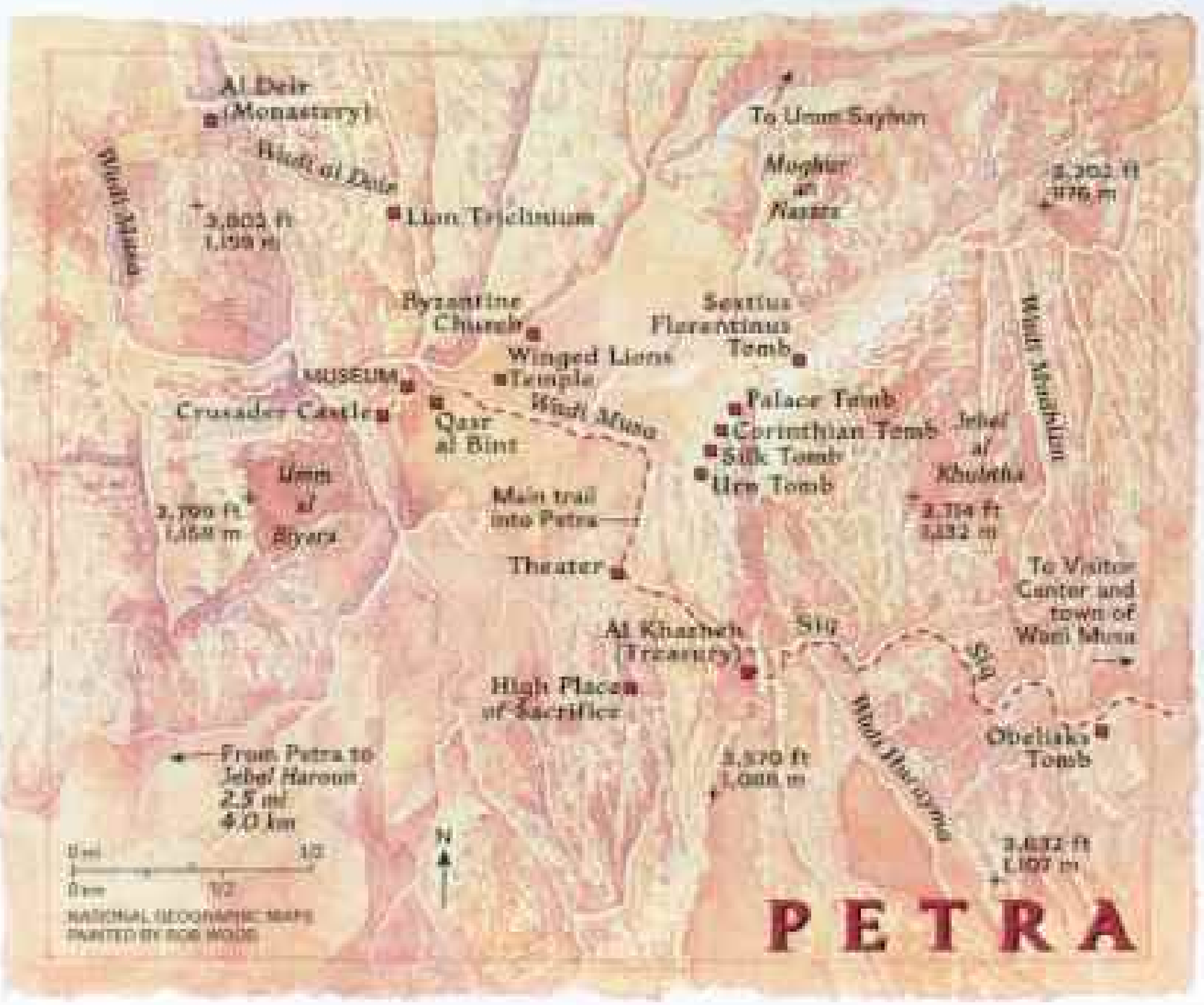
With no oil fields and few natural resources, Jordan greets the thousands of tourists who come pouring down the Siq into Petra as joyously as rainfall in the desert. The challenge will be to keep this flood of visitors from sweeping away the very features that make the place unique.

Crowned by geography, the Nabataean capital was strategically situated on a pass through the Shara mountains that divided ancient Arabia and Syria from Palestine and Egypt. A crossroads for the caravan trade, Petra prospered and built a modest empire. By A.D. 106, when Rome annexed it and expanded a Nabataean theater carved from its cliffs (right), 30,000 lived in the city.

I FIRST MET Hamoudi al-Bedoul in a Nabataean tomb, and even there he made quite an impression. It was shortly after dawn in a stone chamber twelve feet square and six feet under, illuminated only by the murky plume of daylight that filled the rock chimney we'd used to get in.

We were excavating beneath the ruins of a fifth-century A.D. Byzantine church in Petra, and the dust was already thick enough to muffle the growl of Hamoudi's shovel as he carved chunks of hard-packed sand from a nearby grave, then deposited them gently onto the screen of my wooden sifter. I would shake the sand through, as if panning for gold, and Hamoudi would pause to check the debris left behind, plucking out sherds of pottery with fingers as fluent and precise as the bill of a bird.

ANNIE GRIFFITHS BELT's assignments have taken her from the American Midwest to the Middle East, where she spent many a painful day photographing this story from the back of a camel.


Al Deir
(Monastery)
Wadi Ad Dayr
3,803 ft
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Lion Triclinium
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an
Nasara
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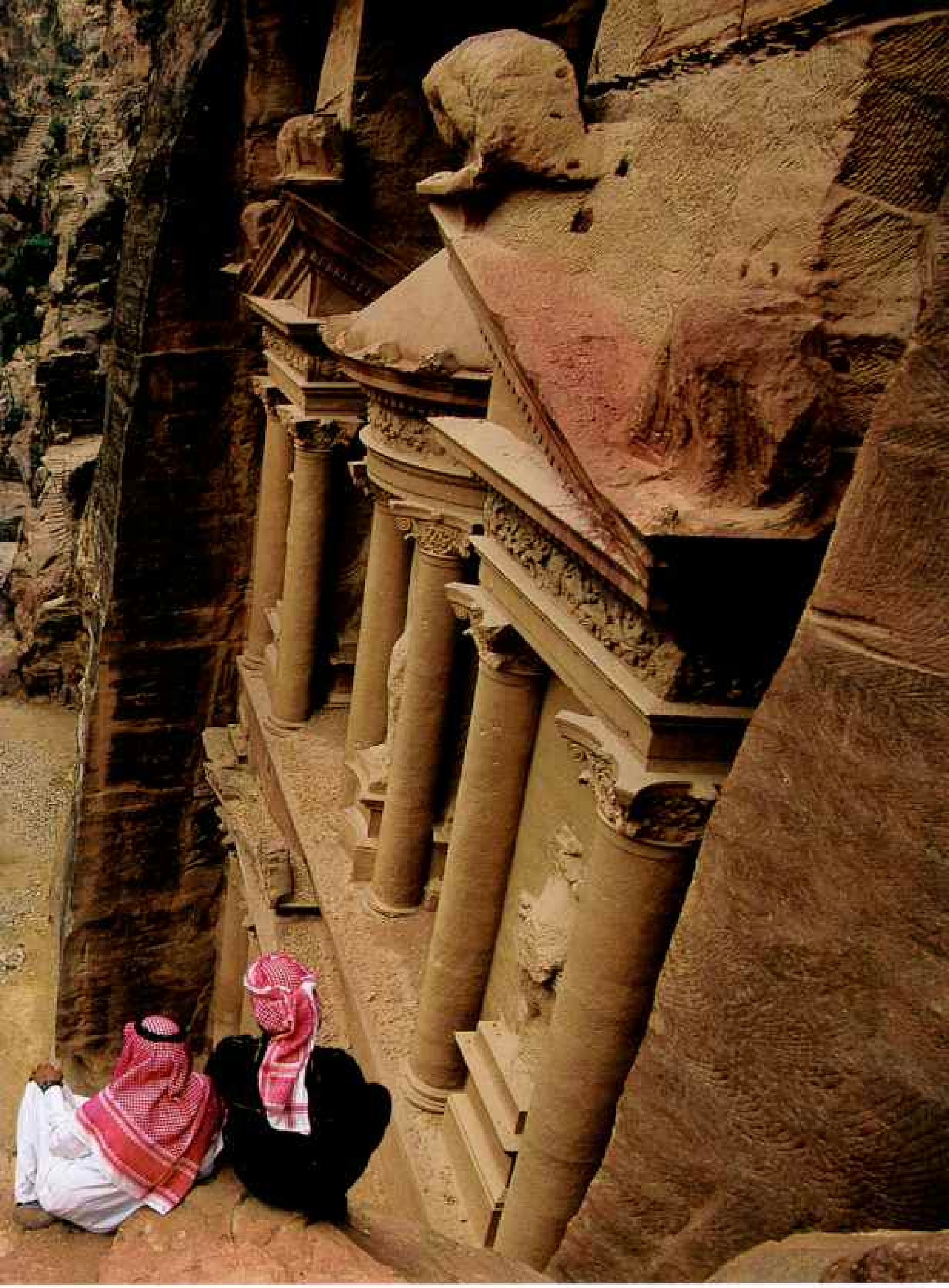
976 m
Byzantine
Church
Winged Lions
Temple
Wadi Musa
Qasr
al Bint
MUSEUM
Crusader Castle
Umm
al
Biyara
2,799 ft
1,468 m
Main trail
into Petra
Theater
Seextus
Florentinus
Tomb
Palace Tomb
Corinthian Tomb
Silk Tomb
Urn Tomb
Jebel
al
Khubtha
2,334 ft
1,232 m
Wadi Muthlim
To Visitor
Center and
town of
Wadi Musa
Al Khazneh
(Treasury)
Sig
High Places
of Sacrifice
Wadi Farasa
3,379 ft
1,030 m
Obelisks
Tomb
3,632 ft
1,107 m
From Petra to
Jebel Haroun
2.5 mi
4.0 km
0 mi
1/2
0 km
1/2
N
NATIONAL GEOGRAPHIC MAPS
PAINTED BY ROB WOOD
PETRA

Lookouts on a ledge, Bedouins watch as a group of tourists admire Al Khazneh (the Treasury), whose function in Nabatean times is still unknown. Spurred by



Jordan's peace treaty with Israel, tourism to Petra is up tenfold since 1991, boosting the economy but raising concerns about preservation.

"Hallas," he'd finally say—"finished"—with a dismissive flick of his fingertips, and I would empty the sifter into the hollow grave I was standing in.

As the sun rose, the tomb brightened, and then I could see just enough of Hamoudi under his *kaffiyeh* to be wary of him. He was all Bedouin—short, slim, dark—and had a face as fierce as a shrike, with a pointed beak and a sharp little beard thrust forward like a dagger.

Later, after I'd gotten to know Hamoudi, I could look past this face to the merriment in his soul, and his keen unlettered intelligence, and his exuberant love of people that took us, sooner or later, to drink tea in practically every Bedouin tent in the region.

Within his tribe Hamoudi is something of a legend for his gentle way with camels and his unabashed eye for pretty girls, whom he calls, without a trace of lechery, *"Bellaboooozzz!!!"*

In the archaeology community Hamoudi is celebrated for his professionalism and his eagle eye, both of which figured into one of the most significant finds of this century at Petra.

A few years ago Hamoudi was digging in the ruins of another Byzantine church for the American Center of Oriental Research. In one corner he discovered church scrolls that had been charred when the building burned around A.D. 600 but were still legible. Experts believe these records of daily life in Petra may hold clues to the demise of the city after the Romans took control in A.D. 106 and rerouted the caravan trade away from Petra.

By the time Rome fell and the Byzantines built the church that lay in ruins above Hamoudi and me, most Nabatean tombs had been looted, and only a few thousand of the living remained for the Byzantine clergy to convert to their new religion. Earthquakes in A.D. 363 and again in 551 rocked what was left of the city, although the charred scrolls record

Making bread the Bedouin way—on hot metal over a campfire—Imhiylah al-Bedoul prepares a meal in the Petra backcountry, where her family spends the summer tending goats, using water from a Nabataean cistern. A lifelong resident of Petra, she raised six of her ten children in a cave near the city center. But after the city was made a world heritage site in 1985, the government moved the thousand-member Bedoul tribe to Umm Saylun, a village of cinder-block houses. Though it has schools and a clinic, the village empties as the weather turns warm. "No one likes those crazy houses," says her son Mahmoud, who was nine when the family left the cave. "Petra is our home."

marriages as late as 582. Later the city was forsaken, possibly because the Nabataean channels and cisterns, long neglected, had filled with sand. Petra may simply have run dry.

Thirteen centuries of sandstorms and floods packed the ruined city in drifts and debris. Experts estimate that more than 75 percent of the urban center still lies hidden from view, which may account for the sense of imminent discovery that hangs in the air over Petra.

"*Meeeoooowww!*" Hamoudi yelped and fell to his knees in the grave.

"Are you OK?" I said, afraid that he'd driven the shovel blade into his sandaled foot.

"OK!" he said as he stood up carefully, balancing an unbroken ceramic bowl in his palm. He turned to me, his black eyes shining like little spotlights in the gloom. "Naba-*teee*-an!" he grinned, holding up the 2,000-year-old bowl like a newborn baby for me to admire. "Look, full round! In museum, same same!"

With so much of Petra still underground, practically every stab of a shovel yields something worth talking about. There were nearly two dozen archaeological projects under way the last time I was there, ranging from a study measuring the effect of wind erosion on Petra's sandstone facades to the unearthing of a massive building along the main street.

Some of the most spectacular recent finds involve the Siq, the cliff-lined road into Petra that was buried under sand and flood debris. In the mountains overlooking it, engineers have begun to retrace and map the Nabataeans' network of channels, basins, and dams—all built to capture and control springwater and the rainfall that gushes down toward the Siq through 19 distinct tributaries.

"We were astonished by how sophisticated their ideas were," said Maan al-Huneidi, who manages the project, the day I scrambled for hours over waterworks with one of his lead engineers. We found dozens of sand-filled dams tucked into the mountainside that day and almost as many cisterns carved from solid rock. Miniature canals linked one catchment area to the next, moving water downhill gracefully, sometimes whimsically, in little troughs of sandstone as finely carved as sculpture.

Last year Maan's company removed some 400,000 cubic feet of rubble from the Siq's floor, exposing the original pavement and ancient features on the chasm walls, including ceramic water pipes and a giant camel caravan carved in bas-relief from the sandstone.

I watched one morning as dozens of tourists admired this monumental carving, which is just above eye level. Some ran their hands over the stone, bringing down a faint shower of sand, while others picked idly at the wall for souvenirs. At one point a tour guide mounted a nearby Nabataean channel to deliver his spiel; he failed to mention that the plaster crumbling under his feet was two millennia old.

That man was lucky that Aysar Akrawi didn't catch his act the morning she and I toured the Siq together. As director of the nongovernmental Petra National Trust, Akrawi helped raise the half million dollars it cost to excavate the Siq—only to be reminded, daily, of how vulnerable it is once exposed.

"Petra is an exceptionally fragile site," she

said, moments after a little boy blissfully urinated in front of us on the sandstone steps of the Treasury, Petra's most famous building. "To overdevelop it for tourism without protecting these antiquities is a huge mistake."

A look at the statistics explains why the custodians of Petra might be feeling overwhelmed. In 1991 just 41,000 people visited the site; last year nearly ten times that number did, reflecting Jordan's peace treaty with Israel and its reputation abroad as a relatively peaceful corner of the Middle East.

To handle the influx, Jordan recently borrowed some 23 million dollars from the World Bank to build new roads, tourist facilities, and other infrastructure in Wadi Musa, the boomtown that has grown up around the entrance to Petra. Only a small amount is set aside for site preservation.

"My first job is to clean up Petra," says Kamel Mahadin of the Petra Regional Planning Council, a local government bureau that will administer the World Bank funding.

Following a master plan approved by the various constituencies he serves, Mahadin began by redesigning the entrance to the site, which as recently as 1996 was a cloud of rose-colored dust and noise filled with vendors, beggars, kids on donkeys for hire, all swirling around a nucleus of stone-faced tourists in tennis shoes. Today the area is a quiet roadway.

Mahadin has also turned his attention to the Bedouin vendors inside Petra, decreeing that their medley of souvenir stands, restaurants, and animal rides be reorganized into cooperative ventures. Designed to protect the archaeology and make the site more presentable, these changes effectively limit vendors to a fraction of their former incomes. As one might expect, Mahadin's office in Wadi Musa was immediately besieged with angry Bedouin, many of whom depend on tourism for a living.

It's not easy to manage a living antiquity that people will cross an ocean to see, and the government is seeking a fair solution. "Petra has many husbands," Mahadin sighs. "Everybody loves her. We know that mass tourism hurts the site, but we can't just close the gate either."

THERE IS A QUIET GRANDEUR to Petra that eludes the casual tourist, many of whom trek down the Siq to the Treasury and back out again without pausing longer than the time it takes to buy a bottle of water and a "Petra, Jordan" T-shirt. This is exactly what I did the first time I visited, giving the place a few hours one spring afternoon, seeing only a fraction of the hundred square miles that Jordan set aside as a national park in 1993.

From its center Petra extends for miles in all directions along a network of wadis, or dry riverbeds, and old caravan roads that once moved frankincense from Oman to Gaza and bracelets of gold from workshops in Aleppo to the suqs of Yemen. In recent years I've retraced those routes and felt the presence of the ancient world in everything from the plaintive trav-eling songs of the Bedouin to the sandpaper swish of a camel's hoof on sandstone, each as big as a salad plate, soft as a paw.

Time pokes along haphazardly here, moving to the ever changing rhythms of sun and grass and goats. One afternoon Hamoudi and I dropped by the men's tent at a wedding feast near Beida, a tree-lined wadi that serves as Petra's back door. Hamoudi, who is at home anywhere, folded his lank frame gracefully onto shaded mattresses after greeting the groom's father with fervent kisses on both cheeks. Hamoudi didn't know this family—they were of a different tribe—but for all anyone knew, he might have been a long-lost brother.

Inevitably the line of dark desert faces turned to me—the white guy in a kaffiyeh trying not to wince from the glass of scalding tea he'd been handed. Without taking their eyes off me, they asked Hamoudi where I was from. His response stirred the conversation and moved it in my direction.

"America?" said one of the younger men. "Do you know Muhammad Ali?"

In the Petra backcountry you still find some of Hamoudi's tribe, called the Bedoul, dwelling

Laced with channels, terraces, dams, and cisterns (left, at center), the cliffs above Petra display the Nabataeans' skill at capturing and controlling rainwater—essential in a desert that gets only about six inches of rain a year. "Hydrology is the unseen beauty of Petra," says an engineer familiar with Nabataean techniques. "Those guys were absolute geniuses."

A subtle palette radiates from Nabataean tombs east of the city center. Scattered over 400 square miles, Petra includes dozens of such enclaves. Its citizens once depended

on water piped in from surrounding mountains, though as Petra declined under Roman and Byzantine rule, the channels filled with sand and were lost.

Petra's heyday ended when the Romans rerouted trade in the second century A.D., sending the city into a long decline. In a fifth-century Byzantine church archaeologists found detailed mosaics (above), while their Bedouin foreman, Hamoudi al-Bedoul (right), discovered scrolls detailing life in the waning city. Recent excavations in the Siq—the road into Petra—uncovered water channels visible along the roadway, at right. "Three-fourths of Petra is still underground," says one archaeologist. "Every day we find something new."

in caves, as they have for centuries. For me, this human dimension is what breathes life into Petra and elevates the place from scenic to sublime—although I understand why most of the Bedoul, including Hamoudi and his family, live today in government houses in Umm Sayhun, a dreary little village of about 1,500 overlooking the land they once called their own.

After Petra was made a UNESCO world heritage site in 1985, the tribe moved out of the caves at the government's request and with an understanding that they'd continue working inside Petra as archaeologists, laborers, and vendors while grazing their goats in the countryside. In Umm Sayhun the Bedoul have access to schools, electricity, and health care—services that have enhanced their lives.

Yet if it weren't for his four children, Hamoudi, Bedouin to the core, would prefer to sleep in the open every night. In fact, many of the villagers vanish into the countryside at the first sign of warm weather, and those who stay behind usually camp out too—on the roofs of their government houses. And though squeezed into a village, the Bedoul still know this vast region better than anyone else. When a tourist wanders off in the desert and winds up dehydrated, it's not the army, which guards Petra, that finds him, revives him, and brings him in on the back of a camel or in the bed of a pickup truck. It's one of the Bedoul.

THE CARAVAN ROAD that brought fine Chinese silks to Petra and on to Amman and Damascus passes near a massive outcrop of pale yellow sandstone about ten miles from the city center. The Bedoul call this Shamassa, the "sunny place," and if you're thirsty and out of water, it's a good place to know.

I learned this the day I stopped there to rest, leaning against a warm rock as I caught my

breath. There was a sunlit cliff across the way, with a grooved channel running horizontally along its base. After a time I walked over to investigate and saw that the channel turned the corner. From there it skirted a rock, made a clever little detour around a tree, and traversed a boulder the size of a school bus. Weaving with the contours of the sandstone, the channel suddenly made a sweeping left turn, ran through a basin, rounded another corner, then dived into a large, teardrop-shaped hole in the rock. I crept down to the rim; peering in, I saw nothing but black. A stone was fetched, tossed into the hole. I heard a distant splash.

A few weeks later I brought an archaeologist to see this example of Nabataean skill. A relative of Hamoudi's, Mahmoud al-Bedoul is 23 and the only Jordanian on record to grow up in a cave—in Petra—and go on to earn a university degree in Near Eastern archaeology. I figured he'd be interested in my find. Yet when I showed him the secret little canal and cistern, he was strangely matter-of-fact.

"You don't seem interested, Mahmoud," I said. "Have you been here before?"

"Only thousands of times," he laughed. "I grew up here. Every summer of my life we brought our goats and camped right here by this rock. This is the cistern of my father."

He attached a cord to my canteen, lowered it into the hole, and brought it up filled to the brim. Then he took out his shirttail, placed the fabric over the hole as a filter, and took a long, savoring drink.

"Nice and cold," he said, offering the water to me—and I saw again how discoveries large and small are imminent at Petra, and how the lifeblood of an ancient city might sustain a people from that day to this.

"But is it *Nabataean?*" I asked.

"Of course," said Mahmoud, with a mischievous smile. "They left it to my father." □

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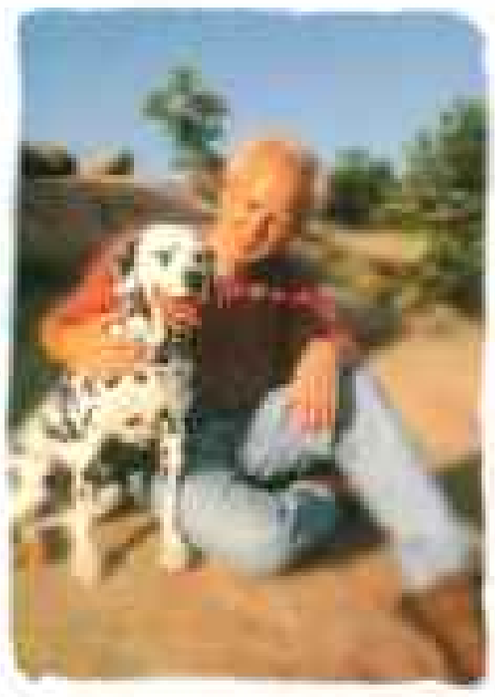
I wish  *my dog didn't scratch so much.*

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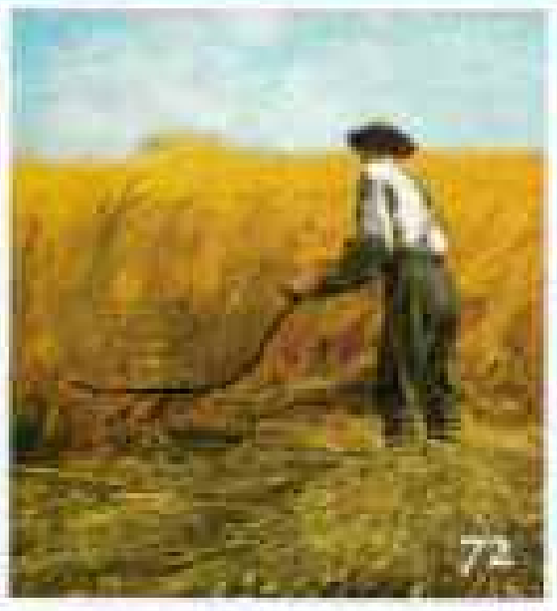

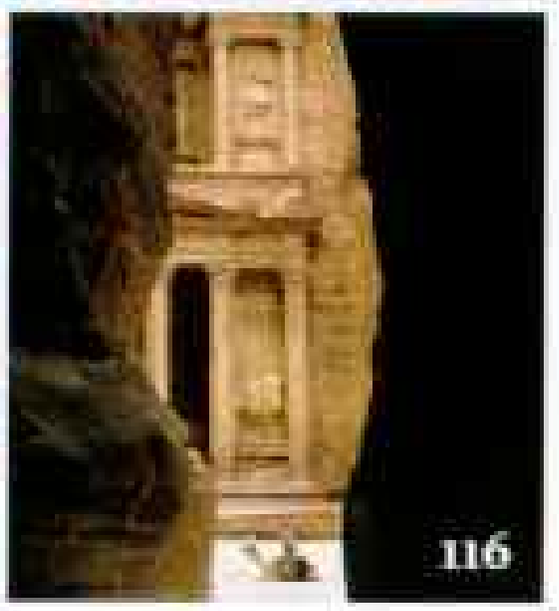

The Cover

A Bedouin contemplates the craggy landscape of southern Jordan from a rooftop in Petra, the 2,000-year-old capital of the ancient Nabateans. Photograph by Annie Griffiths Belt

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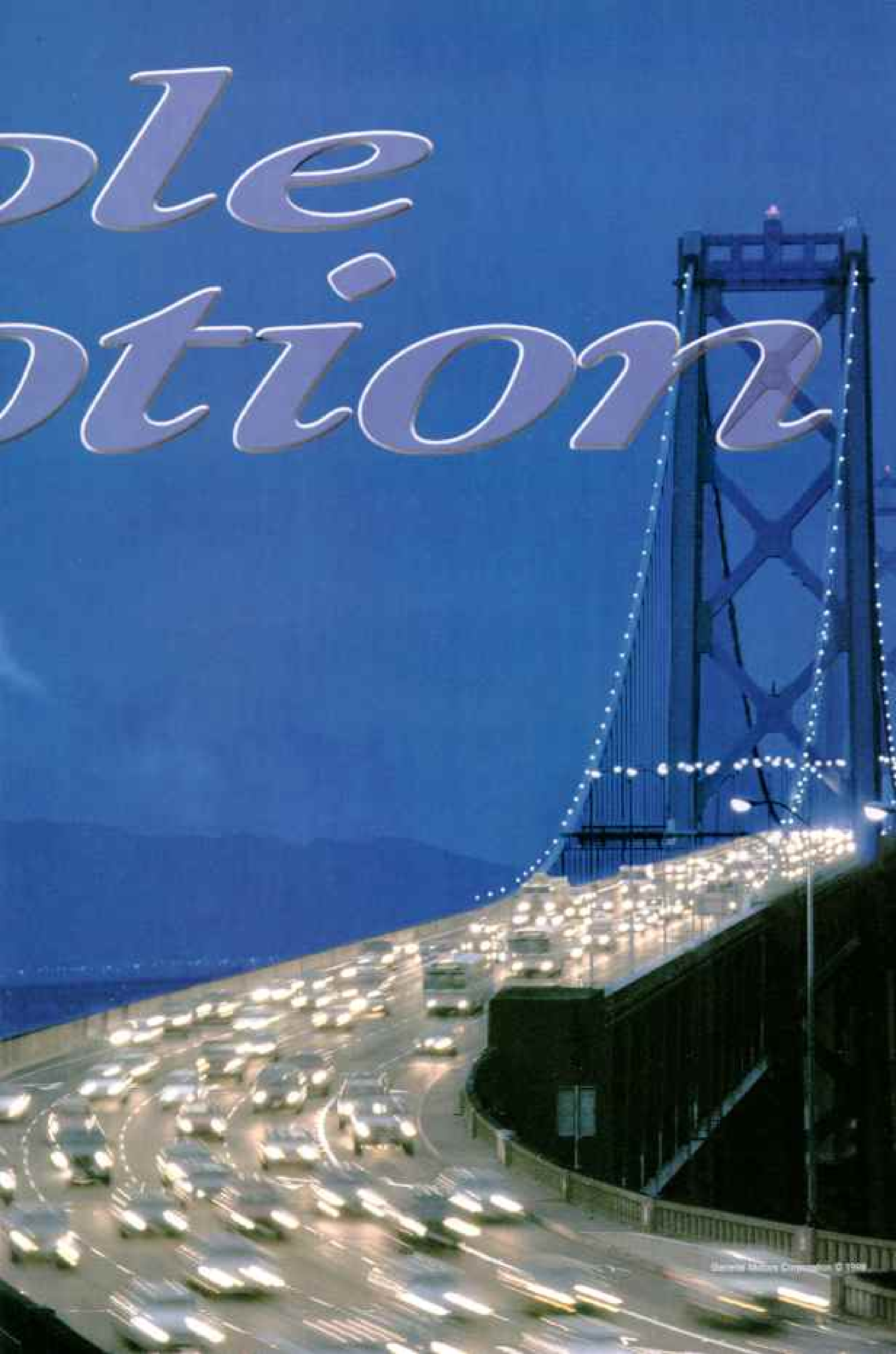

Behind the Scenes

Season's Greetings

Christmastime meant "Jingle Bells" and jingling pockets around the National Geographic Society in the 1920s, when, as an end-of-the-year tradition, employees received holiday advances on their salaries. By the Great Depression, though, cold cash had been replaced with warm thoughts: Christmas cards, which would grow ever more elaborate over the decades.

In 1932 Society officials sent employees a nautical-theme card (center) with a note of appreciation for the year's work.

By 1951 color had taken over, as it had in the pages of the magazine, enlivening a photo of a skier and her Saint Bernard.

To coincide with the 1985 release of the *Atlas of North America*, the holiday card—which by then was also distributed to magazine contributors—featured satellite images of the continent (top) with a wish for "Peace on Earth." Later, a series of brass tree ornaments (top right, from 1989) glued inside the cards added to our collectible cachet.

One of our ornaments even ended up in the British Museum. In 1987 Jennifer Moseley of our United Kingdom office sent a card to an associate there. He so liked our holographic centennial medallion that he submitted it to his museum's Department of Coins and Medals.

No Matter How Much Mrs. Carter Puts In These Bags, People Seem To Get Twice As Much Out Of Them.

Homework is not something we usually associate with preschool. But, for the 3 to 5 year olds in Mrs. Carter's class, it's rapidly becoming their favorite activity. Thanks, in large part, to an innovative program Mrs. Carter initiated called "Book Buddies."

Book Buddies is a unique lending library that packages books with other objects like games, toys, art and recipe cards that relate to each story. These objects, and the projects and assignments that go with them, invite the children and their parents to further explore the world of imagination the story has helped to open. This in turn has helped their parents play a greater role in their children's education, especially for those who have children with learning disabilities.

For showing her students and their parents that learning is one story that never really ends. State Farm is proud to present Debbie Carter of Indian Prairie School District #204 in Naperville, Illinois, with our Good Neighbor Award and to donate $5,000 to the Prairie Children Preschool.

Good Neighbor Award

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The Good Neighbor Award was developed in cooperation with The Council for Exceptional Children.

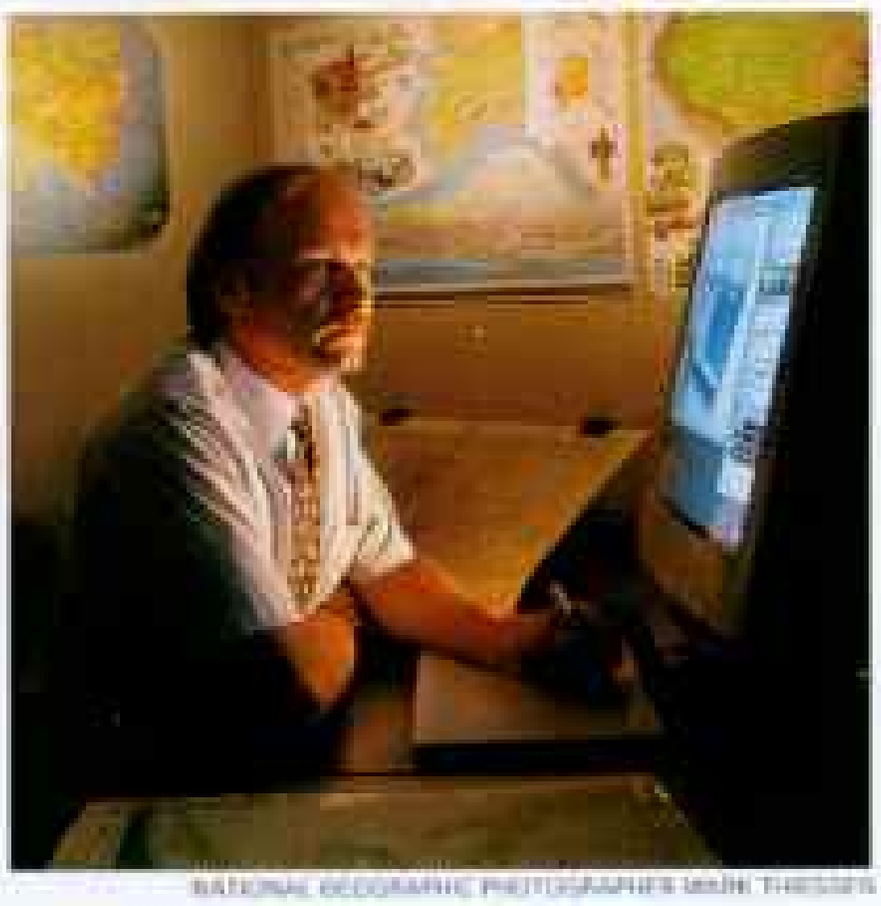
SCOTT GOLDSMITH

Read the Writing on the Walls

Ezra Giterman had an idea. Since his family's GEOGRAPHICS always ended up in the bathroom of their Ohio home, "Why not just put them there permanently?" He and Jean Elliott (above) rounded up copies from friends and family and paged through them to find images they particularly enjoyed—they knew they'd be looking at them for a while. Then Ezra, a retired plumber who now works as an artist, got out the Elmer's glue. The project took two days, and the family has enjoyed the results for seven years. "Everybody," says Jean's son, George, "loves that bathroom."

A World of Detail

For the next year John Bonner's got the world to do—literally. The NG Maps artist (far right) is digitally painting physical features of the Earth into our world database. It's a one-man job, so extensive that John has set up a workstation in his rural Maryland home. As a telecommuter he can put in ten-hour days, helping ensure that future maps will be enhanced with telling details, like vegetation on this map of Africa. "Our older atlases had a lot of different relief styles," explains John. "The new seventh edition [available in late 1999], the first to use all the work I'm doing now, will be consistent."



NATIONAL GEOGRAPHIC PHOTOGRAPHER MARK THISSEN

This isn't John's first task with a global reach. When the Soviet Union broke up in 1991, he had to touch up the world's largest freestanding globe, which he had recently finished painting for our Explorers Hall. He could not have brought that work home, says John. "Imagine *that* on the back of my pickup truck!"

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Our Wyeth Connection

The National Geographic Society needed some painting done around headquarters in 1926, so we gave the job to a friend: N.C. Wyeth. The famed artist's five murals celebrating the theme of discovery still adorn the staircase in our Hubbard Hall (right). Founder of a family of artists (see "American Visions," July 1991), Wyeth was a longtime Society member. He grew close to John Oliver La Gorce—later President of the Society—while executing the murals. The two shared a fascination with pirates; Wyeth once painted the stolid official as a grinning buccaneer. La Gorce acquired several of Wyeth's works, including this startled sea monster (above), now part of the Society's collection.

The World at Our Feet

Ever want to walk across the world? It's done daily in our Explorers Hall, where bronze seals depicting the Western and Eastern Hemispheres are set into the floor at each entrance. The seals were designed for the building, which opened in 1964, by Felix de Weldon, an artist more famous for another local work—the Marine Corps War Memorial in Arlington, Virginia, also known as the Iwo Jima monument.

ALL BY NGS PHOTOGRAPHER MARK THIESSEN

TEXT BY MAGGIE ZACKOWITZ

EXPLORERS HALL

Our headquarters museum gets the royal treatment this month when the Crown Prince and Princess of Jordan arrive to open "Petra, Jordan's City in the Rock." The show will highlight Petra's history and include artifacts from the region's ancient Nabatatean people, Byzantine treasures, and a present-day Bedouin family tent.

■ FOR INFORMATION

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Zanzibar Red Colobus *(Procolobus kirkii)* **Size:** Head and body length, 50 - 60 cm; tail, 60 - 70 cm **Weight:** Approx. 5 - 8 kg **Habitat:** Forests, coastal thickets, fruit tree gardens and mangrove swamps on Zanzibar Island, Tanzania **Surviving number:** Estimated at 1,500 - 2,000 Photographed by Thomas T. Struhsaker

WILDLIFE AS CANON SEES IT

A vivid red on the coat and an arc of white hairs radiating from the face mark the Zanzibar red colobus. Extremely long feet allow this monkey to leap prodigiously in the treetops; however, as forests disappear, and in the absence of a major predator, this tree-dwelling species also spends time on the ground. Females have just one infant every three to five years. Because of this low reproductive rate, a restricted range, a steadily shrinking habitat, and mortality from roadkills, the red colobus on Zanzibar Island is one of Africa's most threatened species. 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.

Forum

The 3-D photographs in the August magazine drew both high praise and criticism, sparking numerous letters from our readers. While one member exclaimed that the issue "took my breath away, made the hair stand straight up on my arms and legs," another responded in verse: "Your pics have always been superior; the 3-D gimmick is inferior."

Return to Mars

The three-dimensional photographs are both compelling and haunting, providing us with a realistic view of an empty world that may have once been very much like our own and in some ways still resembles it. We can easily wonder whether we are getting a glimpse of our own planet's future.

DANIEL J. HANNEMAN
Maplewood, Minnesota

The splendid pictures in your article on Mars made me feel homesick! I could almost smell the rocks and sand. I'm not actually from Mars but am an Icelander living in Sweden. The likeness of the rocky plains in Iceland to those on Mars is striking. Mars thus being the closest thing in space to Iceland confirms to me that my cold and harsh homeland is heaven on Earth.

GUNNAR THOR GUNNARSSON
Stenungsund, Sweden

I'm surprised that the rover didn't have an attachment for a can of spray paint so we could write "Sojourner was here" on some of the largest rocks. If names like Moe and Scooby Doo and Barnacle Bill are the best we Earthlings can do, perhaps we should just stay home, y'know? It's embarrassing.

STEWART GILBERT
San Francisco, California

I enjoyed your article about the Pathfinder mission. I would like to add that Sojourner weighs 23 pounds only on Earth. On Mars she weighs about 8.9 pounds. This 14.1-pound weight loss might account for her exuberance when attempting to climb up the side of Yogi early in the mission.

HENRY J. MOORE
Rover Scientist, Mars Pathfinder
Palo Alto, California

I have to disagree with the statement on page 22 that "life cannot exist without liquid water." Indeed life as we know it cannot exist without water, but scientists need to keep an open mind as to what kind of life might be out there.

THOMAS S. TAYLOR
Moab, Utah

On page 19 you say the Martian volcano Olympus Mons is two and a half times the height of Mount Everest. Does Olympus Mons actually tower 75,000 feet above its surroundings, or is that the greatest measure of variation in the Martian surface? Measured from the lowest point on Earth's crust, rather than sea level, Everest is over 67,200 feet high.

DAVID KAMM
Decorah, Iowa

Mount Everest was measured from sea level and Olympus Mons from the flattest area around its base. Since there is no sea level on Mars, the height equivalents are as close to comparing apples to apples as possible.

Orangutans

Tears came to my eyes as I read about the death of the male orangutan Rocky (pages 48-9). Had he been a human, every possible means would have been used to save his life. Couldn't we have stepped in to save him?

RICHARD MCCARTHY
Buffalo, New York

Aside from the inherent danger involved in rescuing a wild animal in distress, there is an ethic among those who document the natural world against interfering with the natural order of things.

New York's Chinatown

Your article mentioned that American-born Chinese are called either "ABCs" or "bananas—yellow on the outside and white on the inside." Banana is a word for those Chinese who are blindly for the American people and their values. Often these people do not want to be with other Chinese. Thus, banana is a very negative term.

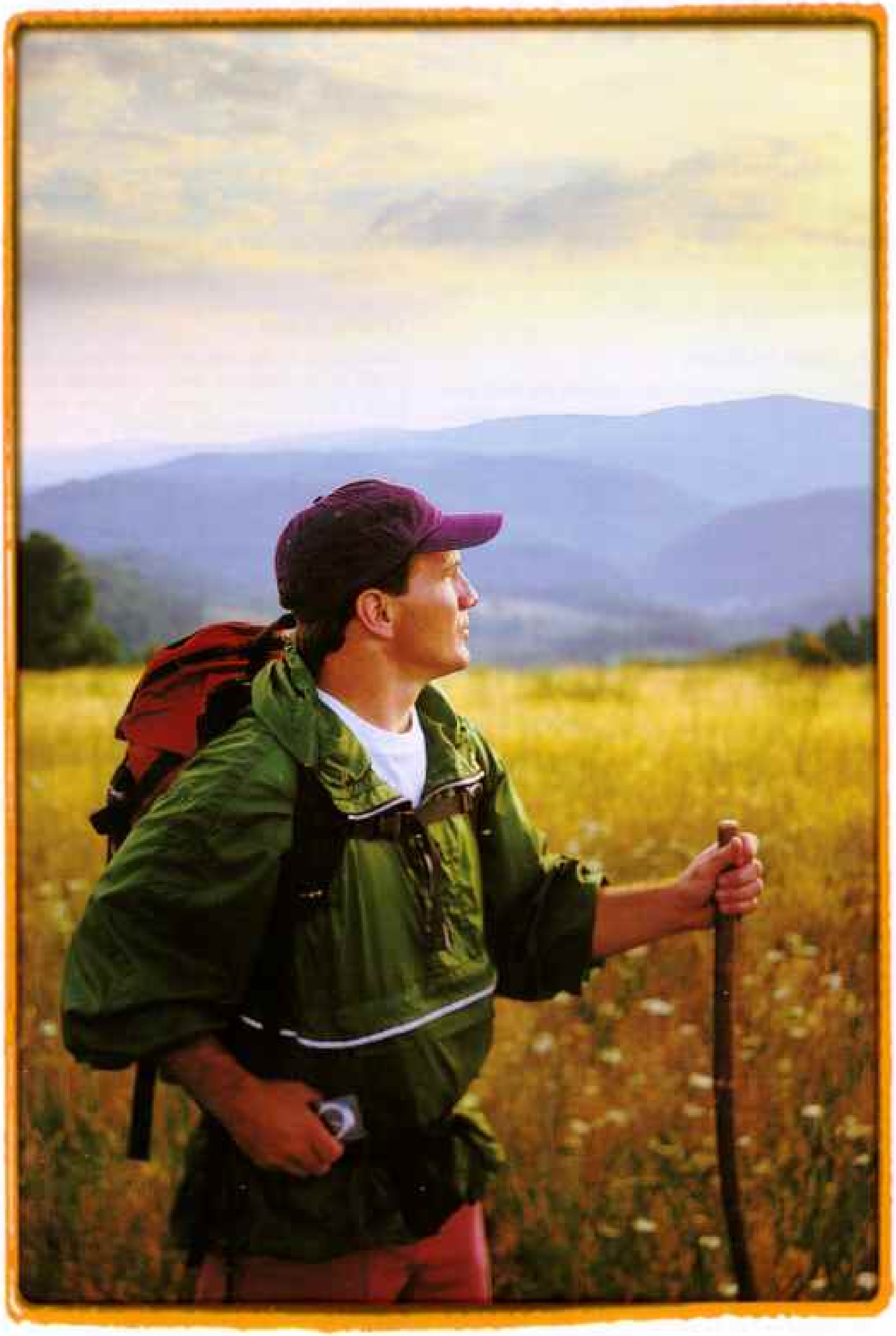
SHEN KUO-CHEN
New York, New York

Regarding Tian-Li and his aspiration to start a Chinese fruit farm in America (page 77), litchi and longan trees are semitropical and won't grow anywhere in New Jersey without a greenhouse. I am growing both successfully in Puerto Rico and would be happy to help any aspiring farmers get started.

ROBIN PHILLIPS
Nagüabo, Puerto Rico

Bottlenose Whales

It is a common prejudice that whales live only in the cold, open water of the oceans, and most of my fellow countrymen from Greece are not aware of the fact that bottlenose whales live right in front of their noses. A close relative of the northern bottlenose, the elusive Cuvier's beaked whale, can be found throughout the warm and heavily trafficked waters of the Mediterranean Sea, and strandings of animals have been frequent in past years. In 1996 I had an unfortunate encounter with a dead Cuvier's beaked whale. Probably struck by a ship's propeller,



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natural wonder, do what the locals often do. Stop the car and see what the mountain air will inspire in you.

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TOYOTA People Drive Us

the animal was a sad reminder of mankind's negative effects on our marine environment. Douglas Chadwick's article and Flip Nicklin's photographs gave me a rare glimpse into a world close by yet so far away.

ALEXANDROS KARAMANLIDIS
Berlin, Germany

Redrawing Our Family Tree?

I read with interest your article on australopithecine evolution. On page 98 you noted that the exact gaits of *Australopithecus afarensis* and *A. africanus* are unknown. In her doctoral dissertation Patricia Kramer of the University of Washington compared the locomotion of *A. afarensis* with that of modern humans. She concluded that in some circumstances Lucy was more efficient than modern humans while walking at slow speeds.

KIMBERLY HENKE BREUER
Nashville, Tennessee

Having interned with Philip Tobias of the University of the Witwatersrand in South Africa in 1981, I see his proposals echoed by Berger. Almost two decades ago Dr. Tobias promulgated the view that *A. africanus* played a more pivotal role in human evolution than the more widely publicized East African *A. afarensis*. Which theory is more correct? We may never know. We do know, however, that East and South African paleontologists respectfully disagree with one another.

JEFFREY M. BLOOM
San Luis Obispo, California

Is it possible that hominids started to walk upright because they noticed that some of the smaller animals would rise up on their hind legs to see more of the terrain?

GERALD S. KUPKOWSKI
Buffalo, New York

Indonesia's Plague of Fire

At the time of the terrible forest fires I was on board a vessel in the South China Sea carrying out route surveys for a fiber-optic cable network. Even at 250 kilometers' [155 miles'] distance from the coast of Kalimantan, the air was thick with smoke. For nearly three weeks we could not see the sun's disk, only smoke-diffused light.

The most astonishing and sad event we witnessed happened one night when we were surveying west of Bintan. Our ship was engulfed by an ever increasing flock of exhausted birds and bats, all fleeing the fires of Sumatra. Dozens of birds landed all over the deck, where, too fatigued to move, they could be easily approached and handled. In the morning we found several tired bats dangling from overhead steel gratings.

I sincerely hope that a new and more benign Indonesian government will prevent such awful, and needless, environmental calamities from happening again.

CHRISTOPHER WOODWORTH-LYNAS
Capuk, Newfoundland

Titanic

The images of *Titanic* jumped off the page when viewed with the enclosed 3-D glasses. Also jumping off the page were the words "oil slick" on the map of the *Titanic*'s wreck site (page 123). A similar map from your December 1986 issue (pages 714–15) correctly showed that the stain in the debris field between the bow and stern sections of the wreck was due to "spilled fuel coal." We know the *Titanic* ran on anthracite coal for fuel, not fuel oil.

ROBERT H. GIBBONS
Titanic Historical Society, Inc.
Springfield, Missouri

The author states on page 124 that "*Titanic* sank without completing a single voyage." She actually completed two voyages. Those holding tickets from Southampton to Cherbourg, France, completed the first, while those departing from Southampton to Queenstown, Ireland, via Cherbourg completed the second. It is a matter of record that there were ticket holders to those destinations, people who had no intention of sailing to New York. A completed destination is a voyage in nautical terms.

JOHN F. MEEK
Orangeville, Ontario

I wish the 3-D images could have been of the untainted, unsalvaged, and dignified wreck of the R.M.S. *Titanic*—the one that Robert Ballard and Jean-Louis Michel found in 1985, two years before she was crassly looted by others. The crow's nest was destroyed by salvagers in 1987 so they could grab one or two artifacts off the bow section of the wreck. If only they could have let the *Titanic* rest in peace instead of stigmatizing her and her legacy.

RICHARD A. KREBES
Minnetonka, Minnesota

Geographica

Another for Frank Gallant's collection of unusual town names: Chicken, Alaska . . . so called because the territory's gold-seeking settlers couldn't agree on how to spell "ptarmigan." When Alaska achieved statehood, the willow ptarmigan was adopted as its state bird.

JOHN T. LOGAN
North Branford, Connecticut

Letters for Forum should be sent to National Geographic Magazine, Box 98198, Washington, D.C. 20090-8198, or by fax to 202-828-5460, or via the Internet to ngsforum@nationalgeographic.com. Include name, address, and daytime telephone. Letters may be edited for clarity and space.

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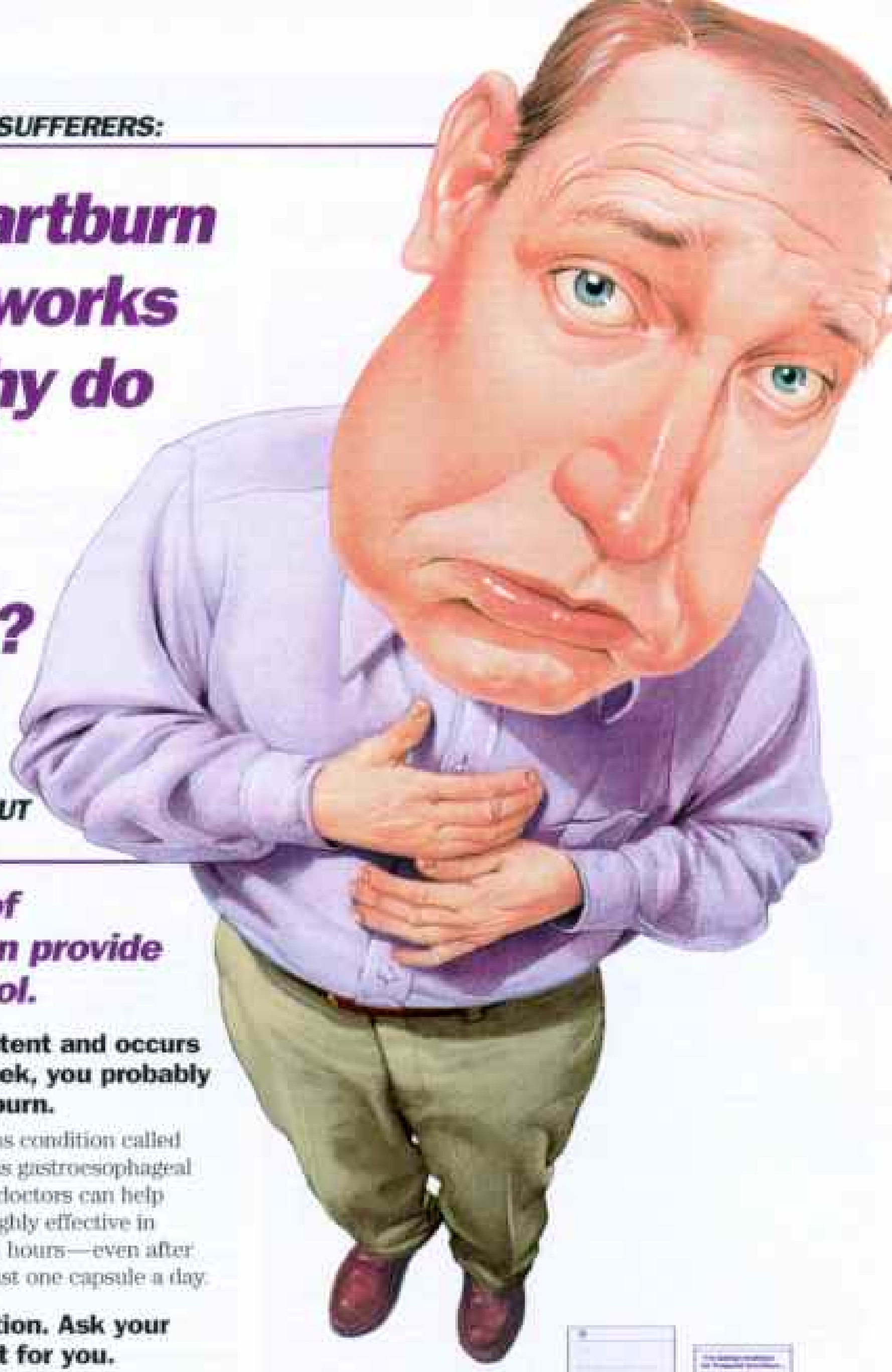

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Please read this summary carefully, and then ask your doctor about PRILOSEC. No advertisement can provide all the information needed to prescribe a drug. This advertisement does not take the place of careful discussions with your doctor. Only your doctor has the training to weigh the risks and benefits of a prescription drug for you.

PRILOSEC®* *(OMEPRAZOLE) Delayed-Release Capsules*

BRIEF SUMMARY.

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

INDICATIONS AND USAGE *Duodenal Ulcer:* PRILOSEC is indicated for short-term treatment of active duodenal ulcer. Most patients heal within 4 weeks. Some patients may require an additional 4 weeks of therapy. PRILOSEC, in combination with clarithromycin and amoxicillin, is indicated for treatment of patients with *H. pylori* infection and duodenal ulcer disease (active or up to 1-year history) to eradicate *H. pylori*. PRILOSEC, in combination with clarithromycin, is also indicated for treatment of patients with *H. pylori* infection and duodenal ulcer disease to eradicate *H. pylori*. Eradication of *H. pylori* has been shown to reduce the risk of duodenal ulcer recurrence. Among patients who fail therapy, PRILOSEC with clarithromycin is more likely to be associated with the development of clarithromycin resistance as compared with triple therapy. In patients who fail therapy, susceptibility testing should be done. If resistance to clarithromycin is demonstrated or susceptibility testing is not possible, alternative antimicrobial therapy should be instituted. (See the clarithromycin package insert, MICROBIOLOGY section.) *Gastric Ulcer:* PRILOSEC is indicated for short-term treatment (4-8 weeks) of active benign gastric ulcer. ***Treatment of Gastroesophageal Reflux Disease (GERD): Symptomatic GERD*** – PRILOSEC is indicated for the treatment of heartburn and other symptoms associated with GERD. ***Erosive Esophagitis*** – PRILOSEC is indicated for the short-term treatment (4-8 weeks) of erosive esophagitis which has been diagnosed by endoscopy. The efficacy of PRILOSEC used for longer than 8 weeks in these patients has not been established. In the rare instance of a patient not responding to 8 weeks of treatment, it may be helpful to give up to an additional 4 weeks of treatment. If there is recurrence of erosive esophagitis or GERD symptoms (e.g., heartburn), additional 4-8 week courses of omeprazole may be considered. ***Maintenance of Healing of Erosive Esophagitis:*** PRILOSEC is indicated to maintain healing of erosive esophagitis. Controlled studies do not extend beyond 12 months. ***Pathological Hypersecretory Conditions:*** PRILOSEC is indicated for the long-term treatment of pathological hypersecretory conditions (e.g., Zollinger-Ellison syndrome, multiple endocrine adenomas and systemic mastocytosis).

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

WARNINGS: *Clarithromycin:* **CLARITHROMYCIN SHOULD NOT BE USED IN PREGNANT WOMEN EXCEPT IN CLINICAL CIRCUMSTANCES WHERE NO ALTERNATIVE THERAPY IS APPROPRIATE. IF PREGNANCY OCCURS WHILE TAKING CLARITHROMYCIN, THE PATIENT SHOULD BE APPRISED OF THE POTENTIAL HAZARD TO THE FETUS.** (See **WARNINGS** in prescribing information for clarithromycin.) Amoxicillin: SERIOUS AND OCCASIONALLY FATAL HYPERSENSITIVITY (anaphylactoid) REACTIONS HAVE BEEN REPORTED IN PATIENTS ON PENICILLIN THERAPY. THESE REACTIONS ARE MORE LIKELY TO OCCUR IN INDIVIDUALS WITH A HISTORY OF PENICILLIN HYPERSENSITIVITY AND/OR A HISTORY OF SENSITIVITY TO MULTIPLE ALLERGENS. BEFORE INITIATING THERAPY WITH AMOXICILLIN, CAREFUL INQUIRY SHOULD BE MADE CONCERNING PREVIOUS HYPERSENSITIVITY REACTIONS TO PENICILLINS, CEPHALOSPORINS, OR OTHER ALLERGENS. IF AN ALLERGIC REACTION OCCURS, AMOXICILLIN SHOULD BE DISCONTINUED AND APPROPRIATE THERAPY INSTITUTED. **SERIOUS ANAPHYLACTIC REACTIONS REQUIRE IMMEDIATE EMERGENCY TREATMENT WITH EPINEPHRINE. OXYGEN, INTRAVENOUS STEROIDS, AND AIRWAY MANAGEMENT, INCLUDING INTUBATION, SHOULD ALSO BE ADMINISTERED AS INDICATED.** (See WARNINGS in prescribing information for amoxicillin.) Antibacterials: **Pseudomembranous colitis has been reported with nearly all antibacterial agents and may range in severity from mild to life-threatening. Therefore, it is important to consider this diagnosis in patients who present with diarrhea subsequent to the administration of antibacterial agents.** (See WARNINGS in prescribing information for clarithromycin and amoxicillin.)

PRECAUTIONS *General:* Symptomatic response to therapy with omeprazole does not preclude the presence of gastric malignancy. Atrophic gastritis has been noted occasionally in gastric corpus biopsies from patients treated long-term with omeprazole. ***Information for Patients:*** PRILOSEC Delayed-Release Capsules should be taken before eating. Patients should be cautioned that the PRILOSEC Delayed-Release Capsule should not be opened, chewed or crushed, and should be swallowed whole. ***Drug Interactions: Other*** – Omeprazole can prolong the elimination of diazepam, warfarin and phenytoin, drugs that are metabolized by oxidation in the liver. Although in normal subjects no interaction with theophylline or propranolol was found, there have been clinical reports of interaction with other drugs metabolized via the cytochrome P-450 system (e.g., cyclosporine, disulfiram, benzodiazepines). Patients should be monitored to determine if it is necessary to adjust the dosage of these drugs when taken concomitantly with PRILOSEC. Because of its profound and long lasting inhibition of gastric acid secretion, it is theoretically possible that omeprazole may interfere with absorption of drugs where gastric pH is an important determinant of their bioavailability (e.g., ketoconazole, ampicillin esters, and iron salts). In the clinical trials, antacids were used concomitantly with the administration of PRILOSEC. ***Combination Therapy with Clarithromycin*** – Co-administration of omeprazole and clarithromycin have resulted in increases in plasma levels of omeprazole, clarithromycin, and 14-hydroxy-clarithromycin. (See CLINICAL PHARMACOLOGY, *Pharmacokinetics, Combination Therapy with Antimicrobials* in full Prescribing Information.) Concomitant administration of clarithromycin with cisapride, pimozide, or terfenadine is contraindicated. There have been reports of an interaction between erythromycin and astemizole resulting in QT prolongation and torsades de pointes. Concomitant administration of erythromycin and astemizole is contraindicated. Because clarithromycin is also metabolized by cytochrome P450, concomitant administration of clarithromycin with astemizole is not recommended. (See also CONTRAINDICATIONS, clarithromycin above. Please refer to full prescribing information for clarithromycin.) ***Carcinogenesis, Mutagenesis, Impairment of Fertility:*** In two 24-month carcinogenicity studies in rats, omeprazole at daily doses of 1.7, 3.4, 13.8, 44.0 and 140.8 mg/kg/day (approximately 4 to 350 times the human dose, based on a patient weight of 55 kg and a human dose of 20 mg), produced gastric ECL cell carcinoids in a dose-related manner in both male and female rats; the incidence of this effect was markedly higher in female rats, which had higher blood levels of omeprazole. Gastric carcinoids seldom occur in the untreated rat. In addition, ECL cell hyperplasia was present in all treated groups of both sexes. In one of these studies, female rats were treated with 13.8 mg/kg/day omeprazole (approximately 35 times the human dose) for 1 year, then followed for an additional year without the drug. No carcinoids were seen in these rats. An increased incidence of treatment-related ECL cell hyperplasia was observed at the end of 1 year (24% treated vs. 10% controls). By the second year the difference between treated and control rats was much smaller (49% vs 29%) but still showed more hyperplasia in the treated group. An enlarged primary malignant tumor in the stomach was seen in one rat (2%). No similar tumor was seen in male or female rats treated for 2 years. For this strain of rat no similar tumor has been noted historically, but a finding involving only one tumor is difficult to interpret. A 78-week mouse carcinogenicity study of omeprazole did not show increased tumor occurrence, but the study was not conclusive. Omeprazole was not mutagenic in an *in vitro* Ames *Salmonella typhimurium* assay, an *in vitro* mouse lymphoma cell assay, and an *in vivo* rat liver DNA damage assay. A mouse micronucleus test at 625 and 1250 times the human dose gave a borderline result, as did an *in vivo* bone marrow chromosome aberration test. A second mouse micronucleus study at 2500 times the human dose, but with different (suboptimal) sampling times, was negative. ***Pregnancy: Omeprazole: Pregnancy Category C*** – In rabbits, omeprazole in a dose range of 6.9 to 69.1 mg/kg/day (approximately 17 to 173 times the human dose) produced dose-related increases in embryo lethality, fetal resorptions and pregnancy disruptions. In rats, dose-related embryofetal toxicity and postnatal developmental toxicity were observed in offspring resulting from parents treated with omeprazole 13.8 to 138.0 mg/kg/day (approximately 35 to 345 times the human dose). There are no adequate or well controlled studies in pregnant women. Sporadic reports have been received of congenital abnormalities occurring in infants born to women who have received omeprazole during pregnancy. Omeprazole should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. ***Clarithromycin: Pregnancy Category C*** – See WARNING (above) and full prescribing information for clarithromycin before using in pregnant women. ***Nursing Mothers:*** It is not known whether omeprazole is excreted in human milk. In rats, omeprazole administration during late gestation and lactation at doses of 13.8 to 138 mg/kg/day (35 to 345 times the human dose) resulted in decreased weight gain in pups. Because many drugs are excreted in human milk, because of the potential for serious adverse reactions in nursing infants from omeprazole, and because of the potential for tumorigenicity shown for omeprazole in rat carcinogenicity studies, a decision should be made whether to discontinue nursing or discontinue the drug, taking into account the importance of the drug to the mother. ***Pediatric Use:*** Safety and effectiveness in children have not been established.

ADVERSE REACTIONS: In the U.S. clinical trial population of 465 patients (excluding duodenal ulcer, Zollinger-Ellison syndrome and resistant ulcer patients), the following adverse experiences were reported in either 1% or more of patients on therapy with PRILOSEC® (omeprazole). Numbers in parentheses indicate percentages of the adverse experiences considered by investigators as possibly, probably, or definitely related to the drug.

	Omeprazole (n=465)	Placebo (n=64)	Ranitidine (n=129)
Headache	6.9 (2.4)	6.3	7.7 (2.6)
Diarrhea	3.0 (1.9)	3.1 (1.6)	2.1 (0.5)
Abdominal Pain	2.4 (0.4)	3.1	2.3
Nausea	2.3 (0.9)	3.1	4.1 (0.5)
URI	2.3	1.6	2.3
Dizziness	1.5 (0.9)	3.0	2.3 (1.0)
Vomiting	1.5 (0.4)	4.7	1.5 (0.5)
Rash	1.5 (1.1)	0.0	0.0
Constipation	1.1 (0.9)	0.0	0.0
Cough	1.1	0.0	1.5
Asthenia	1.1 (0.2)	1.6 (1.6)	1.5 (1.0)
Back Pain	1.1	3.0	0.5

The following additional reactions which occurred in 1% or more of omeprazole-treated patients have been reported in international double-blind, and open-label, clinical trials in which 2,837 patients and subjects received omeprazole.

Incidence of Adverse Experiences ≥ 1%, Causal Relationship not Assessed

		Omeprazole (n=2651)	Placebo (n=328)
Body as a Whole- site unspecified	Abdominal pain	3.2	2.7
	Asthenia	1.3	0.9
Digestive System	Constipation	1.5	0.9
	Diarrhea	3.7	2.5
	Flatulence	2.7	1.8
	Nausea	4.0	6.7
	Vomiting	3.2	10.0
	Acid regurgitation	1.8	3.0
Nervous System/Psychiatric	Headache	2.8	2.5

Additional adverse experiences occurring in <1% of patients or subjects in domestic and/or international trials, or occurring since the drug was marketed, are shown below within each body system. In many instances, the relationship to PRILOSEC was unclear. *Body As a Whole:* Allergic reactions including, rarely, anaphylaxis (see also Skin below), fever, pain, fatigue, malaise, abdominal swelling. *Cardiovascular:* Chest pain or angina, tachycardia, bradycardia, palpitation, elevated blood pressure, peripheral edema. *Gastrointestinal:* Pancreatitis (some fatal), anorexia, irritable colon, flatulence, fecal discoloration, esophageal candidiasis, mucosal atrophy of the tongue, dry mouth. During treatment with omeprazole, gastric fundic gland polyps have been noted rarely. These polyps are benign and appear to be reversible when treatment is discontinued. Gastric duodenal carcinoids have been reported in patients with ZE syndrome on long-term treatment with PRILOSEC. This finding is believed to be a manifestation of the underlying condition, which is known to be associated with such tumors. *Hepatic:* Mild and rarely marked elevations of liver function tests [ALT (SGPT), AST (SGOT), γ-glutamyl transpeptidase, alkaline phosphatase, and bilirubin (jaundice)]. In rare instances, overt liver disease has occurred, including hepatocellular, cholestatic, or mixed hepatitis, liver necrosis (some fatal), hepatic failure (some fatal), and hepatic encephalopathy. *Metabolic/Nutritional:* Hyponatremia, hypoglycemia, weight gain. *Musculoskeletal:* Muscle cramps, myalgia, muscle weakness, joint pain, leg pain. *Nervous System/Psychiatric:* Psychic disturbances including depression, aggression, hallucinations, confusion, insomnia, nervousness, tremors, apathy, somnolence, anxiety, dream abnormalities, vertigo, paresthesia, hemifacial dysesthesia. *Respiratory:* Epistaxis, pharyngeal pain. *Skin:* Rash and, rarely, cases of severe generalized skin reactions including toxic epidermal necrolysis (TEN, some fatal), Stevens-Johnson syndrome, and erythema multiforme (some severe); purpura and/or petechiae (some with rechallenge), skin inflammation, urticaria, angioedema, pruritus, alopecia, dry skin, hyperhidrosis. *Special Senses:* Tinnitus, taste perversion. *Urogenital:* Interstitial nephritis (some with positive rechallenge), urinary tract infection, microscopic pyuria, urinary frequency, elevated serum creatinine, proteinuria, hematuria, glycosuria, testicular pain, gynecomastia. *Hematologic:* Rare instances of pancytopenia, agranulocytosis (some fatal), thrombocytopenia, leukopenia, anemia, eosinophilia, and hemolytic anemia have been reported. *Combination Therapy for H. pylori Eradication:* Dual therapy with PRILOSEC and clarithromycin, or triple therapy with PRILOSEC, clarithromycin, and amoxicillin: Adverse experiences that have occurred have been limited to those that have been previously reported with omeprazole, clarithromycin, or amoxicillin. Triple Therapy (PRILOSEC+clarithromycin+amoxicillin): The most frequent adverse experiences observed in clinical trials using combination therapy with PRILOSEC, clarithromycin, and amoxicillin (n = 274) were diarrhea (14%), taste perversion (10%), and headache (7%). Many of these occurred at a higher frequency than that reported by patients taking the antibacterial drugs alone. Dual Therapy (PRILOSEC+clarithromycin): Adverse experiences observed in controlled clinical trials using combination therapy with PRILOSEC and clarithromycin (n = 340) which differed from those previously described for omeprazole alone were: Taste perversion (16%), tongue discoloration (2%), dizziness (2%), pharyngitis (1%) and flu syndrome (1%). For more information on clarithromycin or amoxicillin, refer to the respective package inserts, ADVERSE REACTIONS sections.

OVERDOSAGE: Rare reports have been received of overdosage with omeprazole. Doses ranged from 320 mg to 900 mg (16-45 times the usual recommended clinical dose). Manifestations were variable, but included confusion, drowsiness, blurred vision, tachycardia, nausea, diaphoresis, flushing, headache, and dry mouth. Symptoms were transient, and no serious clinical outcome has been reported. No specific antidote for omeprazole overdosage is known. Omeprazole is extensively protein bound and, therefore, not readily dialyzable. In the event of overdosage, treatment should be symptomatic and supportive.

DOSAGE AND ADMINISTRATION *Short-Term Treatment of Active Duodenal Ulcer:* The recommended adult oral dose of PRILOSEC is 20 mg once daily. Most patients heal within 4 weeks. Some patients may require an additional 4 weeks of therapy. (See INDICATIONS AND USAGE.) ***H. pylori Eradication for the Reduction of the Risk of Duodenal Ulcer Recurrence:*** Triple Therapy (PRILOSEC+clarithromycin+amoxicillin): The recommended adult oral regimen is PRILOSEC 20 mg plus clarithromycin 500 mg plus amoxicillin 1000 mg each given twice daily for 10 days. In patients with an ulcer present at the time of initiation of therapy, an additional 18 days of PRILOSEC 20 mg once daily is recommended for ulcer healing and symptom relief. Dual Therapy (PRILOSEC+clarithromycin): The recommended adult oral regimen is PRILOSEC 40 mg once daily plus clarithromycin 500 mg three times daily for 14 days. In patients with an ulcer present at the time of initiation of therapy, an additional 14 days of PRILOSEC 20 mg once daily is recommended for ulcer healing and symptom relief. Please refer to clarithromycin full prescribing information for CONTRAINDICATIONS and WARNINGS, and for information regarding dosing in elderly and renally impaired patients (PRECAUTIONS: *General*, PRECAUTIONS: *Geriatric Use* and PRECAUTIONS: *Drug Interactions*). Please refer to amoxicillin full prescribing information for CONTRAINDICATIONS and WARNINGS. ***Gastric Ulcer:*** The recommended adult oral dose is 40 mg once a day for 4 to 8 weeks. (See INDICATIONS AND USAGE, *Gastric Ulcer.*) ***Gastroesophageal Reflux Disease (GERD):*** The recommended adult oral dose for the treatment of patients with symptomatic GERD and no esophageal lesions is 20 mg daily for up to 4 weeks. The recommended adult oral dose for the treatment of patients with erosive esophagitis and accompanying symptoms due to GERD is 20 mg daily for 4 to 8 weeks. (See INDICATIONS AND USAGE.) ***Maintenance of Healing of Erosive Esophagitis:*** The recommended adult oral dose is 20 mg daily. ***Pathological Hypersecretory Conditions:*** The dosage of PRILOSEC in patients with pathological hypersecretory conditions varies with the individual patient. The recommended adult oral starting dose is 60 mg once a day. Doses should be adjusted to individual patient needs and should continue for as long as clinically indicated. Doses up to 120 mg t.i.d. have been administered. Daily dosages of greater than 80 mg should be administered in divided doses. No dosage adjustment is necessary for patients with renal impairment, hepatic dysfunction or for the elderly.

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June 1998 PRI28

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

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My Pentax IQZoom 160

My Photo

This is my bird's-eye view of Omar — "King of the Petting Zoo" as he was eyeing my son Toby for lunch.

This is the five-point passive autofocus system that measured how tall Omar was, chose the optimum setting, and captured every feather in perfect detail.

This is the easy-to-read dial that let me quickly pick the daylight-sync shooting mode so not a single shadow crossed Omar's kissable mug.

This is the power zoom lens that went from 38mm to 160mm in the blink of an ostrich's eye. It let me get to Omar's level without having to get in Omar's path.

This is the fail-safe loading technology that let me slip in a new roll of film while Toby was circling my legs and Omar was circling Toby.

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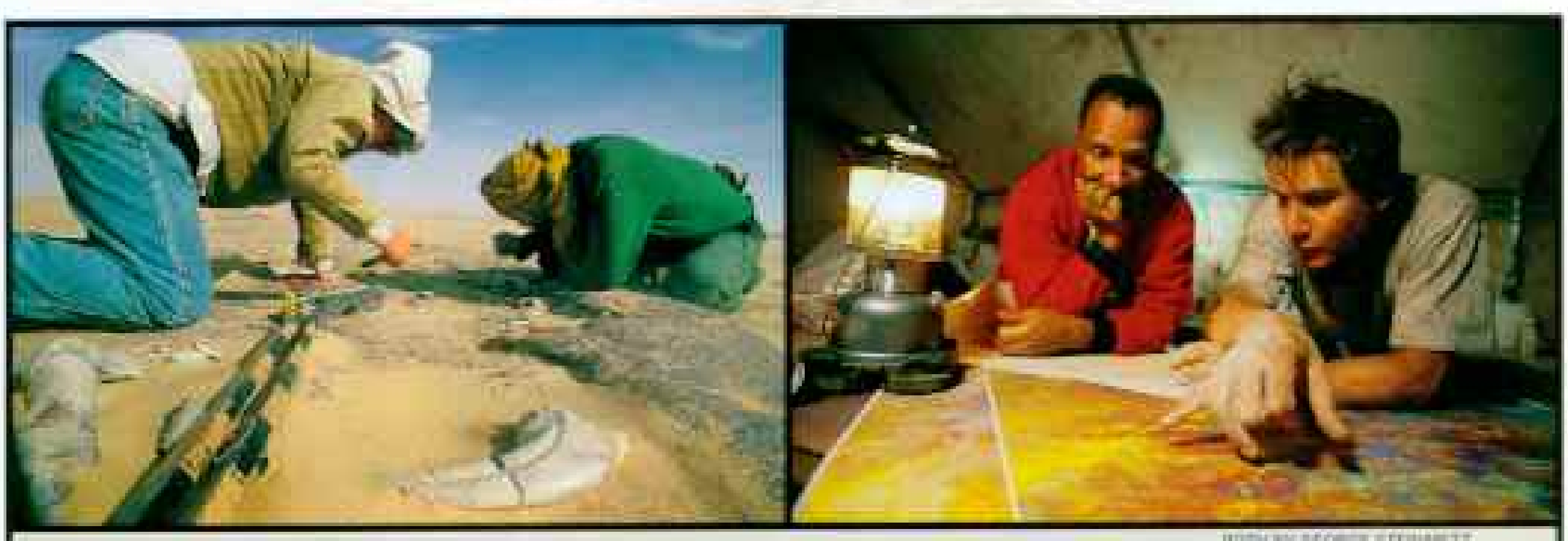

BOTH BY GEORGE STEINMETZ

■ NGS RESEARCH GRANT

New Dinosaur From the Sahara

"A dinosaur trying hard to be a crocodile," paleontologist Paul Sereno calls the 36-foot-long dinosaur he and his team discovered in the Ténéré, a remote part of the Sahara in Niger. No wonder they named the hundred-million-year-old spinosaur—a newly identified genus and species—*Suchomimus tenerensis*, or "crocodile mimic from Ténéré."

Spinosaur bones had turned up earlier in North Africa, Europe, and Brazil. But the team came upon so many *Suchomimus* bones in Niger that Sereno (above right, at right) and French colleague Didier Dutheil had their pick of locations as they pored over NASA satellite images of the region. In three weeks the team collected 70 percent of the creature's parts, including the foot-long thumb claw that caught the eye of David Varricchio (above left, at left). They later assembled the most complete spinosaur skeleton yet. Most intriguing was the skull, with its elongated snout and interlocking front teeth like those of a crocodile. "Its jaws and conical teeth tell us clearly that it ate fish," Sereno says. "The claws, attached to huge, muscular forearms, say that it probably gulped down anything it ran into." Coincidentally, Sereno found crocodile remains in an ancient riverbed where *Suchomimus* fed.

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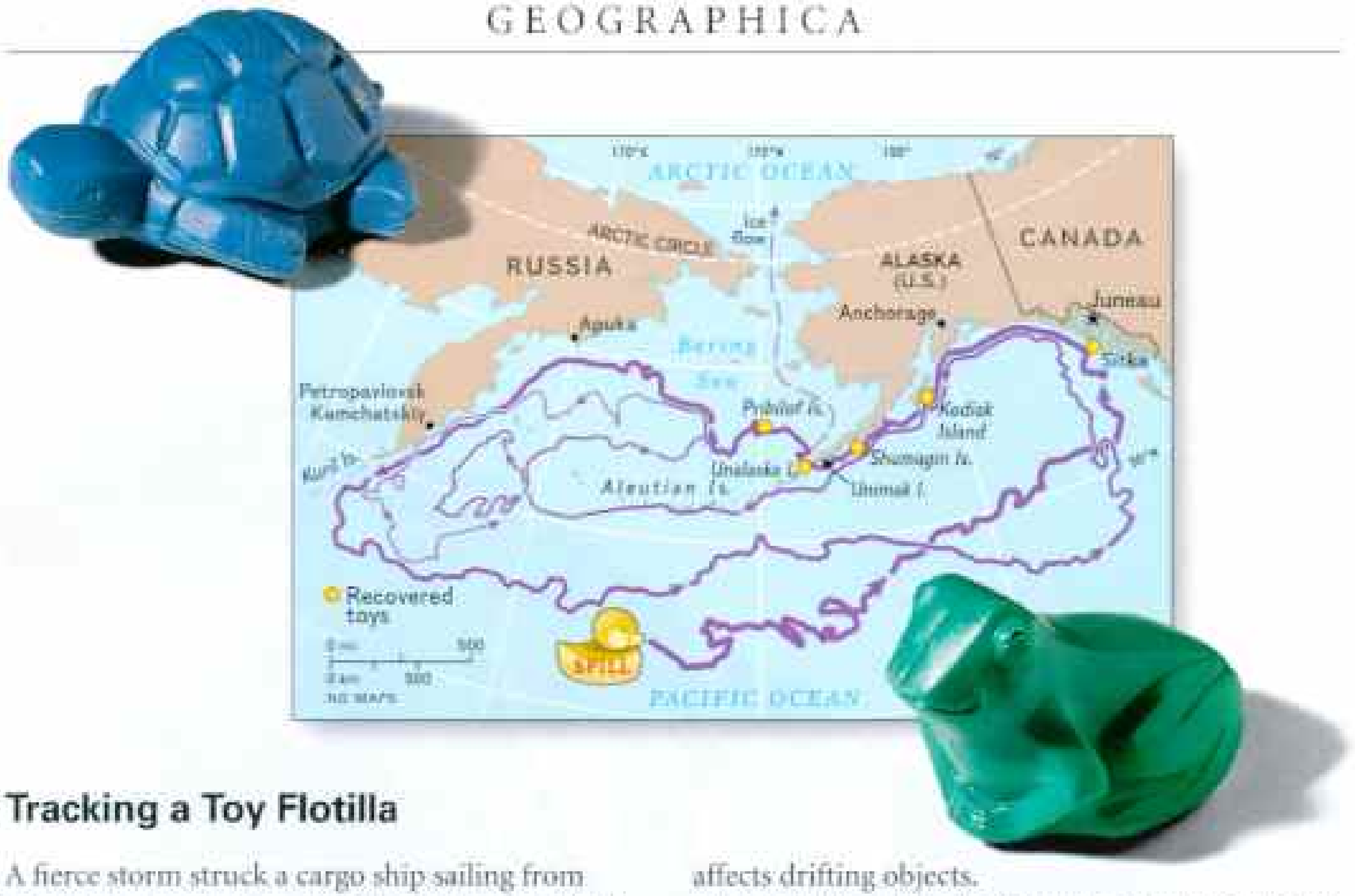

Tracking a Toy Flotilla

A fierce storm struck a cargo ship sailing from Hong Kong to Tacoma, Washington, and washed a container carrying 29,000 plastic bathtub toys overboard south of the Aleutian Islands. That was in January 1992, but the blue turtles, green frogs, yellow ducks, and red beavers still turn up on beaches at Sitka and elsewhere in Alaska (map). Oceanographers charting the toy armada's counterclockwise course around and around the northern Pacific now have a new view of how wind affects drifting objects.

It took the little critters only two and a half years to make their first circuit, not the expected four to six years, says Jim Ingraham of NOAA, and they're now near the end of their second circuit. Some may even get trapped in northward-flowing ice, float over the North Pole, and wind up in the Atlantic, says Ingraham, who normally has a more mundane task: monitoring fish-egg concentrations drifting around the Pacific.

■ NGS RESEARCH GRANT

BOTH BY TOM STRUHSAKER

Traffic Turns Monkeys into Roadkill

Why did the red colobus monkey try to cross the road? To get to trees on the other side. But why was it killed? Because traffic on a newly paved road in Zanzibar moves as fast as 60 miles an hour, says Tom Struhsaker, a Duke University biologist studying the endangered species (GEOGRAPHIC, November 1998). Each year 18 to 26 monkeys from four groups totaling about 150 animals living near the Jozani Forest Reserve are killed, forestry workers there told Struhsaker. He has lobbied, so far unsuccessfully, for speed bumps to be built on a mile-long stretch of road near the reserve that is used by taxis, buses, and trucks. "The monkeys don't have good road sense," he says. "They're getting clobbered."

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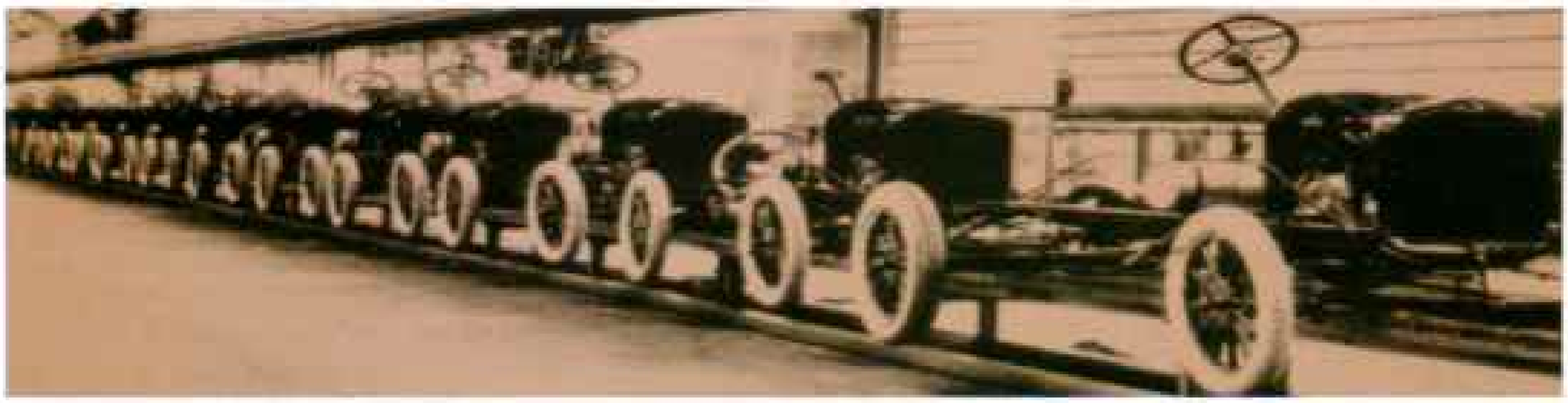

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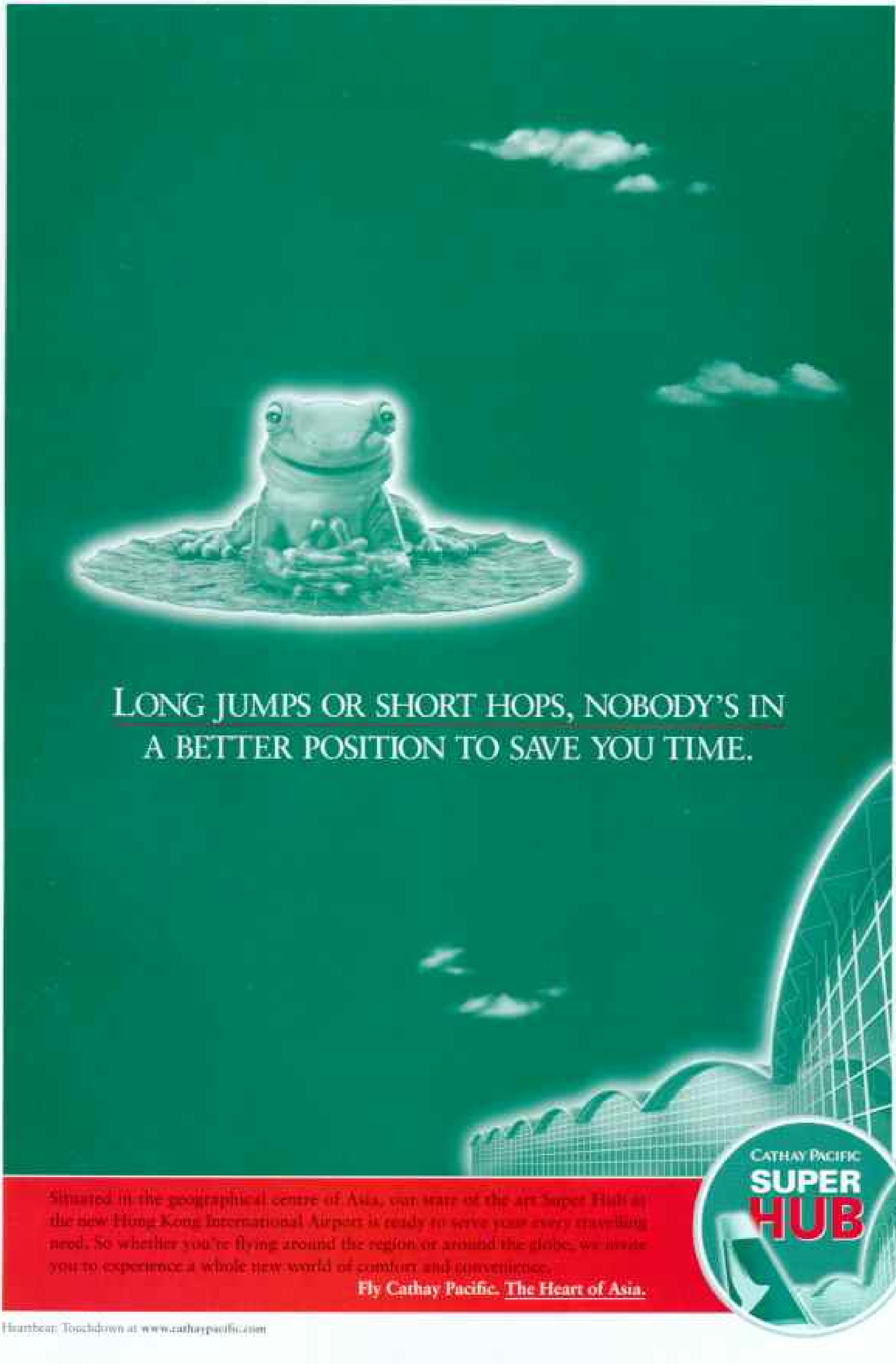

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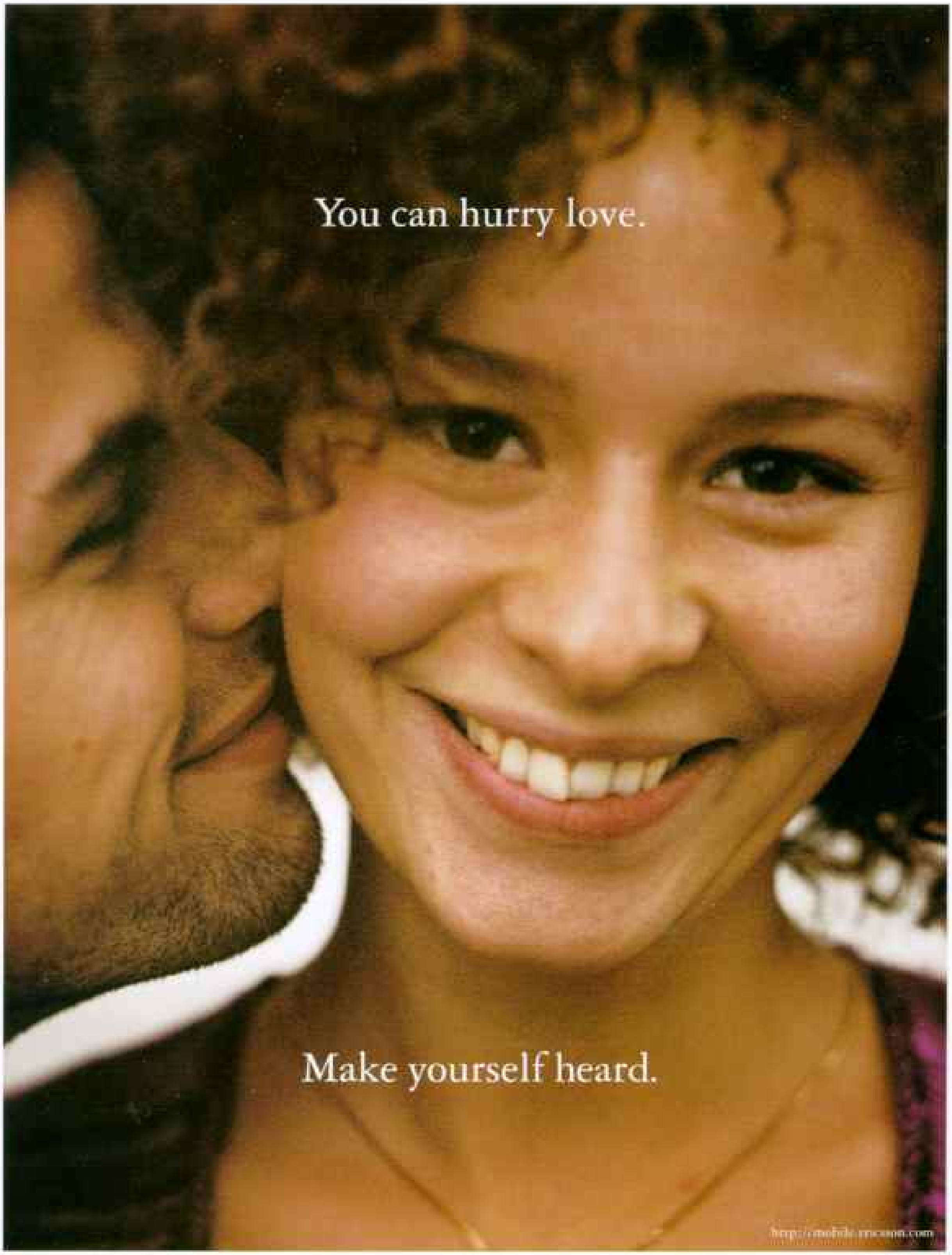

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18 Rabbit

Funny name for a King

What's in a name? You might have expected a more awe-inspiring title for the Copan Dynasty's 13th governor. Yet 18 Rabbit was one of the greatest rulers the Americas have ever known, a Renaissance man long before the Renaissance. Both priest and astronomer, he raised the stately Temple 22, and inscribed it with the glyph for Venus. In veneration of his ancestors, 18 Rabbit the historian began construction of Pre-Colombian America's longest inscribed text, the celebrated hieroglyphic stairway. An athlete, he constructed the grandest ball court of his time, and played ball.

His reign converted Copan into the Maya's crowning artistic achievement

As a warrior, he inspired terror throughout his empire, offering to the gods the still-beating hearts of his captives. Dramatic in death as in life, the old man was finally ambushed by guerillas from the city of Quiriguá, who ended his illustrious 43-year rule by jubilantly cutting off his head.

Name glyph of 18 Rabbit

His most enduring legacy is his art. The Great Plaza of Copan is scattered with remarkable stelae, monolithic sculptures intricately carved in deep, nearly full-round relief, and in 18 Rabbit's own image, the handsome devil. His reign converted Copan into the Maya's crowning artistic achievement. His great works have earned for his city the title, "The Athens of the New World", and for himself, "King of the Arts".

The story of 18 Rabbit is only one of dozens in Copán, the most intensely studied and best understood of all Maya cities – and one of Honduras' two World Heritage Sites. Hundreds more stories wait to be discovered in such sites as El Puente, Los Naranjos, Talgua Cave (The Cave of the Glowing Skulls), and a liberal scattering of rock art sites throughout the country.

THE LAB OF LUXURY

The next time you go to the post office, if you see a "Wanted" poster with a picture of a black Labrador retriever on it, he's probably mine.

His name is Walter, and he has a wit, charm and personality that could probably land him his own talk show, should he be so inclined. But he has one character flaw: He's a thief.

Befitting his breed, he's always retrieved with a tireless energy bordering on obsession. But lately his retrieving has gone beyond tennis balls and authorized socks. It's more like Grand Theft—Shoe.

I should have known something was up when two or three copies of the same morning paper would appear on the lawn. I thought the paper carrier was just taking a mulligan. I didn't realize my own dog was swiping them from my now newsdeprived neighbors.

He returned from a brief burst of freedom the other day, triumphantly toting one of those expensive European wooden sandals. I surmised he had stolen it off a neighbor's deck. He beamed like he'd found a Nobel Prize.

I loaded Labrador and his loot into my new Catera, intending to drive through the neighborhood to find a deck

with one shoe, or worse, a neighbor wearing just one. I quickly forgot my mission. The driving was just too much fun.

I had read about all the features in a newspaper ad: 200-horsepower V6 with multi-ram induction, speed-sensitive steering, traction control, on and on. But they didn't mean much until I felt them behind the wheel. My drive around the block took me way out in the country and back.

It seems odd to pass other luxury cars on two-lane highways when you're not really in a hurry to begin with. Something about Catera makes you do it anyway. Walter smiled the whole way.

As luck would have it, on my way back up my street, I spied a neighbor searching his yard, sporting the other sandal in his hand and a puzzled look.

He was less interested in my explanation than in having a long discussion about my new Catera, repeatedly asking questions about feature after feature while running his hand across the leather seating areas.†

I asked if he'd seen the newspaper ad; he had not. He said his papers kept disappearing from his lawn. Walter and I took the Fifth.

Now, all I need is to find a support group for canine kleptomaniacs. Preferably, one that's some distance from here. I won't mind the drive.

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Global engineering group ABB uses Lotus Notes to unite 210,000 employees as well as many customers and suppliers. The enterprise-wide solution supports core business processes helping ABB track quality, speed workflow and seize opportunities.

World leading auto manufacturer Daimler-Benz uses Lotus Domino to set up fast-track teams which follow design modifications from start to finish. Its Commercial Vehicles Division now records a 60% time saving in the decision-making process.

Clariant transformed its specialty chemicals division (formerly Hoechst) with a global inventory management system based on Lotus Domino. The solution brings together stock data from thirteen different systems. It reduced inventory by over 25% in the last year.

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70th anniversary

If You're Trying To Lower Your Cholesterol, But Your Numbers Still Come Up High...

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...Ask Your Doctor For The Low Down On LIPITOR®

TAKE YOUR BAD CHOLESTEROL NUMBERS TO NEW LOWS.

LIPITOR (atorvastatin calcium), in combination with diet and exercise, was proven in clinical studies to reduce LDL "bad" cholesterol by 39%–60%. See chart at right.

"DIET AND EXERCISE JUST WEREN'T DOING IT — BUT ONE MONTH AFTER MY DOCTOR STARTED ME WITH LIPITOR, I GOT MY TOTAL CHOLESTEROL DOWN FROM 255 TO 185."

LIPITOR also significantly lowers total cholesterol and triglycerides while raising HDL "good" cholesterol. And LIPITOR is taken only once a day, at any time of day, with or without food.

ONLY YOUR DOCTOR

or healthcare provider knows if LIPITOR is right for you. Some people should not take LIPITOR, including those with liver disease or possible liver problems, women who are nursing, pregnant, or who may become pregnant, or people who are allergic to any of the ingredients in LIPITOR. It's important to tell your doctor about any medications you are currently taking to avoid possible serious drug interactions. Your doctor may perform simple blood tests to monitor liver function before and during treatment.

LIPITOR IS GENERALLY WELL TOLERATED.

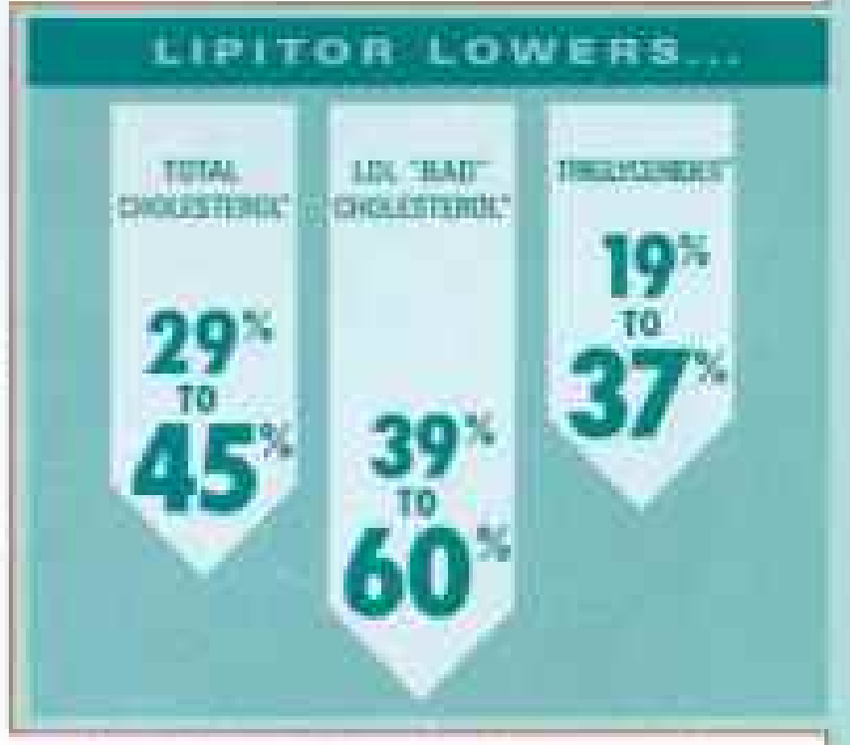
Side effects are usually mild and temporary. In clinical studies, less than 2% of patients had to stop taking LIPITOR because of adverse effects. If you take LIPITOR, tell your doctor about any unusual muscle pain or weakness, as this could be a sign of serious side effects.

"I'VE TRIED FOR YEARS TO GET MY CHOLESTEROL BELOW 250. SINCE MY DOCTOR PUT ME ON LIPITOR, I'M BELOW 200 — AT LAST!"

TODAY LIPITOR IS PRESCRIBED MORE THAN ANY OTHER CHOLESTEROL MEDICATION.

Over 3 million people have started using LIPITOR to lower their cholesterol. For more information about LIPITOR, please ask your doctor or pharmacist. Information about LIPITOR and a free brochure are also available by calling toll free, **1-888-LIPITOR**.

Please see important additional information on adjacent page.



*Results of two placebo-controlled dose-response studies of 10 to 80 mg of LIPITOR in high cholesterol patients.

LIPITOR®
atorvastatin calcium
tablets

The Lower Numbers You're Looking For

LIPITOR® (Atorvastatin Calcium) Tablets
Brief Summary of Prescribing Information

CONTRAINDICATIONS: Active liver disease or unexplained persistent elevations of serum transaminases. Hypersensitivity to any component of this medication. **Pregnancy and Lactation:** Atherosclerosis is a chronic process and discontinuation of lipid lowering drugs during pregnancy should have little impact on the outcome of long-term therapy of primary hypercholesterolemia. Cholesterol and other products of cholesterol biosynthesis are essential components for fetal development (including synthesis of steroids and cell membranes). Since HMG-CoA reductase inhibitors decrease cholesterol synthesis and possibly the synthesis of other biologically active substances derived from cholesterol, they may cause fetal harm when administered to pregnant women. Therefore, HMG-CoA reductase inhibitors are contraindicated during pregnancy and in nursing mothers. ATORVASTATIN SHOULD BE ADMINISTERED TO WOMEN OF CHILDBEARING AGE ONLY WHEN SUCH PATIENTS ARE HIGHLY UNLIKELY TO CONCEIVE AND HAVE BEEN INFORMED OF THE POTENTIAL HAZARDS. If the patient becomes pregnant while taking this drug, therapy should be discontinued and the patient apprised of the potential hazard to the fetus.

WARNINGS: Liver Dysfunction — HMG-CoA reductase inhibitors, like some other lipid-lowering therapies, have been associated with biochemical abnormalities of liver function. **Persistent elevations (>3 times the upper limit of normal [ULN] occurring on 2 or more occasions) in serum transaminases occurred in 0.7% of patients who received atorvastatin in clinical trials. The incidence of these abnormalities was 0.2%, 0.2%, 0.6%, and 2.3% for 10, 20, 40, and 80 mg, respectively.** One patient in clinical trials developed jaundice. Increases in liver function tests (LFT) in other patients were not associated with jaundice or other clinical signs or symptoms. Upon interruption, or discontinuation, of atorvastatin, transaminase levels returned to or near pretreatment levels without sequelae. Eighteen of 20 patients with persistent LFT elevations continued treatment with a reduced dose of atorvastatin. **It is recommended that liver function tests be performed prior to and at 12 weeks following both the initiation of therapy and any elevation of dose, and periodically (eg, semiannually) thereafter.** Liver enzyme changes generally occur in the first 3 months of treatment with atorvastatin. Patients who develop increased transaminase levels should be monitored until the abnormalities resolve. Should an increase in ALT or AST of >3 times ULN persist, reduction of dose or withdrawal of atorvastatin is recommended. Atorvastatin should be used with caution in patients who consume substantial quantities of alcohol and/or have a history of liver disease. Active liver disease or unexplained persistent transaminase elevations are contraindications to the use of atorvastatin (see CONTRAINDICATIONS). **Skeletal Muscle — Rhabdomyolysis with acute renal failure secondary to myoglobinuria has been reported with other drugs in this class.** Uncomplicated myalgia has been reported in atorvastatin treated patients (see ADVERSE REACTIONS). Myopathy, defined as muscle aches or muscle weakness in conjunction with increases in creatine phosphokinase (CPK) values >10 times ULN, should be considered in any patient with diffuse myalgias, muscle tenderness or weakness, and/or marked elevation of CPK. Patients should be advised to report promptly unexplained muscle pain, tenderness or weakness, particularly if accompanied by malaise or fever. Atorvastatin therapy should be discontinued if markedly elevated CPK levels occur or myopathy is diagnosed or suspected. The risk of myopathy during treatment with other drugs in this class is increased with concurrent administration of cyclosporine, fibric acid derivatives, erythromycin, niacin, or azole antifungals. Physicians considering combined therapy with atorvastatin and fibric acid derivatives, erythromycin, immunosuppressive drugs, azole antifungals, or lipid-lowering doses of niacin should carefully weigh the potential benefits and risks and should carefully monitor patients for any signs or symptoms of muscle pain, tenderness, or weakness, particularly during the initial months of therapy and during any periods of upward dosage titration of either drug. Periodic creatine phosphokinase (CPK) determinations may be considered in such situations, but there is no assurance that such monitoring will prevent the occurrence of severe myopathy. **Atorvastatin therapy should be temporarily withheld or discontinued in any patient with an acute, serious condition suggestive of a myopathy or having a risk factor predisposing to the development of renal failure secondary to rhabdomyolysis (eg, severe acute infection, hypotension, major surgery, trauma, severe metabolic, endocrine and electrolyte disorders, and uncontrolled seizures).**

PRECAUTIONS: General — Before instituting therapy with atorvastatin, an attempt should be made to control hypercholesterolemia with appropriate diet, exercise, and weight reduction in obese patients, and to treat other underlying medical problems (see INDICATIONS AND USAGE in full prescribing information). **Information for Patients** — Patients should be advised to report promptly unexplained muscle pain, tenderness, or weakness, particularly if accompanied by malaise or fever. **Drug Interactions** — The risk of myopathy during treatment with other drugs of the class is increased with concurrent administration of cyclosporine, fibric acid derivatives, niacin (nicotinic acid), erythromycin, azole antifungals (see WARNINGS, Skeletal Muscle). **Antacid:** When atorvastatin and Maalox® TC suspension were coadministered, plasma concentrations of atorvastatin decreased approximately 35%. However, LDL-C reduction was not altered. **Antipyrine:** Because atorvastatin does not affect the pharmacokinetics of antipyrine, interactions with other drugs metabolized via the same cytochrome isozymes are not expected. **Colestipol:** Plasma concentrations of atorvastatin decreased approximately 25% when colestipol and atorvastatin were coadministered. However, LDL-C reduction was greater when atorvastatin and colestipol were coadministered than when either drug was given alone. **Colestipol:** Atorvastatin plasma concentrations and LDL-C reduction were not altered by coadministration of colestipol. **Digoxin:** When multiple doses of atorvastatin and digoxin were coadministered, steady-state plasma digoxin concentrations increased by approximately 20%. Patients taking digoxin should be monitored appropriately. **Erythromycin:** In healthy individuals, plasma concentrations of atorvastatin increased approximately 40% with coadministration of atorvastatin and erythromycin, a known inhibitor of cytochrome P450 3A4 (see WARNINGS, Skeletal Muscle). **Oral Contraceptives:** Coadministration of atorvastatin and an oral contraceptive increased AUC values for norethindrone and ethinyl estradiol by approximately 30% and 20%. These increases should be considered when selecting an oral contraceptive for a woman taking atorvastatin. **Warfarin:** Atorvastatin had no clinically significant effect on prothrombin time when administered to patients receiving chronic warfarin treatment. **Endocrine Function** — HMG-CoA reductase inhibitors interfere with cholesterol synthesis and theoretically might blunt adrenal and/or gonadal steroid production. Clinical studies have shown that atorvastatin does not reduce basal plasma cortisol concentration or impair adrenal reserve. The effects of HMG-CoA reductase inhibitors on male fertility have not been studied in adequate numbers of patients. The effects, if any, on the pituitary-gonadal axis in premenopausal women are unknown. Caution should be exercised if an HMG-CoA reductase inhibitor is administered concomitantly with drugs that may decrease the levels or activity of endogenous steroid hormones, such as ketoconazole, spironolactone, and cimetidine. **CNS Toxicity** — Brain hemorrhage was seen in a female dog treated for 2 months at 120 mg/kg/day. Brain hemorrhage and optic nerve vacuolation were seen in another female dog that was sacrificed in moribund condition after 11 weeks of escalating doses up to 280 mg/kg/day. The 120 mg/kg dose resulted in a systemic exposure (approximately 16 times the human plasma area under the curve (AUC 0-24 hours) based on the maximum human dose of 80 mg/day. A single toxic convulsion was seen in each of 2 male dogs (one treated at 15 mg/kg/day and one at 120 mg/kg/day) in a 2 year study. No CNS lesions have been observed in mice after chronic treatment for up to 2 years at doses up to 400 mg/kg/day or in rats at doses up to 100 mg/kg/day. These doses were 6 to 11 times (mouse) and 8 to 16 times (rat) the human AUC (0-24) based on the maximum recommended human dose of 80 mg/day. CNS vascular lesions, characterized by perivascular hemorrhages, edema, and mononuclear cell infiltration of perivascular spaces, have been observed in dogs treated with other members of the class. A chemically similar drug in this class produced optic nerve degeneration (Wallerian degeneration of retinogeniculate fibers) in clinically normal dogs in a dose-dependent fashion at a dose that produced plasma drug levels about 30 times higher than the mean drug level in humans taking the highest recommended dose. **Carcinogenesis, Mutagenesis, Impairment of Fertility** — In a 2 year carcinogenicity study in rats at dose levels of 10, 30, and 100 mg/kg/day, 2 rare tumors were found in muscle in high-dose females: in one, there was a rhabdomyosarcoma and, in another, there was a fibrosarcoma. This dose represents a plasma AUC (0-24) value of approximately 16 times the mean human plasma drug exposure after an 80 mg oral dose. A 2 year carcinogenicity study in mice given 10, 200, or 400 mg/kg/day resulted in a significant increase in liver adenomas in high-dose males and liver carcinomas in high-dose females. These findings occurred at plasma AUC (0-24) values of approximately 6 times the mean human plasma drug exposure after an 80 mg oral dose. In vitro, atorvastatin was not mutagenic or clastogenic in the following tests with and without metabolic activation: the Ames test with Salmonella typhimurium and Escherichia coli, the HGPRT forward mutation assay in Chinese hamster lung cells, and the chromosomal aberration assay in Chinese hamster lung cells. Atorvastatin was negative in the *in vivo* mouse micronucleus test. Studies in rats performed at doses up to 175 mg/kg (15 times the human exposure) produced no changes in fertility. There was systemic and especially in the epididymis of 2 of 18 rats treated with 100 mg/kg/day of atorvastatin for 3 months (16 times the human AUC at the 80 mg dose); testis weights were significantly lower at 30 and 100 mg/kg and epididymal weight was lower at 100 mg/kg. Male rats given 100 mg/kg/day for 11 weeks prior to mating had decreased sperm motility, spermatid head concentration, and increased abnormal sperm. Atorvastatin caused no adverse effects on semen parameters, or reproductive organ histopathology in dogs given doses of 10, 40, or 120 mg/kg for two years. **Pregnancy**

Pregnancy Category X — See CONTRAINDICATIONS. Safety in pregnant women has not been established. Atorvastatin crosses the rat placenta and reaches a level in fetal liver equivalent to that of maternal plasma. Atorvastatin was not teratogenic in rats at doses up to 300 mg/kg/day or in rabbits at doses up to 100 mg/kg/day. These doses resulted in multiples of about 30 times (rat) or 60 times (rabbit) the human exposure based on surface area (mg/m²). In a study in rats given 20, 100, or 225 mg/kg/day, from gestation day 7 through to lactation day 21 (weaning), there was decreased pup survival at birth, neonatal, weaning, and maturity in pups of mothers dosed with 225 mg/kg/day. Body weight was decreased on days 4 and 21 in pups of mothers dosed at 100 mg/kg/day; pup body weight was decreased at birth and at days 4, 21, and 91 at 225 mg/kg/day. Pup development was delayed (neural performance at 100 mg/kg/day and acoustic startle at 225 mg/kg/day, pinnae detachment and eye opening at 225 mg/kg/day). These doses correspond to 6 times (100 mg/kg) and 23 times (225 mg/kg) the human AUC at 80 mg/day. Rare reports of congenital anomalies have been received following intrauterine exposure to HMG-CoA reductase inhibitors. There has been one report of severe congenital bony deformity, tracheo-esophageal fistula, and anal atresia (VATER association) in a baby born to a woman who took lovastatin with diethylstilbestrol during the first trimester of pregnancy. LIPITOR should be administered to women of child-bearing potential only when such patients are highly unlikely to conceive and have been informed of the potential hazards. If the woman becomes pregnant while taking LIPITOR, it should be discontinued and the patient advised again as to the potential hazards to the fetus. **Nursing Mothers:** Nursing rat pups had plasma and liver drug levels of 50% and 40%, respectively, of that in their mother's milk. Because of the potential for adverse reactions in nursing infants, women taking LIPITOR should not breast-feed (see CONTRAINDICATIONS). **Pediatric Use:** Treatment experience in a pediatric population is limited to doses of LIPITOR up to 80 mg/day for 1 year in 8 patients with homozygous FH. No clinical or biochemical abnormalities were reported in these patients. None of these patients was below 8 years of age. **Geriatric Use:** Treatment experience in adults age ≥70 years with doses of LIPITOR up to 80 mg/day has been evaluated in 221 patients. The safety and efficacy of LIPITOR in this population were similar to those of patients <70 years of age.

ADVERSE REACTIONS: LIPITOR is generally well-tolerated. Adverse reactions have usually been mild and transient. In controlled clinical studies of 2502 patients, ~2% of patients were discontinued due to adverse experiences attributable to atorvastatin. The most frequent adverse events thought to be related to atorvastatin were constipation, flatulence, dyspepsia, and abdominal pain. **Clinical Adverse Experiences:** Adverse experiences reported in ≥2% of patients in placebo-controlled clinical studies of atorvastatin, regardless of causality assessment, are shown in the following table.

Adverse Events in Placebo-Controlled Studies (% of Patients)

BODY SYSTEM Adverse Event	Placebo N = 270	Atorvastatin 10 mg N = 863	Atorvastatin 20 mg N = 36	Atorvastatin 40 mg N = 70	Atorvastatin 80 mg N = 94
BODY AS A WHOLE					
Infection	19.6	18.3	2.8	18.1	7.4
Headache	7.0	5.6	16.7	2.3	6.4
Accidental Injury	3.7	4.2	0.0	1.2	2.2
Flu Syndrome	1.9	2.2	0.0	2.3	3.2
Abdominal Pain	0.7	2.8	0.0	2.8	2.1
Back Pain	2.6	2.8	5.6	2.8	1.1
Allergic Reaction	2.6	0.9	2.8	1.2	0.0
Asthenia	1.9	2.2	0.0	2.8	0.0
DIGESTIVE SYSTEM					
Constipation	1.8	2.1	0.0	2.5	1.1
Diarrhea	1.5	2.7	0.0	2.8	3.2
Dyspepsia	4.1	2.5	2.8	1.2	2.1
Flatulence	0.3	2.1	2.8	1.2	1.1
RESPIRATORY SYSTEM					
Sinusitis	3.0	2.8	0.0	2.5	0.4
Pharyngitis	1.5	2.3	0.0	1.2	2.1
SKIN AND APPENDAGES					
Rash	0.7	2.0	2.8	2.8	1.1
MUSCULOSKELETAL SYSTEM					
Arthralgia	1.5	2.0	0.0	5.1	0.0
Myalgia	1.1	2.2	5.6	1.2	2.2

The following adverse events were reported, regardless of causality assessment in patients treated with atorvastatin in clinical trials. The events in italics occurred in ≥2% of patients and the events in plain type occurred in <2% of patients:

Body as a Whole: Chest pain, face edema, fever, neck rigidity, malaise, photosensitivity reaction, generalized edema. ***Digestive System:*** Nausea, gastroenteritis, liver function tests abnormal, colitis, vomiting, gastritis, dry mouth, rectal hemorrhage, esophagitis, eructation, glossitis, mouth ulceration, anorexia, increased appetite, stomatitis, biliary pain, cheilitis, duodenal ulcer, dysphagia, enteritis, melena, gum hemorrhage, stomach ulcer, tenesmus, ulcerative stomatitis, hepatitis, pancreatitis, cholestatic jaundice. ***Respiratory System:*** Bronchitis, rhinitis, pneumonia, dyspnea, asthma, epistaxis. ***Nervous System:*** Insomnia, dizziness, paresthesia, somnolence, amnesia, abnormal dreams, libido decreased, emotional lability, incoordination, peripheral neuropathy, torticollis, facial paralysis, hyperkinesia, depression, hypesthesia, hypertonia. ***Musculoskeletal System:*** Arthritis, leg cramps, bursitis, tenosynovitis, myasthenia, tendinous contracture, myositis. ***Skin and Appendages:*** Pruritus, contact dermatitis, alopecia, dry skin, sweating, acne, urticaria, eczema, seborrhea, skin ulcer. ***Urogenital System:*** Urinary tract infection, urinary frequency, cystitis, hematuria, impotence, dysuria, kidney calculus, nocturia, epididymitis, fibrocystic breast, vaginal hemorrhage, albuminuria, breast enlargement, metrorrhagia, nephritis, urinary incontinence, urinary retention, urinary urgency, abnormal ejaculation, uterine hemorrhage. ***Special Senses:*** Amblyopia, tinnitus, dry eyes, refraction disorder, eye hemorrhage, deafness, glaucoma, parosmia, taste loss, taste perversion. ***Cardiovascular System:*** Palpitation, vasodilatation, syncope, migraine, postural hypotension, phlebitis, arrhythmia, angina pectoris, hypertension. ***Metabolic and Nutritional Disorders:*** Peripheral edema, hyperglycemia, creatine phosphokinase increased, gout, weight gain, hypoglycemia. ***Hemic and Lymphatic System:*** Ecchymosis, anemia, lymphadenopathy, thrombocytopenia, petechia. ***Postintroduction Reports:*** Adverse events associated with LIPITOR therapy reported since market introduction, that are not listed above, regardless of causality assessment, include the following: anaphylaxis, angioneurotic edema and rhabdomyolysis.

OVERDOSAGE: There is no specific treatment for atorvastatin overdosage. In the event of an overdose, the patient should be treated symptomatically, and supportive measures instituted as required. Due to extensive drug binding to plasma proteins, hemodialysis is not expected to significantly enhance atorvastatin clearance.

Consult package insert before prescribing LIPITOR® (Atorvastatin Calcium) Tablets.

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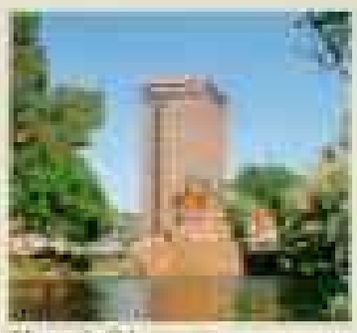

Hotel Okura Amsterdam
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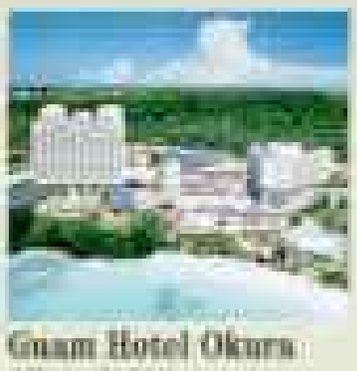

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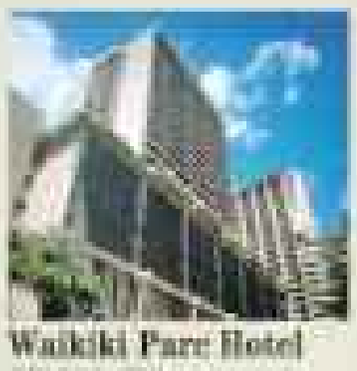

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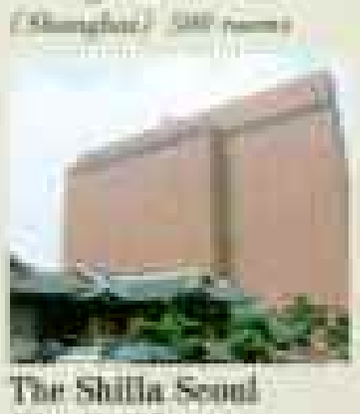

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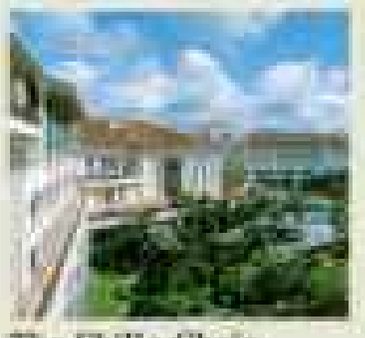

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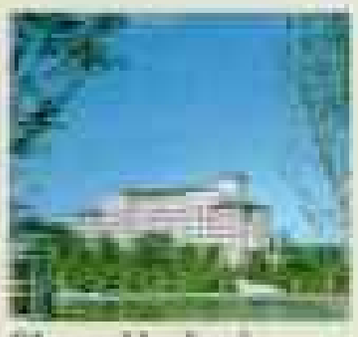

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You can never be too protective

Accidents are sometimes unavoidable. So your car's body should be designed to protect the people inside as much as possible. That's the idea behind Toyota's **GOA** (**Global Outstanding Assessment**) design concept. In creating **GOA**, Toyota developed one of the world's most stringent sets of safety standards. Standards that meet or exceed those of Japan, Europe and the United States.

The **GOA** Body consists of a high-integrity cabin that minimizes distortion during a collision and crumple

Frontal impact test (50km/h)

of the people you love.

13th ASIAN GAMES BANGKOK 1998

zones that disperse crash energy away from the cabin. Together, these elements help protect the cabin space from impact in a frontal collision. Dual driver and passenger front-seat SRS airbags help enhance the GOA concept as well, and of course seatbelts should be worn at all times.

With the GOA concept, Toyota creates cars that set the world's standard for safety. And since you and the people you care about aren't designed to handle a collision, perhaps your car should be.

GOA BODY
High-Integrity Cabin & Crumple Zones

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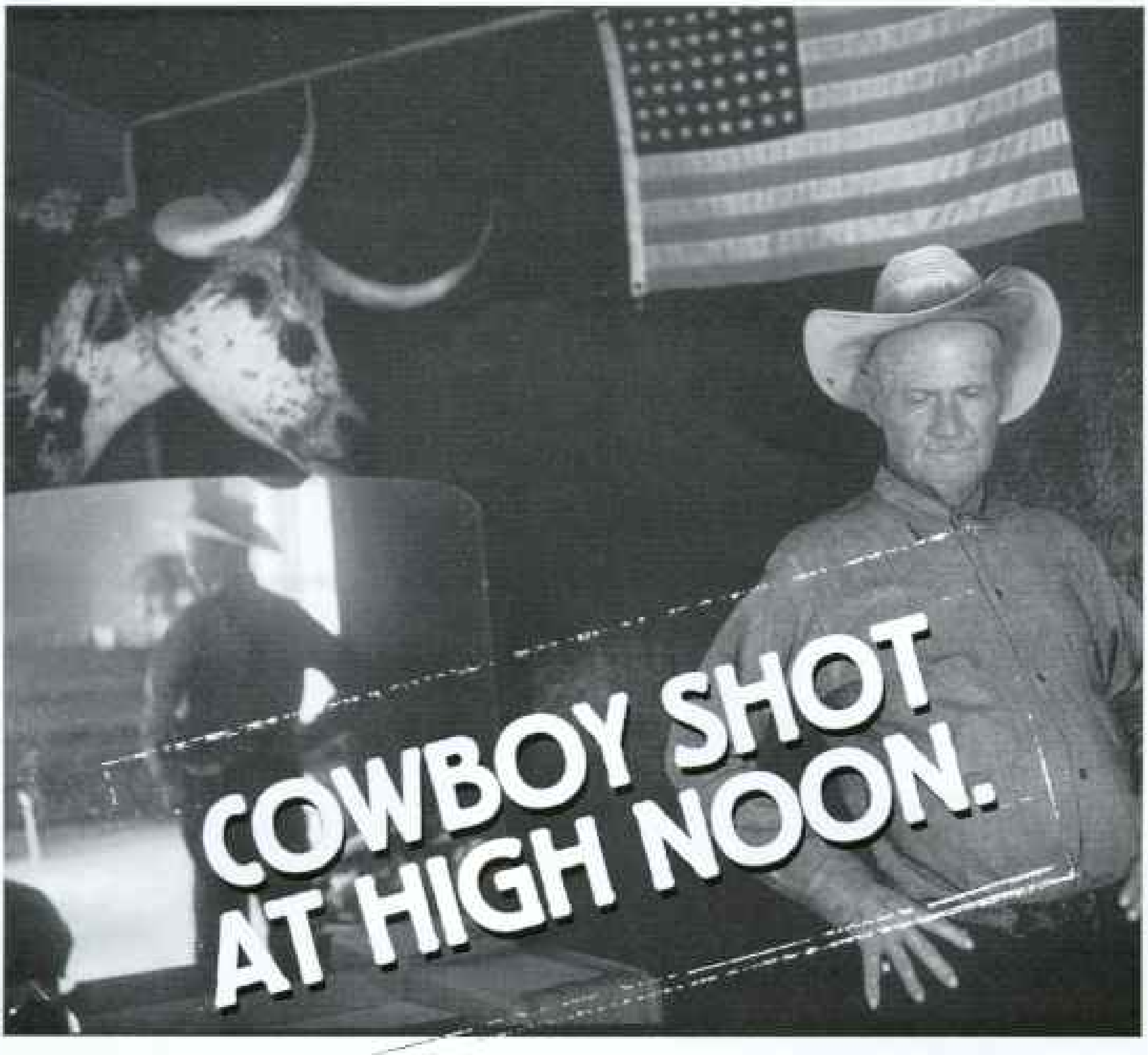

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*Source: 'Auto Motor Und Sport'. Passat v BMW 3 series v Mercedes C-class.

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The Passat. The new Volkswagen.

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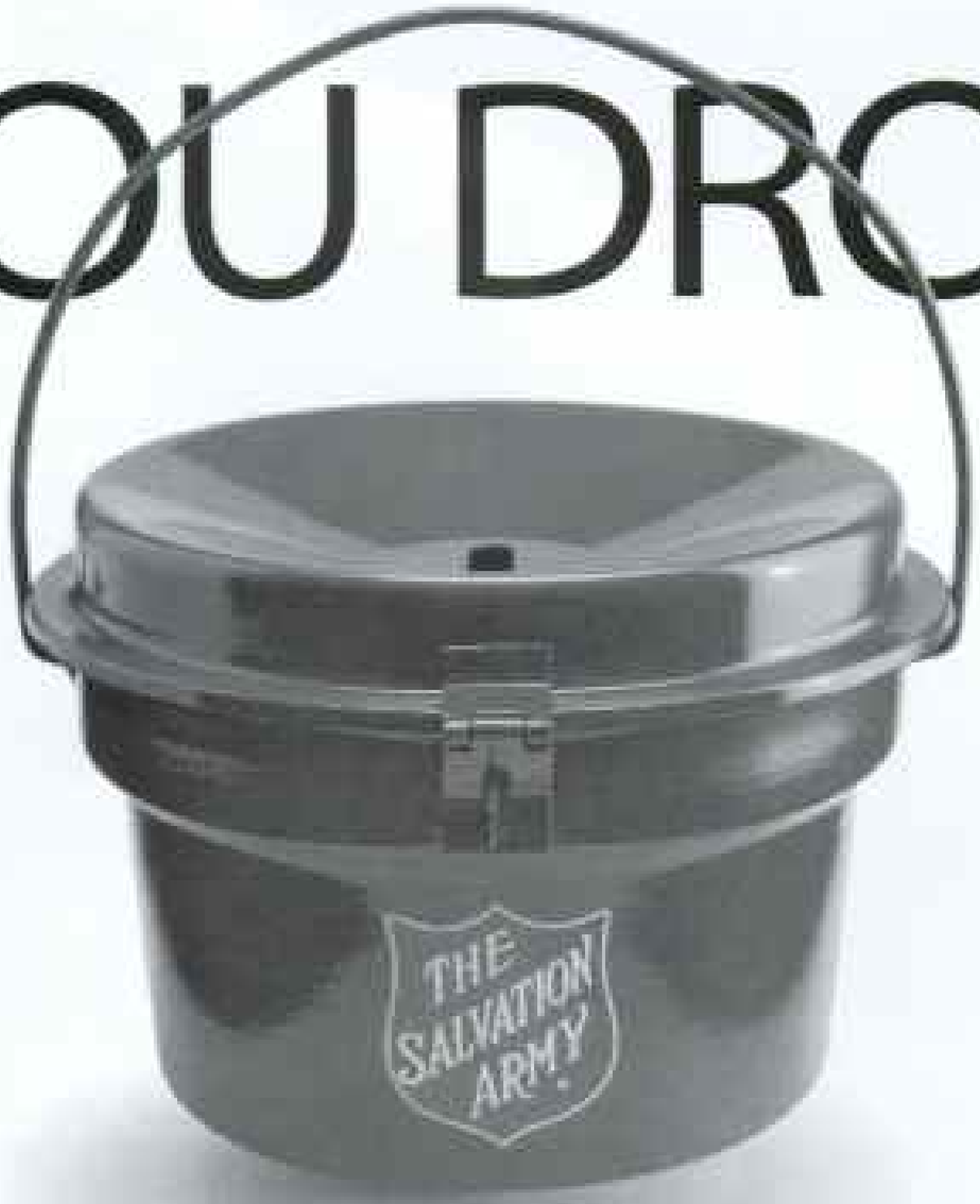

When you're out and about this holiday season, remember all the good you do when you give to The Salvation Army. The help and hope you give make wonderful things happen for people at Thanksgiving and Christmas. But that's just the beginning. Throughout the year, unskilled workers become self-sufficient through job training and placement. Troubled kids learn how to be leaders. Shut-ins and the elderly receive visitors. Victims of disaster find relief. And families are reestablished through substance abuse programs. These are just some of the ways generosity like yours has touched the lives of more than 26 million individuals over the past year. And the donations we receive during the holidays allow this important work to continue. So the next time you're out shopping and see a red kettle, be sure and drop in.

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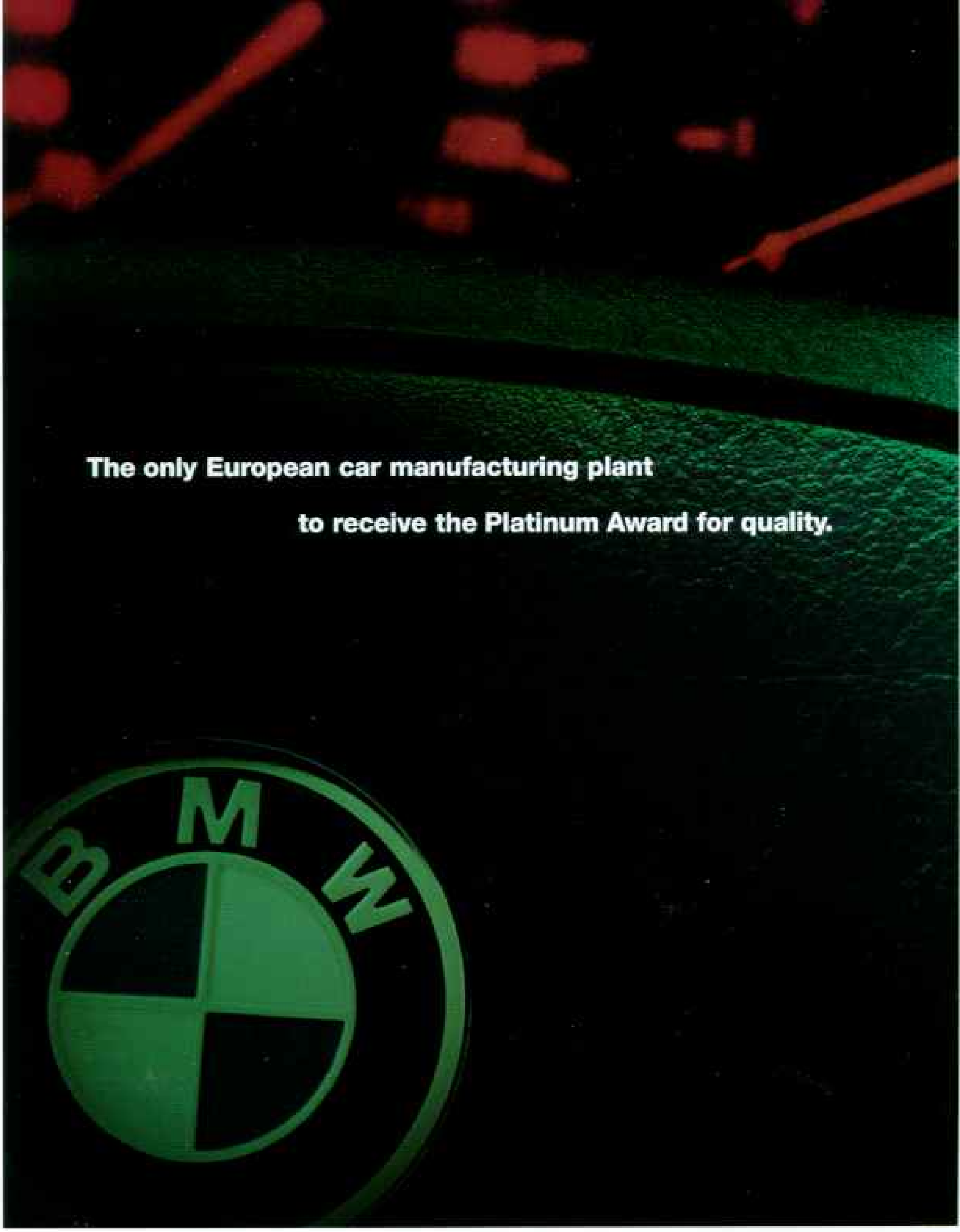
www.salvationarmyusa.org



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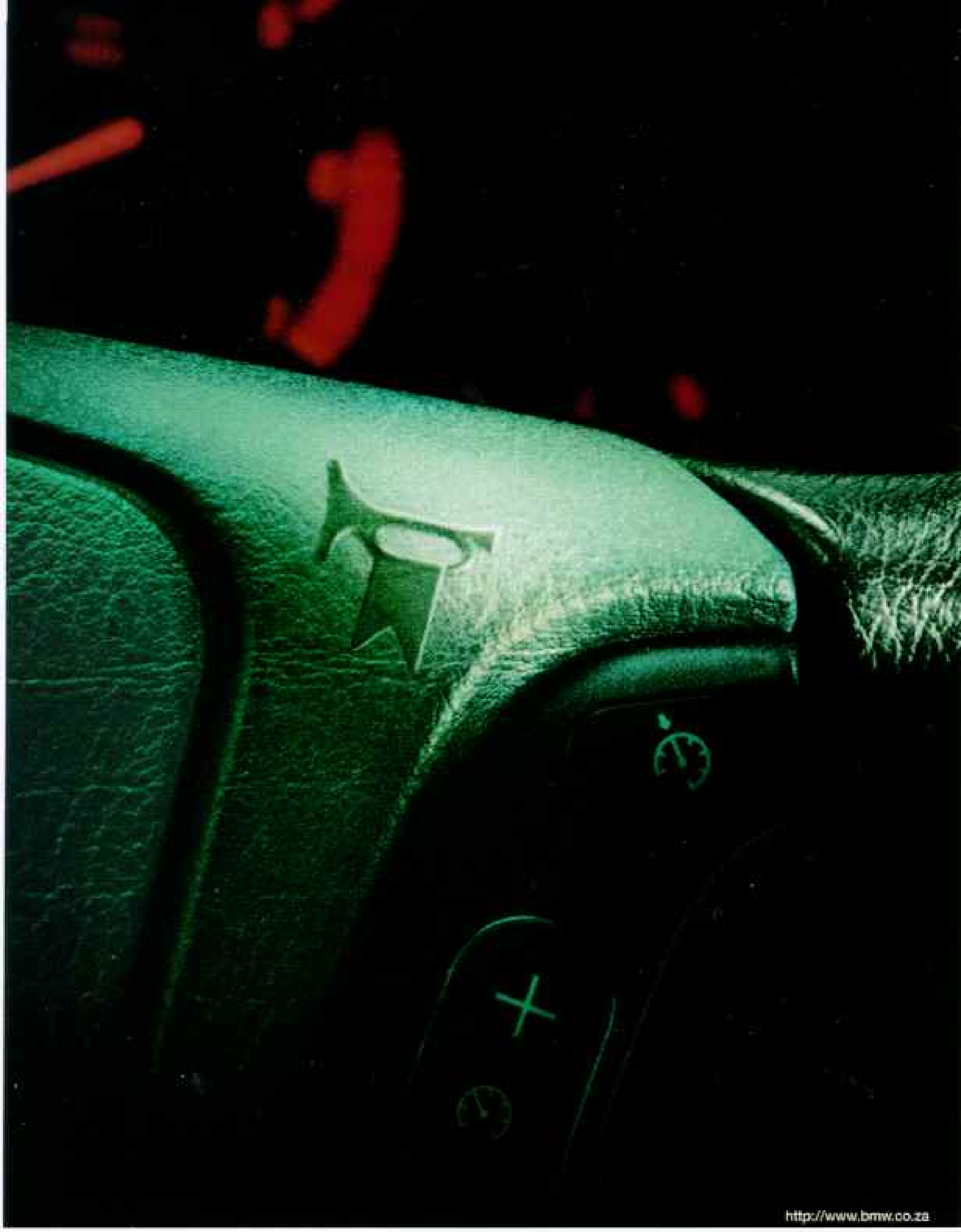

this plant not only exports BMWs to the USA, but also 5 and 7 Series BMWs to South Africa. So

If you own one of these fine machines, you'll be pleased to know that we believe you're driving

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■ FROM THE GEOGRAPHIC ARCHIVES

A Ringing in the Ears

Dressed for a celebration, a Li woman of Hainan Island in the South China Sea gives onlookers an earful. Her five-pound brass earrings, a mark of high status, were typically worn swung up onto the hair as headgear. This picture was published in our September 1938 article about her people, the largest ethnic minority on Hainan. Today's Li forgo such elaborate jewelry. Photographer T. C. Lau was a University of Pennsylvania graduate, a practicing dentist, and—by the time this photo ran—a refugee. When his home city of Canton came under Japanese attack in 1937, he and his family fled to Hong Kong. "Historians may appropriate only a line or two to record this present catastrophe, but it is tremendous to us who are in it," Lau wrote Editor Gilbert H. Grosvenor, who had been a visitor in his home just months before.

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KEY TO 1998

BONUSES for the senses intrigued GEOGRAPHIC readers in 1998. In August they soared across space to examine Mars and dived to the Atlantic Ocean floor to view *Titanic*, both rendered in 3-D by stereoscopic glasses bound into the magazine. In October they were treated to re-created aromas of Cleopatra's perfume and Napoleon's cologne. Logging those and other memorable journeys, a 1998 index for NATIONAL GEOGRAPHIC, TRAVELER, and WORLD magazines will be available in February for $6. The first 109 years of the GEOGRAPHIC, 1888-1997, are available on CD-ROM for $149.95 and on digital video disc for $199.95, plus postage and handling. To order, call 1-800-437-5521 or write to NGS, P.O. Box 11650, Des Moines, IA 50340-1650. An online index can be searched by going to *www.nationalgeographic.com* and clicking "NGS Publications Index."

Sometimes you forget the milk.
Sometimes you forget

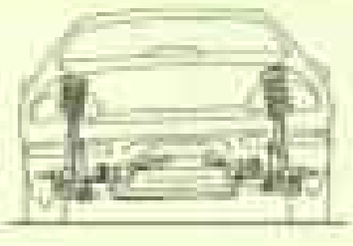
Whether you are going to the store, to work or the dry cleaners, every trip you take in a Concorde LXi inevitably becomes a joyride. With every corner you become lost in the stability of its cab-forward architecture and low-speed traction control. As your thoughts begin to race, Chrysler Concorde LXi's smooth 4-speed automatic, a fully adaptive electronically controlled transaxle, actually begins to learn your driving style and tailors its internal shift patterns for you. Soon your fingers grip the leather-wrapped steering wheel and your mind hums along to the purring sounds of a 225 hp 24-valve V6. Now then, where are you going again?

The Chrysler Concorde was respectfully ranked "Best Premium Midsize Car in Initial Quality" by J.D. Power and Associates.*

For more information about a test-drive you will never forget, call 1.800.CHRYSLER or visit www.chryslercars.com.

Concorde LX starts at $22,060. LXi as shown, $25,785.**

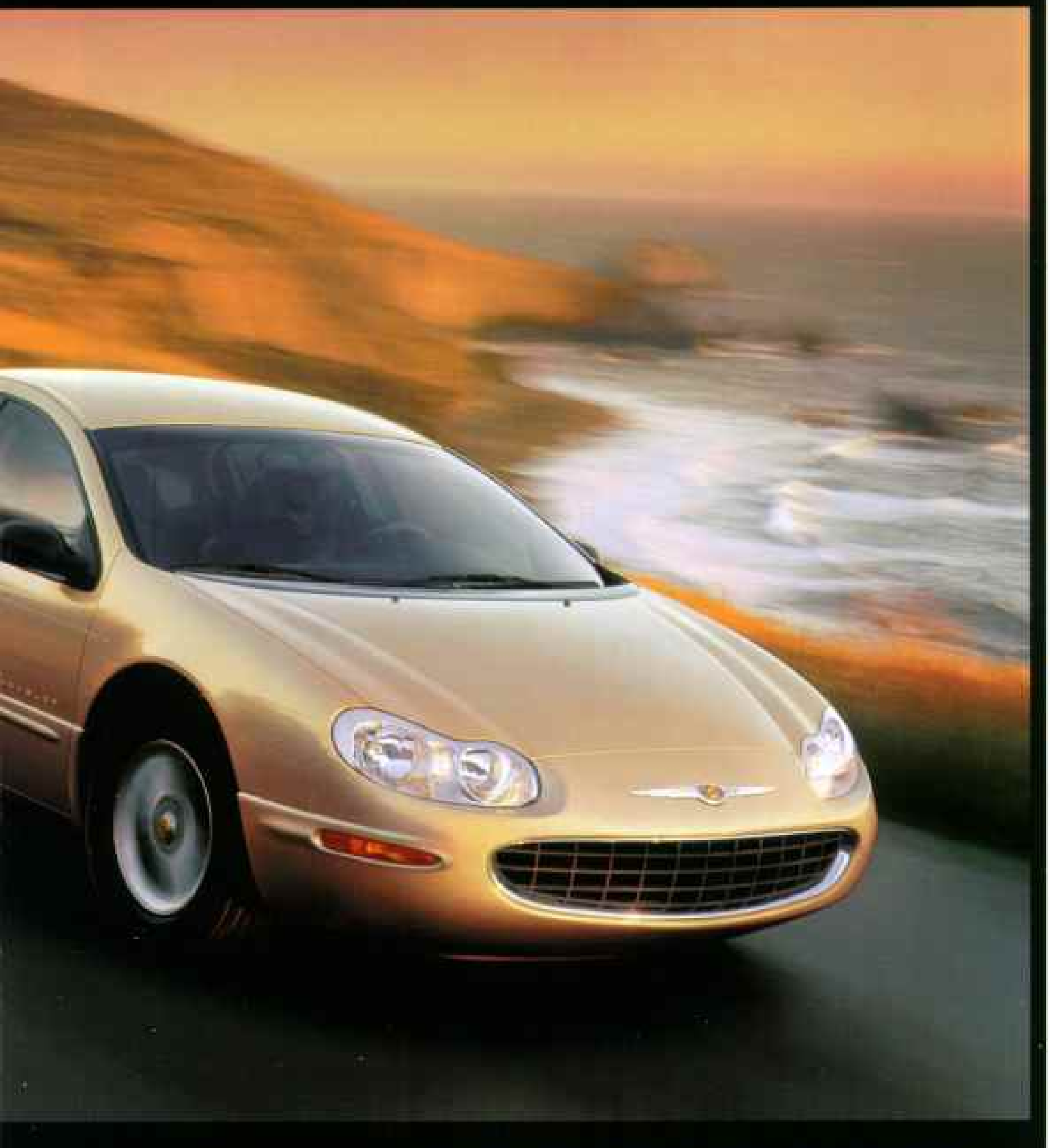
Featuring MacPherson struts up front and a multi-link configuration with Chapman struts at the rear, the exacting geometry



of the Chrysler Concorde's precisely tuned suspension reduces rear end squat under acceleration and front end dive under braking.

*The Chrysler Concorde was the highest ranked premium midsize car in the J.D. Power and Associates 1998 Initial Quality Study 2.SM Study is based on a total of

Sometimes you forget the bread.
the store altogether.



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White Rainbow

After three weeks of skiing around nunataks on the Kaskawulsh Glacier in the Yukon, our group encountered a weather pattern that brought thick ground fog up from the coast every morning, making it impossible for our plane to land and pick us up.

For five days we were trapped. To pass the time, I wrote in my journal and read short stories by Jack London. He wrote about people starving or freezing to death—I've since decided that London isn't the best thing to read when you're stuck on a glacier with a broken radio, not sure when you're getting out.

Just after 7 a.m. one morning we were making coffee, happy to see a very clear sky. As our guide, Sian Williams, and I wondered aloud if we might make it out that day, a rainbow appeared over our camp. I went for my camera and then saw a huge wall of fog coming straight down the glacier. Sian walked toward it on the way to her tent, and I kept shooting. I thought the rainbow would disappear into the mist, but it just turned white.

There's a technical explanation for this: I was actually seeing a second rainbow, white rather than multicolored because of the way fog droplets scatter light. But to me it was ground fog trapped in a rainbow, just as we were trapped in the fog.

ROBERT CLARK

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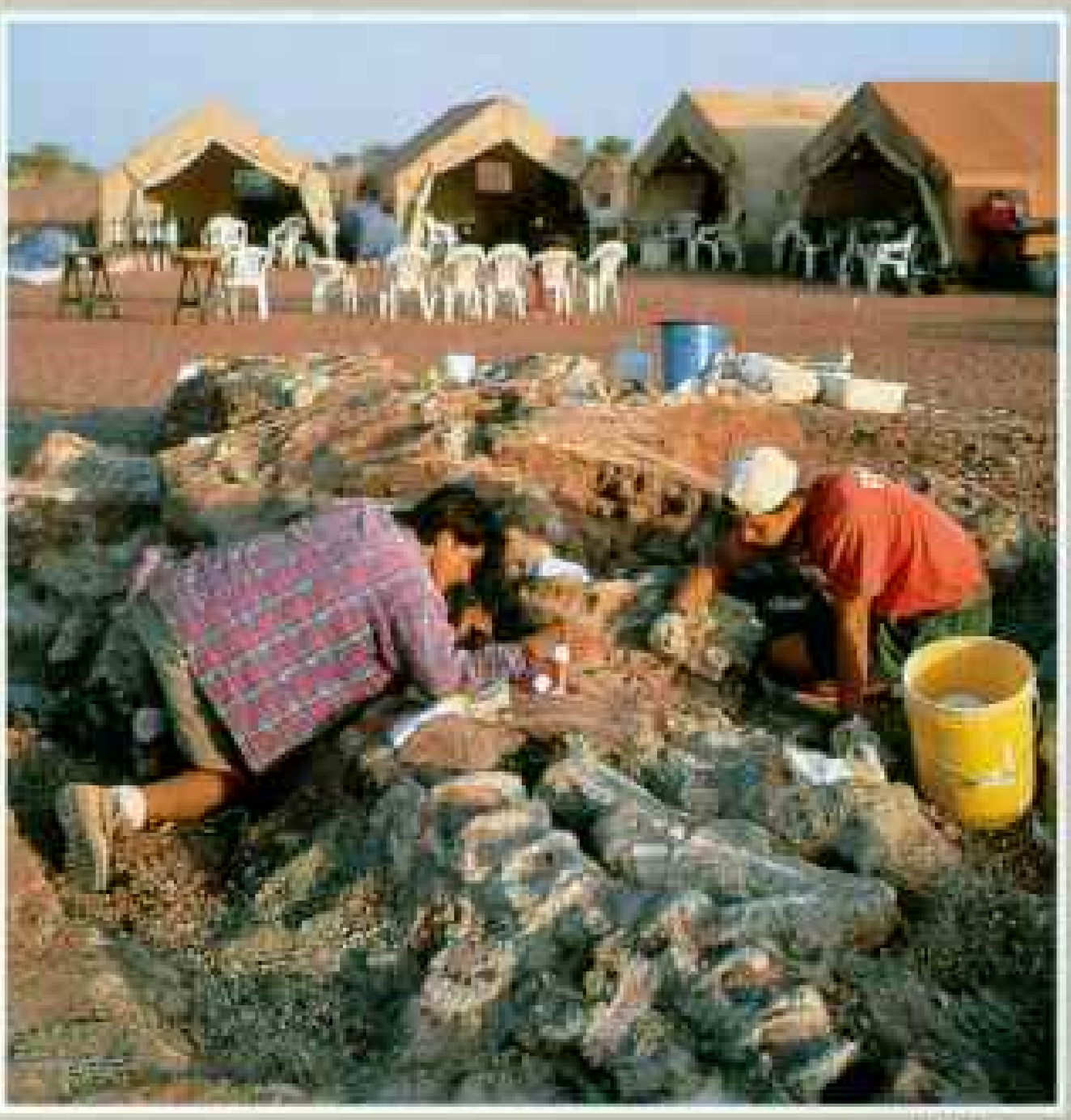
NATIONAL GEOGRAPHIC

OnScreen

■ EXPLORER, DECEMBER 13

Dinosaur Detectives



Longer than a city bus. Weighing close to 50,000 pounds. Each footfall pounding the ground with a force greater than that of an eight-ton wrecking ball. It's an adult sauropod, one of the dinosaur giants and one of the largest land animals that ever lived.

University of Chicago paleontologist Paul Sereno searches for the bones of the beast through the desert heat of the Sahara in EXPLORER's *Dinosaur Fever*. Two colleagues who share the mission, brothers Jeff and Greg Wilson (left), unearth a skeleton of the titanic creature. The quest culminates with a rare prize: a sauropod skull, delicate and easily destroyed, that housed a brain as big as a . . . baseball.

■ EXPLORER, DECEMBER 6

Cossacks Ride Again

Cossacks, an old saying has it, never die in their beds. For centuries those mounted warriors-for-hire rode for Russian tsars. At times they were agents of imperial excess, and at other times they suffered from it. Perhaps descended from Mongol invaders of the 1400s, their ranks grew as they were joined by runaway serfs, mercenaries, and brigands. A new EXPLORER film produced by Sherry Jones examines the past and future roles of these protectors of Russia's frontiers.

Return of the Cossacks was shot in the southern region of Kuban, which borders the Black Sea and Georgia. To the legendary "horsemen of the steppe," soldiering was, and is becoming again, a way of life and death. Cossack units are being officially accepted into the Russian Army, and Cossacks fought for Russia in Chechnya.

Anticipating the day when he too can carry on the warrior tradition, a Cossack youth proudly wears a military tunic.

One meaning of "Cossack" is "free warrior." EXPLORER introduces us to today's Cossacks, who seek to reclaim their history of pride, discipline, and independence.

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■ NGS RESEARCH GRANT

Coelacanths: A Second Site

Gliding through Indonesian waters, Arnaz Mehta Erdmann swims with a strange and ancient fish, a coelacanth (above). Until now only a few hundred were thought to exist, nearly all off the Comoro Islands near Madagascar (GEOGRAPHIC, June 1988). But this coelacanth was found off Sulawesi, an island some 5,400 miles east of the Comoros.

Romance and science married on September 18, 1997, when Arnaz and reef ecologist Mark Erdmann were honeymooning in the Indonesian port of Manado. In the market they saw a cart roll by with a four-foot-long fish—which Mark immediately identified as a coelacanth. "I was intrigued by its strange shape and eerie luminescent green eyes," he recalls.

Erdmann then consulted with colleague Roy L. Caldwell at the University of California at Berkeley. Supported by Geographic research grants, Erdmann interviewed Indonesian fishermen: Did they ever catch such fish? Last July a shark netter delivered a barely alive coelacanth to his door. After being towed behind a boat, the fish revived. It is part of a separate Indonesian population, Erdmann feels certain. Its snout (above left) contains an electroreceptive organ, probably to detect prey. Gold-flecked scales (left) may be unique to this coelacanth population.

The oily, urea-laden fish is virtually inedible, but Erdmann and Caldwell worry about collectors, despite an international treaty that protects coelacanths. Indonesian authorities are working to establish safeguards. Coelacanths evolved about 400 million years ago. They were believed extinct until 1938, when one was caught in a fishing trawl.

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NATALIE J. DEMONG

To Get a Mate, Some Females Kill Rivals' Young

Procreation can involve infanticide among lions, primates, and birds such as these jacanas in Panama. Females keep "harems" of several males to fertilize and incubate their eggs. This female, at right, destroyed another female's eggs, which a male, at left, was sitting on. Now she skitters away with eggshell evidence in her bill. She then mates with the male. "If she didn't destroy the eggs, she would have to wait up to three months until the male finished incubating and caring for the other female's chicks," says Cornell University's Stephen T. Emlen.

New Primate Faces Appear in Brazil

Clad in golden orange fur, with an unusual lack of pigment in its skin, this species of marmoset was found in an area between the Madeira and Tapajós Rivers in Brazil's central Amazonian rain forest in 1993. Christened the Satere marmoset after a group of indigenous people in the area, the squirrel-size monkey does not seem to be threatened, according to Russell Mittermeier, president of Conservation International, which sponsors the ongoing research.

"And we're not finished yet," Mittermeier says, noting that after the Satere find three other marmoset species were discovered there. Since 1990, 11 new monkeys have been found in Brazil, bringing its primate total to 79 species, the world's highest.

CALLITHRIX SATERE-MAUESORUM DE ALMEIDA RODRIGUES

Fly in the Ointment for California Planners

Heir to the snail darter but even smaller? Just like the fish that stalled a dam, the Delhi Sands flower-loving fly has stirred up a hornet's nest of wrath in San Bernardino County, California, 50 miles east of Los Angeles.

Shown here slightly larger than life-size, the fly drinks nectar and hovers like a hummingbird. Development has reduced its habitat to some ten subpopulations on 450 acres of land. Perhaps a few hundred survive. In 1993 it was the first fly named to the endangered species list and caused part of a medical center—then in the planning stages—to be moved 250 feet. Some landowners are designating part of their property as fly preserves. Local officials and the U.S. Fish and Wildlife Service have been negotiating intensely.

TEXT BY JOHN L. ELIOT

RHAPHIOMIDAS TERMINATUS ABDOMINALIS: GREG BALLMER

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NATIONAL GEOGRAPHIC

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■ ONLINE

Eavesdrop on Our TV Crews

Experience the wild, the wondrous, and the just plain weird by going on assignment with National Geographic Television on our website. Boyd Matson, host of EXPLORER, has ventured onto the slopes of a simmering volcano in Mexico and dislocated his elbow in a motorcycle crash in Chile. Producer Lisa Truitt's job required her to spend three summers camping in the Arctic. Field specialist Brady Barr actually enjoyed the chore of wrestling alligators (left). In our new online series you can join crews at shoots around the world and get inside stories fresh from the field at *www.nationalgeographic.com/voices*, a feature sponsored by the telecommunications company Iridium.

Matson

Truitt

Barr

www.nationalgeographic.com/voices

MEI LEN BARR (ABOVE); DAVID EVANS; NGT (TOP); NEIL RETTIG (CENTER); SCOTT SROKA (BOTTOM)

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NATIONAL GEOGRAPHIC

On Assignment

MICHAEL YAMASHITA

■ SOUTH CHINA SEA

Just What He Always Wanted

"I dreamed about being a foreign correspondent when I was a kid," says writer Tracy Dahlby (above, with notebook), interviewing fishing families in Vietnam's Ha Long Bay. Tracy credits growing up in multiethnic Seattle with helping him realize his ambition. "It was early training on how to fit in—how to get past that door on a culture that says 'No Entry'—which a journalist needs to know." His passion for Asia was kindled at age seven, when he reluctantly accompanied his grandmother to the theater. "The film was *Love Is a Many-Splendored Thing*," he remembers. "Not a title to catch a little boy's interest, but the movie opened with an incredible CinemaScope view of Hong Kong harbor. William Holden played this dashing reporter, and I thought: That would be an interesting job."

It has been. Tracy majored in history at the University of Washington, then entered Harvard's East Asian studies graduate program. While studying Japanese in Tokyo, he freelanced for the *Far Eastern Economic Review*. Journalism came naturally. "I discovered I'd rather be out in a real place than reading about it in the halls of academe," he says. After earning his degree, he returned to Japan, eventually heading the Tokyo bureau of the *Washington Post*, then of *Newsweek*, and was managing editor of that magazine's international edition in New York City. In 1988 Tracy left *Newsweek* for documentary filmmaking with partner Alex Gibney. Their first effort, *The Pacific Century*, won an Emmy. Their second, based on David Halberstam's book *The Fifties*, aired on the History Channel last year.

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NATIONAL GEOGRAPHIC
Geoguide

MICHAEL YAMASHITA (BOTH)

Exploring the South China Sea

■ Low, flat, and tiny, the Spratly Islands (pages 8-9) are very different from many other islands in the South China Sea, such as the mountainous, volcanic islands of Indonesia and the Philippines. What accounts for the differences? (Think of the ways islands form.)

■ To get an idea of the size of the South China Sea, examine the map on pages 10-11.

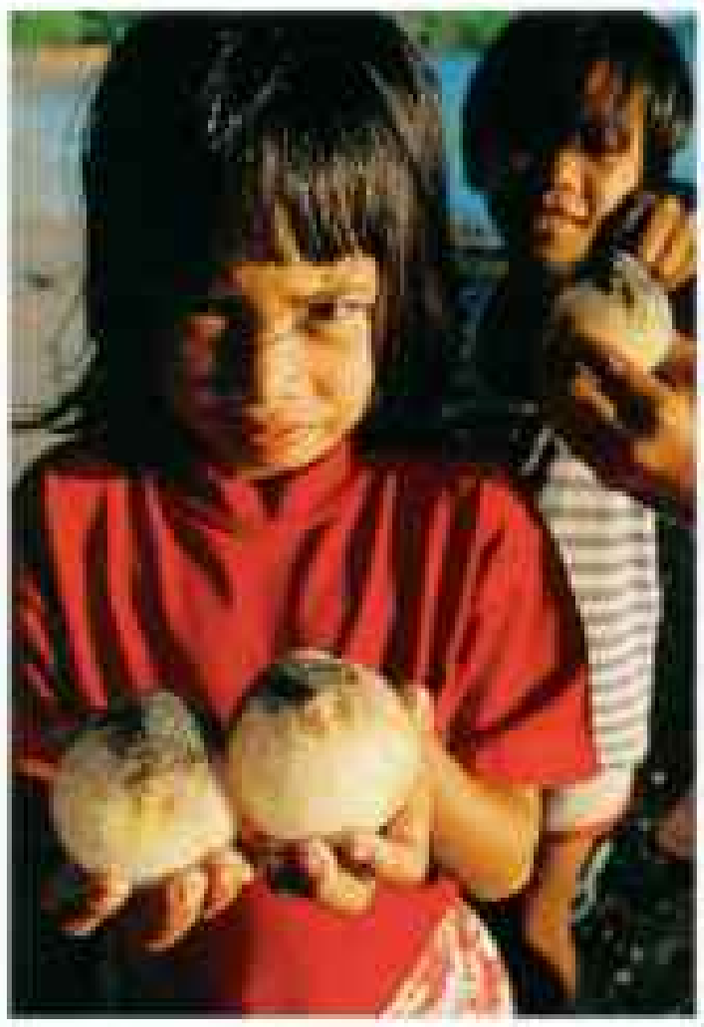
About how far is Haikou, on the Chinese island of Hainan, from Kuching, in Malaysia, on the island of Borneo? (The map scale varies with distance from the Equator, so you'll have to note latitudes. Each degree of latitude equals about 69 miles.)

■ The author mentions riches—fish, oil, gas—that inspire intense competition among countries bordering the South China Sea. Are there ways these countries could share resources peaceably?

■ The boat on pages 4-5 has outriggers that stabilize what would otherwise be a tippy craft. To see how outriggers work, cut a long corner from a plastic milk jug to get a canoe-like shape. See how the piece floats. Then, using wire, attach two pencil outriggers to your model and float it again. Compare its stability.

■ Piracy runs rampant in the South China Sea. Why?

■ Filipino fishermen once made large catches using poison and explosives, but now in some areas they use only hooks, lines, nets, and spears. Why have they changed their methods?

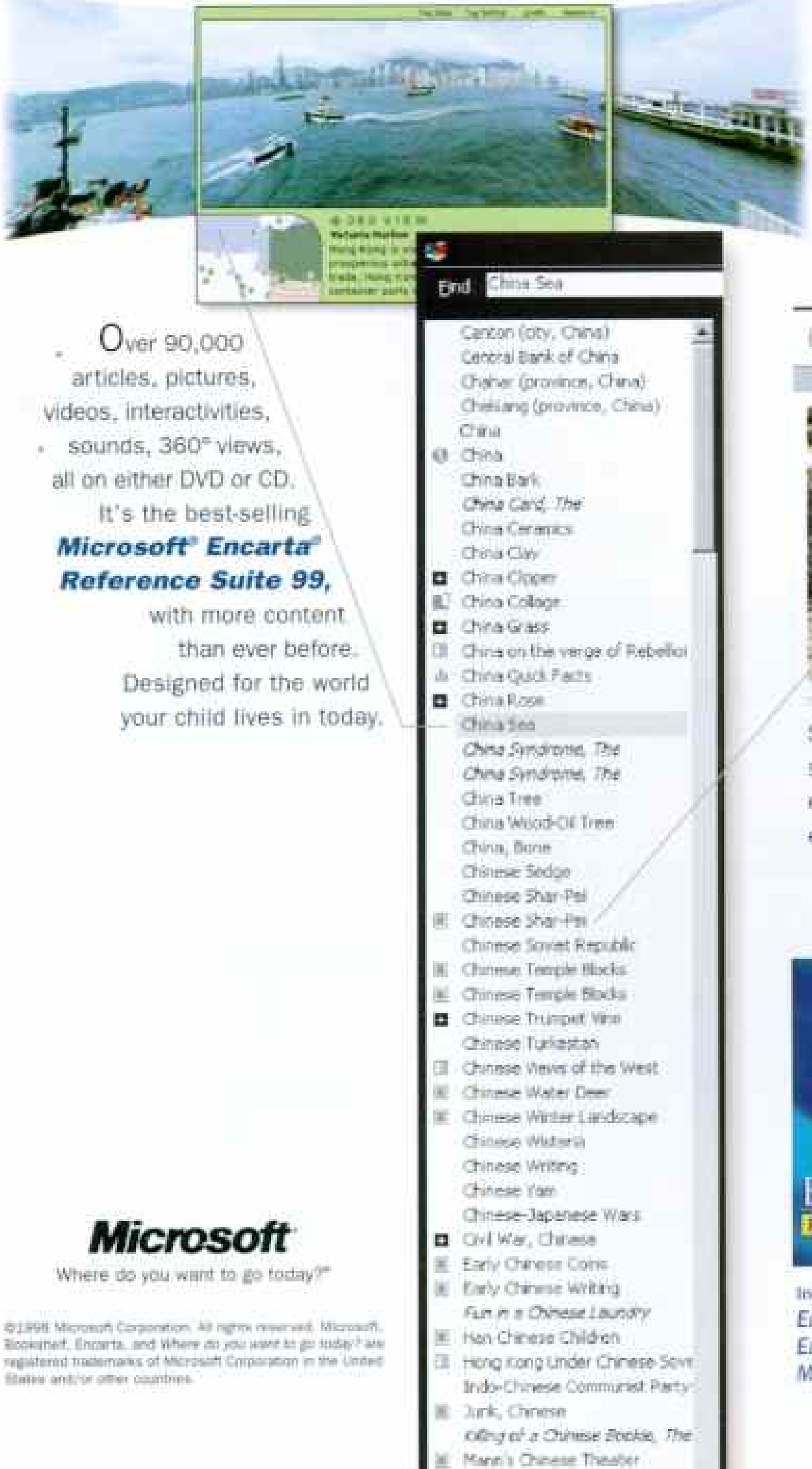


Harvesting sea urchins with a spear and homemade goggles and pulling up coral by hand put money in a Filipino diver's pocket (above). On a nearby beach fresh puffer fish (left) inflate for defense, but that won't save them from the fish market.

This may be the **last page** related to the

China Sea,

but it's not the last word.



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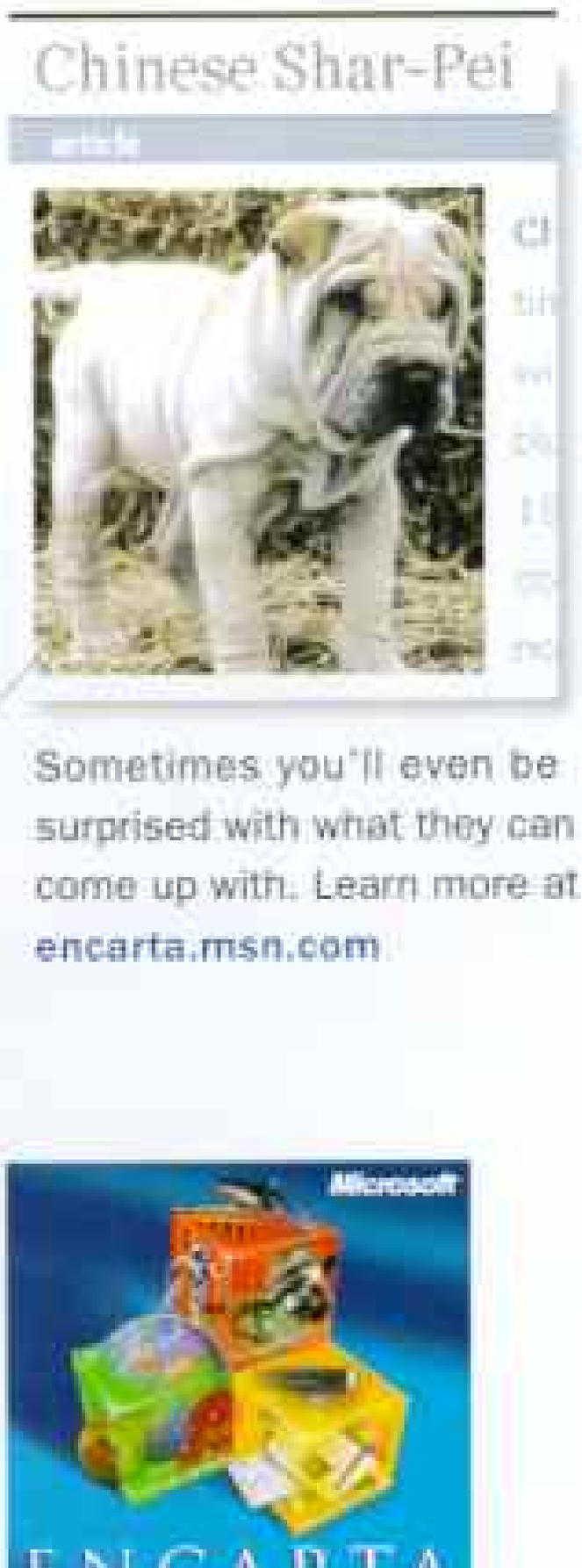

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