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NATIONAL GEOGRAPHIC

August 1986

THERE WAS A TIME when gouging out a prisoner's eyes was considered a worse punishment than killing him. For those of us who are blessed with vision, the loss of our sight probably still ranks as the most terrifying injury possible. Yet approximately 42 million people worldwide—two million in the United States alone—have had to learn to live with blindness.

Fortunately, today many organizations and technologies exist to lighten the burden. Recently I met William Raeder, managing director of National Braille Press, which produces NATIONAL GEOGRAPHIC in Braille for the Library of Congress. He pointed out that society's relationship to the blind person has changed historically—from avoidance to pity, to charity, to the present attitude that permits and encourages independence and self-reliance.

Blind himself, Bill is proof that many overcome their handicap to become dynamic and creative leaders. Under his management National Braille Press provides many services, including books for the blind on using computers, especially utilizing programs that enable computers to talk. A new service that he has pioneered is a line of children's books with Braille added, so that blind parents can read to their sighted children as the children look at the pictures and learn to read the printed words.

Bill's good news about improved tools and technologies is tempered by the fact that the Gramm-Rudman-Hollings legislation has further cut funds of the Library of Congress's National Library Service for the Blind and Physically Handicapped. Currently some 1,250 of you read the GEOGRAPHIC in Braille and 25,400 receive it on records, thanks to this free service of the library. It also provides National Geographic WORLD and 74 other magazines in Braille or sound recordings, as well as 2,000 books each year. National Braille Press is the smallest of the four publishers that produce materials for the Library of Congress.

Cuts in two years of 11 percent of an already modest budget of 36 million dollars seems like kicking someone who's already down. But you can be sure people like Bill Raeder won't take it lying down. They are experts at dealing with bad news.

Wilbur E. Garrett
EDITOR

The Itch to Move West 147

Retracing the Oregon Trail, Boyd Gibbons and photographer James L. Amos recount the adventure of half a million pioneers who struggled west seeking a better life. The latest "Making of America" map supplement, Pacific Northwest, portrays their goal.

Uranus: Voyager Visits a Dark Planet 178

Images beamed to Earth by the Voyager 2 spacecraft, Rick Gore reports, raise as many questions as they answer about the mysterious seventh planet from the sun.

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In a modern-day odyssey, adventurer Tim Severin sets sail in the wake of Homer's classical hero. Photographs by Kevin Fleming.

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After a painful decade of military rule, Argentina looks to democracy and austerity to heal lingering emotional and economic scars. Bryan Hodgson and photographer James P. Blair assess its success.

High Road to "Victory" 256

Joining a Soviet assault on 24,406-foot Pik Pobedy—Peak of Victory—William Garner and Randy Starrett become the first Americans to climb the four highest mountains in the U.S.S.R. Photos by Medford Taylor.

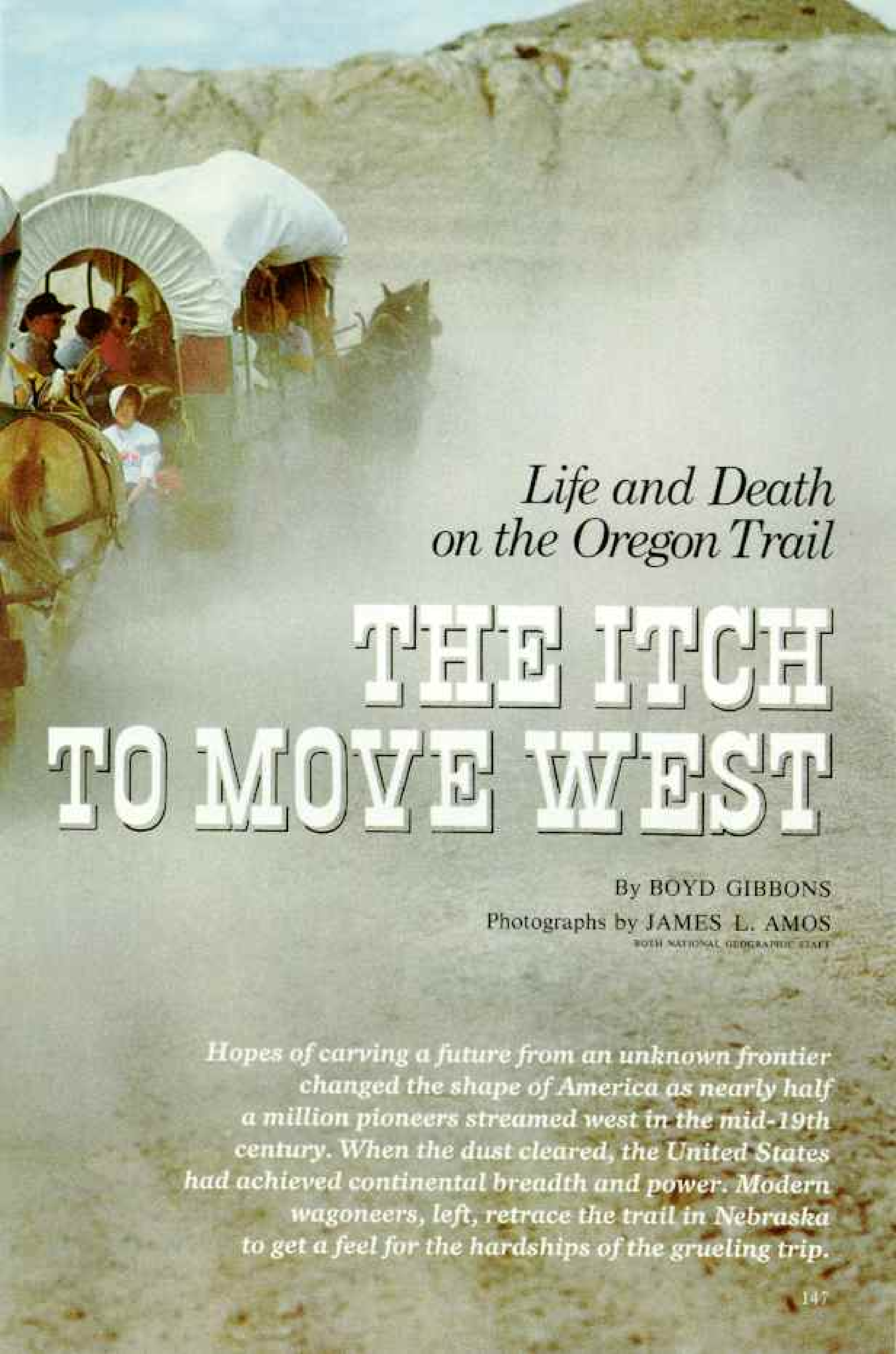
Marauders of the Jungle Floor 273

Tracking voracious hunters on organized raids, Harvard graduate student Mark W. Moffett learns new secrets of the ant world.

COVER: *Heading west, trail-weary pioneers pause for a historic portrait (pages 148-9), preserved in the Denver Public Library.*

THE NATIONAL GEOGRAPHIC MAGAZINE
IS THE JOURNAL OF
THE NATIONAL GEOGRAPHIC SOCIETY
FOUNDED 1888





*Life and Death
on the Oregon Trail*

THE ITCH TO MOVE WEST

By BOYD GIBBONS

Photographs by JAMES L. AMOS

BOTH NATIONAL GEOGRAPHIC STAFF

Hopes of carving a future from an unknown frontier changed the shape of America as nearly half a million pioneers streamed west in the mid-19th century. When the dust cleared, the United States had achieved continental breadth and power. Modern wagoneers, left, retrace the trail in Nebraska to get a feel for the hardships of the grueling trip.



Strain of the trail shows in the faces of pioneers pausing from the routine of travel. A bone-wearying pace of 15 miles a day, often on foot, was required to cross the last mountains before autumn snows, prompting a diarist's



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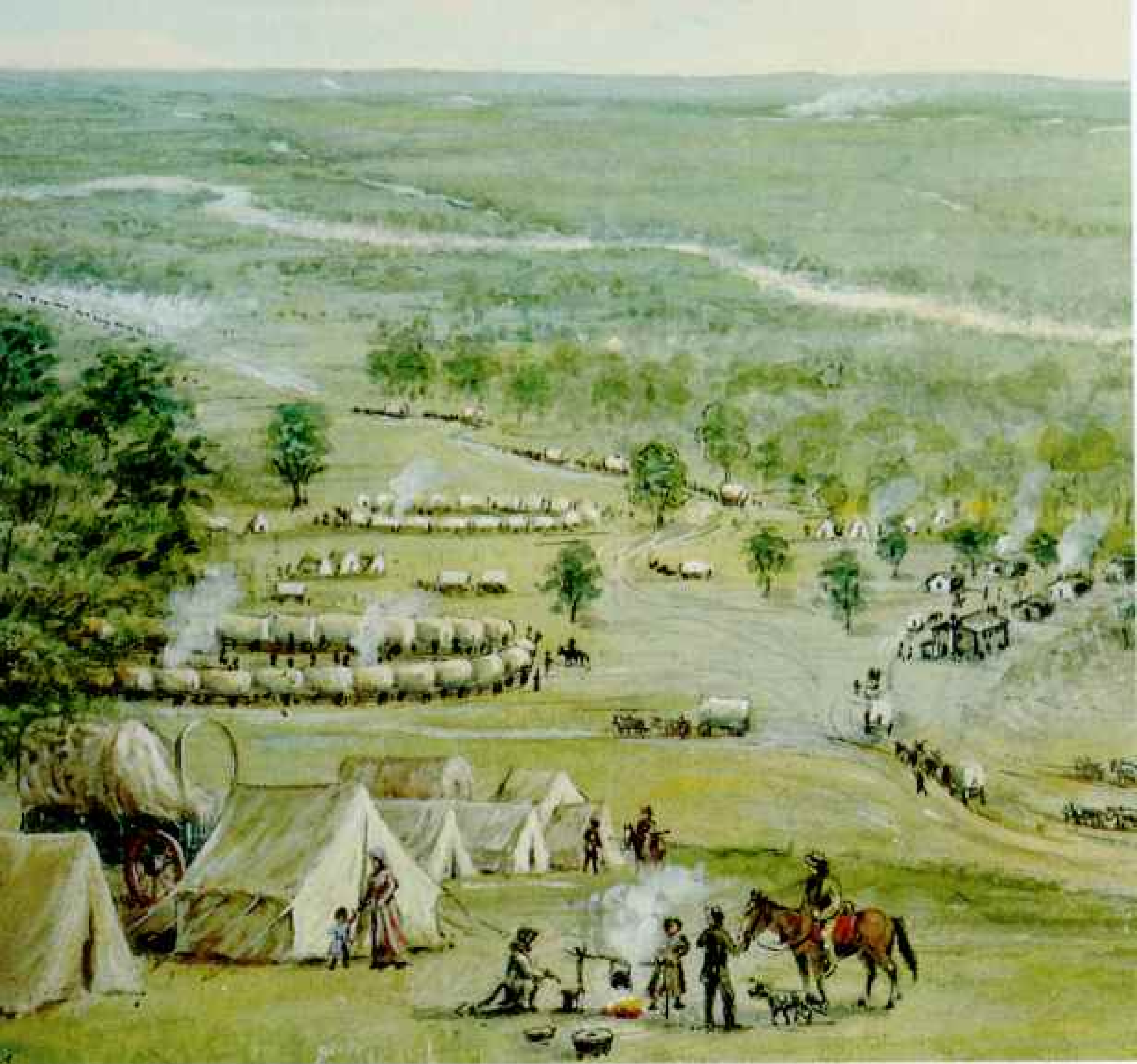
lament, "I am getting oh extremely tired of the journey." Archivists and historians know little about this photograph. If you recognize this family or have any information on the picture, please write Members Forum.



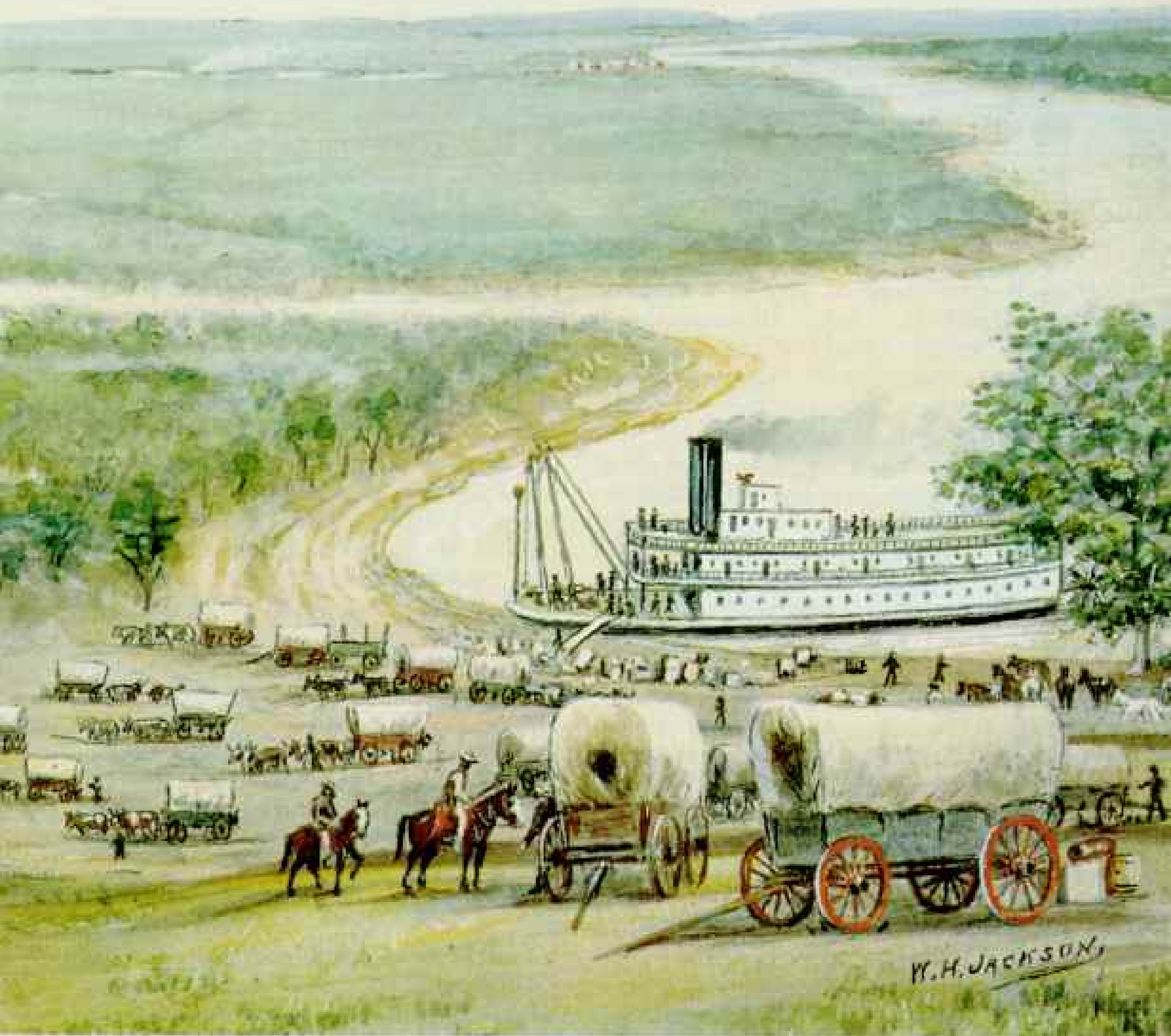
Hard miles had taken a toll of pioneers, wagons, and animals by the time they reached western Wyoming's arid lands – and they still had a long way to go. As he passed



Plume Rocks, above, near South Pass, forty-niner J. Goldsborough Bruff "Counted 46 dead oxen. . . . it is difficult to find a camping ground destitute of carcasses."



Jumping-off places for the great adventure, Westport Landing (above) – now part of Kansas City – and other Missouri River towns were bustling centers for outfitting wagon trains. Pioneers from the East often arrived by riverboat in early April, then camped on the outskirts while waiting for grasses to grow on the plains to feed their animals. The frenzy of activity moved one observer to write, “it was a great life . . . it was life as at a fair.” Such exuberance soon faded. Some 60 shakedown miles west lay Lawrence, Kansas (right), founded in 1854, here mushrooming in the 1860s.



PAINTING BY W. H. JACKSON, COURTESY NATIONAL PARK SERVICE (BOVET); KANSAS STATE HISTORICAL SOCIETY, TOPICKA



AS A MAN WHO WALKS maybe 20 feet for his morning newspaper, I was more than a little curious to learn something of the pioneers who trekked a couple of thousand miles on the Oregon Trail, largely on shoe leather. During the 1840s, '50s, and '60s nearly half a million people trudged out of the shade of settled America and west across the treeless plains to Oregon, California, and Utah. They called themselves emigrants, for until about 1847 they were leaving the United States—Mexico owned California and Utah, and the British still clung to Oregon.

The emigrants rode wagons or horses, or pulled handcarts. A few pushed wheelbarrows. Most walked—2,000 miles to the Pacific. They were on the trail in the middle of nowhere as long as six months and suffered appallingly. Many turned around and went home. There were a thousand ways to be maimed, fall ill, or die—cholera, gunshots (usually accidental), drowning, an occasional arrow, stampedes, wagon wheels. Absalom Harden paused somewhere on the prairie on his way to Oregon in 1847 and wrote in his diary: "Mr. Harveys young little boy Richard 8 years old went to git in the waggon and fel from the tung . . . the wheals run over him and mashed his head and Kil him Ston dead he never moved."

Almost overnight the survivors transformed the United States from half a country into half a continent. Well before 1869, when the transcontinental railroad was completed, the trail migration had peaked. Rarely in history had so many people picked up and gone so far over so vast a wilderness.

Hollywood later distorted this epic with cellos and French horns, and by the time I got there, the trail had its filling stations and motels with coin-operated vibrating beds. Last year on Memorial Day I was driving up the Platte River Valley in Nebraska—the main overland corridor—fiddling with the radio. It had one of those "seek" buttons that automatically seeks out every person within

a thousand miles who sings through his nose. Eventually it landed on a broadcast of the Indianapolis 500. There I was on the Oregon Trail in an air-conditioned rent-a-car listening to a bunch of men in fireproof jumpsuits whang around a racetrack fast enough to cover a quarter of the Oregon Trail in a few hours. I drove into a motel.

THIS GREAT restless upheaval of emigrants came to represent the pioneer spirit. We may still have that spirit, but as I brushed my teeth, I had trouble seeing the pioneer in the mirror. Travel in the U. S. has become so comfortable that the distance between Willie Keil and me could be measured in light-years. Willie traveled to Oregon in 1855 flat on his back, pickled. His father had promised to take him, but Willie died, so Dr. Keil filled a zinc casket with alcohol, put Willie in, strapped it to a wagon, and clucked to the mules.

When the emigrants reached the worst of their hardships, they would reach for a metaphor—they would say, "Today I have seen the elephant." I had yet to see footprints.

In 1850 Clark Thompson traveled to California's goldfields with the elephant's foot on his back. "I have seen the spot that tries men's souls. . . . looked starvation in the face. . . . I have seen men on passing an animal that has starved to death on the plains, stop and cut out a steak, roast and eat it and call it delicious. . . . Have been cheated and deserted by pretended friends and have been abused by those I have accommodated. . . . I have gone through all this to prove to myself that California is one of the grandest humbugs of the age. . . . You ought to consider yourself one of the luckiest of men in not embarking in this speculation."

The extent so far of my hardships on the trail had consisted of washing melted chocolate out of my pajamas, after falling asleep on one of those mints that motel owners insist on placing on your pillow. I was experiencing elephant guilt.


Americans had always itched to move on.

"The loveliest . . . country on earth," gushed promoter Hall Jackson Kelley and issued his 1831 treatise on Oregon, lower right—country that he had never seen. Such widely read promotions urged pioneer farmers to take the long road west, where Kelley promised land so rich that "vegetables, grain, and cattle will require comparatively but little labor."

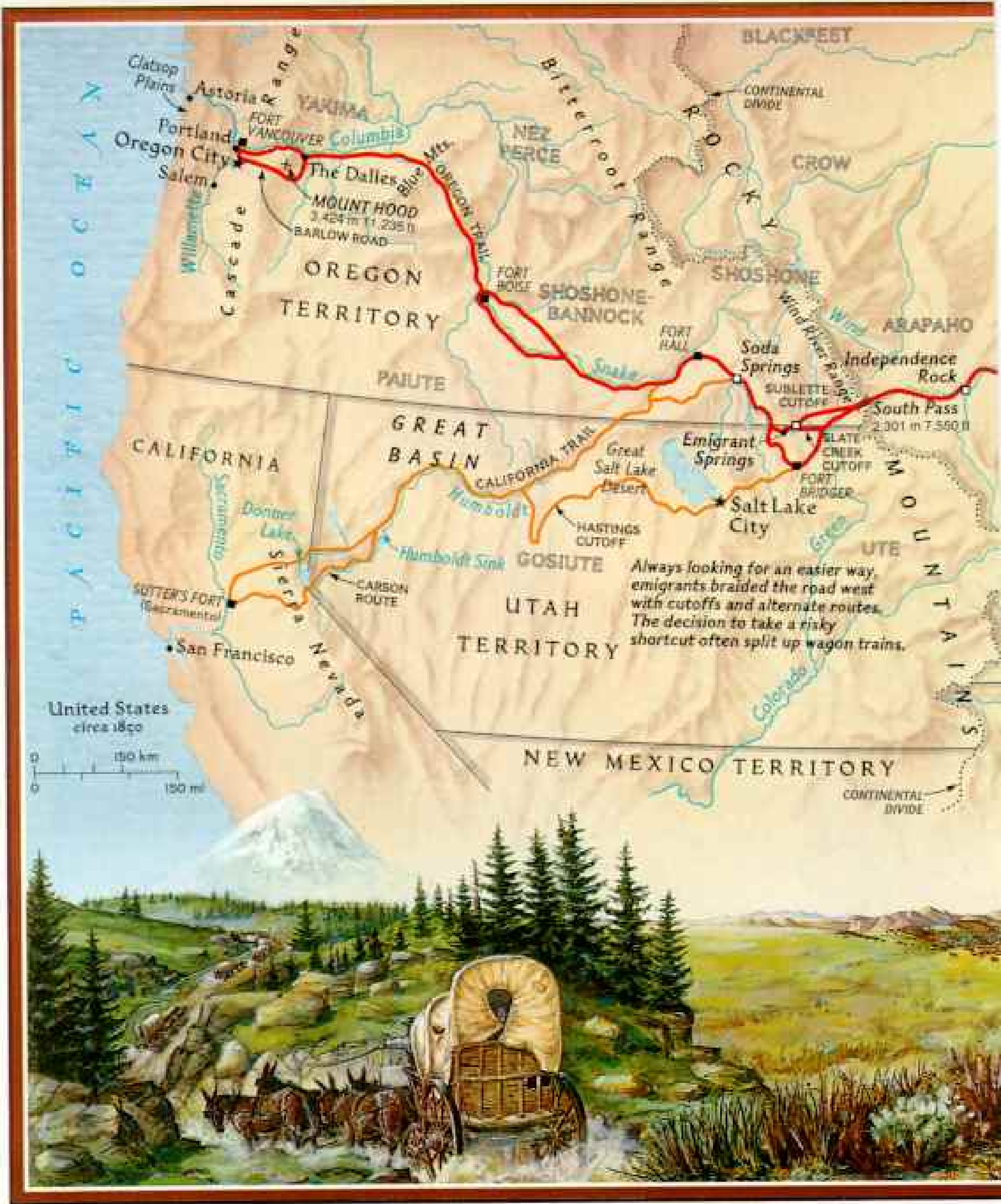
PHOTOGRAPHS AT THE MERCANTILE LIBRARY, ST. LOUIS, MISSOURI



THE
EMIGRANTS' GUIDE
 TO
OREGON AND CALIFORNIA.
 CONTAINING A FULL AND COMPLETE LIST OF A PARTY OF
 EMIGRANTS.
 A DESCRIPTION OF OREGON,
 AND A DESCRIPTION OF CALIFORNIA,
 WITH A DESCRIPTION OF THE COURSE TO BE TAKEN BY
 ALL EMIGRANTS WHOSE ROUTE IS BY THE
 PACIFIC OCEAN TO THE MOUNTAINS OF
 THE ROCKIES OR MOUNTAIN
 RANGE.
 PUBLISHED BY GEORGE W. WOODS,
 1842.

PICTORIAL EDITION!!
 LITH.
ADVENTURES AND TRAVELS
 IN
CALIFORNIA.
 BY T. J. FARRIS,
 AND
 CONQUEST OF CALIFORNIA
 AND
 TRAVELS IN OREGON.

 1852
 NEW YORK:
 PUBLISHED BY SAITS & CORNISH,
 87, LOUIS, MO. — JAY DEN & WAGGONER,
 1852.

GENERAL CIRCULAR
 TO ALL
 PERSONS OF GOOD CHARACTER,
 WHO WISH TO EMIGRATE
 TO THE
OREGON TERRITORY,
 EMIGRANTS ARE ADVISED OF THE CHARACTER AND
 ADVANTAGES OF THE COUNTRY; THE ROUTE
 AND THE MEANS AND OPERATIONS BY
 WHICH IT IS TO BE PERFORMED.
 AND
 ALL NECESSARY DIRECTIONS FOR RECORDING
BY EMIGRANT.
 HENRY J. KELLEY, District Agent
 BY ORDER OF THE AMERICAN SOCIETY FOR ENCOURAGING
 THE SETTLEMENT OF THE OREGON TERRITORY.
 INSTITUTED IN BOSTON, A.D. 1829.
 101545
 CHARLESTON:
 PRINTED BY WILLIAM C. WHITTAKER,
 N. B. & C. WALKER—1852.
 1852.

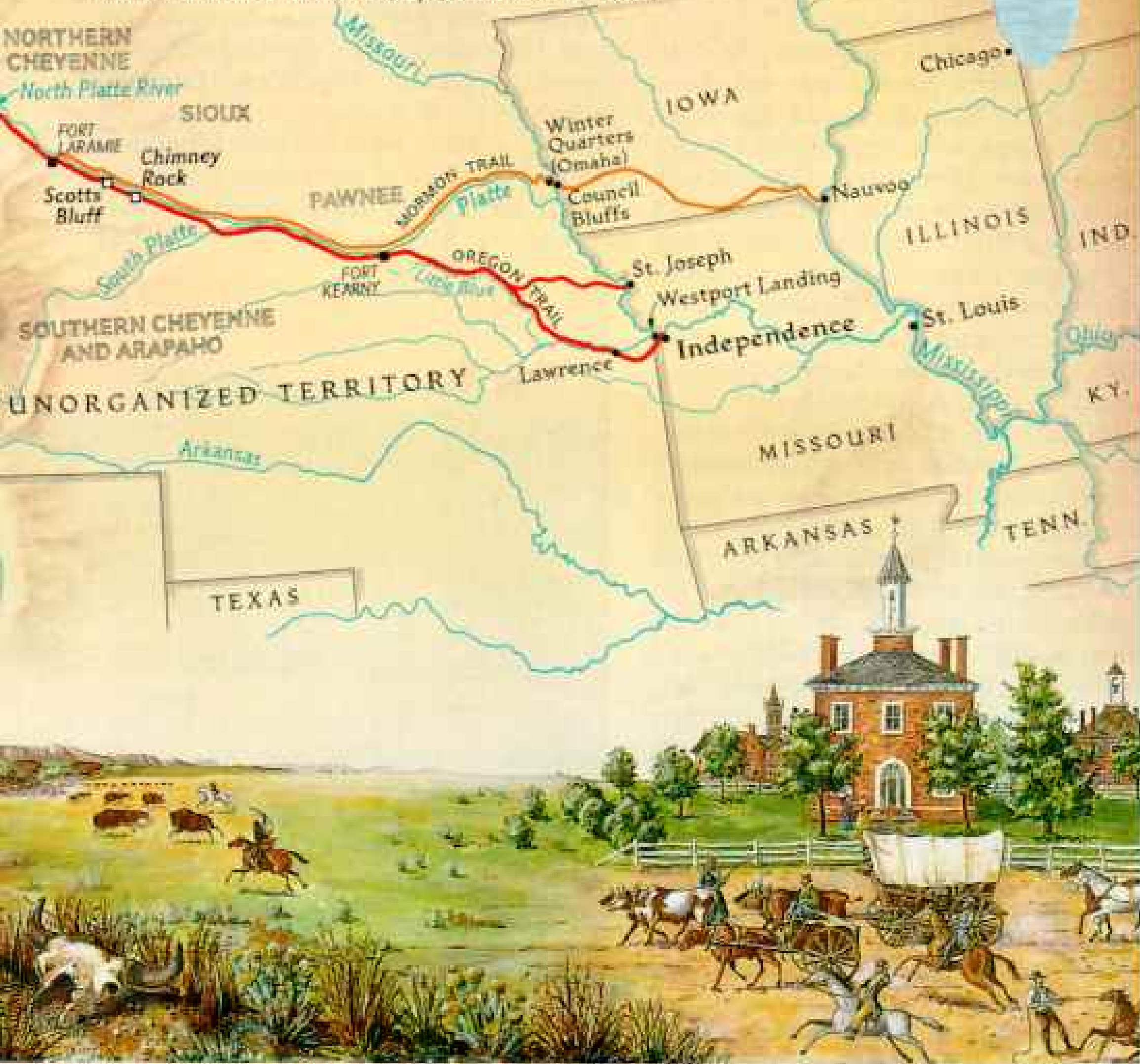


They no sooner landed at Jamestown than they pulled out of Tidewater and plowed on the Piedmont. They hauled out of the limestone valleys and cherty hills and poured into the canebrakes of Kentucky. Leaving New York, going to Ohio. Leaving Ohio, going to Indiana. Leaving Indiana, heading for Missouri. Pushing the frontier west by fits and starts into the setting sun. Moving on was an American habit.

But by 1840 the receding frontier had come to an abrupt halt at Independence, Missouri. Here the trees thinned, settlement ended, and ignorance and fantasy began. According to maps of the time, beyond lay the Great American Desert, populated by Plains Indians, who were welcome to it. Beyond the plains were the Rocky Mountains. Since the Lewis and Clark expedition to the Pacific in 1804-06, knowledge

THE OREGON TRAIL

The 2,000-mile path west was actually blazed west to east in 1812-13, when fur traders found South Pass, a broad saddle-like break in the Rockies; later most emigrant routes shared this natural gateway to the West. The main road to California turned south in Idaho, while the Oregon Trail led to The Dalles, where pioneers either rafted the Columbia or continued overland to the Willamette Valley. The transcontinental railroad eclipsed the trail in 1869.



MAP: CARTOGRAPHIC DIVISION; PAINTING BY CHRISTOPHER A. BLEIN; DESIGN: ERIC S. CHANDLER; RESEARCH: WENDOLITE B. HINDS; SUPPLIES: J. BUTTS; PRODUCTION: BARBARA CARRIGAN

of the West had floated back fur by fur.

Before Lewis and Clark the geography of the West had been obscured by the comforting myth that the Rockies were but a single ridge easily surmountable by paddling a canoe up its eastern drainage, making a short portage over the top, and gliding to the Pacific Ocean. Lewis and Clark had floundered through deep drifts of this myth in the Bitterroot Range.

Trappers following Lewis and Clark up the Missouri River into the Rockies discovered that the Blackfeet enforced injunctions against trespass with imaginative methods of torture. The trappers were realists—forget the Missouri. They found a better way into the Rockies to the south, at the end of the Wind River Range, where the Continental Divide (the border of Oregon Country) flattens into a wide plain of sand and

sagebrush. The trappers called it South Pass. It became the wagon ramp through the Rockies, thus the Oregon Trail.

Beyond the Rockies, beyond the Great Basin, were California and Oregon Country—the source of the Great Itch. The emigrants aimed to scratch it. “My blood ran hot to be on the frontier,” wrote James Clyman, trapper, explorer, overlander to the Pacific. “I just wanted to see the country.”

But to *Oregon*? To *California*? In 1840 gold in the Sierra Nevada was unknown. This would be no short wagon ride to the next settlement, with stops at farmhouses for fresh butter. There was nothing out there from Independence to the Willamette and Sacramento Valleys: nothing, that is, but the Pawnee, Sioux, Shoshone, Bannock, and a jillion buffalo. Why abandon fertile Illinois for six months of exhaustion and shinsplints, with the prospect of plowing only a grave in the Great American Desert?

Why not? Life was grim on the frontier. The valleys, particularly the Mississippi, were still undrained and swampy, and many were gripped by “the ague”—the aches, chills, and fevers of malaria. The few roads were bogs. Taxes were high, the hangover of a canal-building binge. By the late 1830s the country was in its worst depression yet, and farmers were hip deep in unwanted pigs. (Steamships were burning bacon to fire their boilers.) The best frontier land was already tied up by the early comers. By 1840 nearly 400,000 settlers had piled into Missouri, almost tripling its population in ten years. They wanted elbowroom. They were ripe for the promoters.

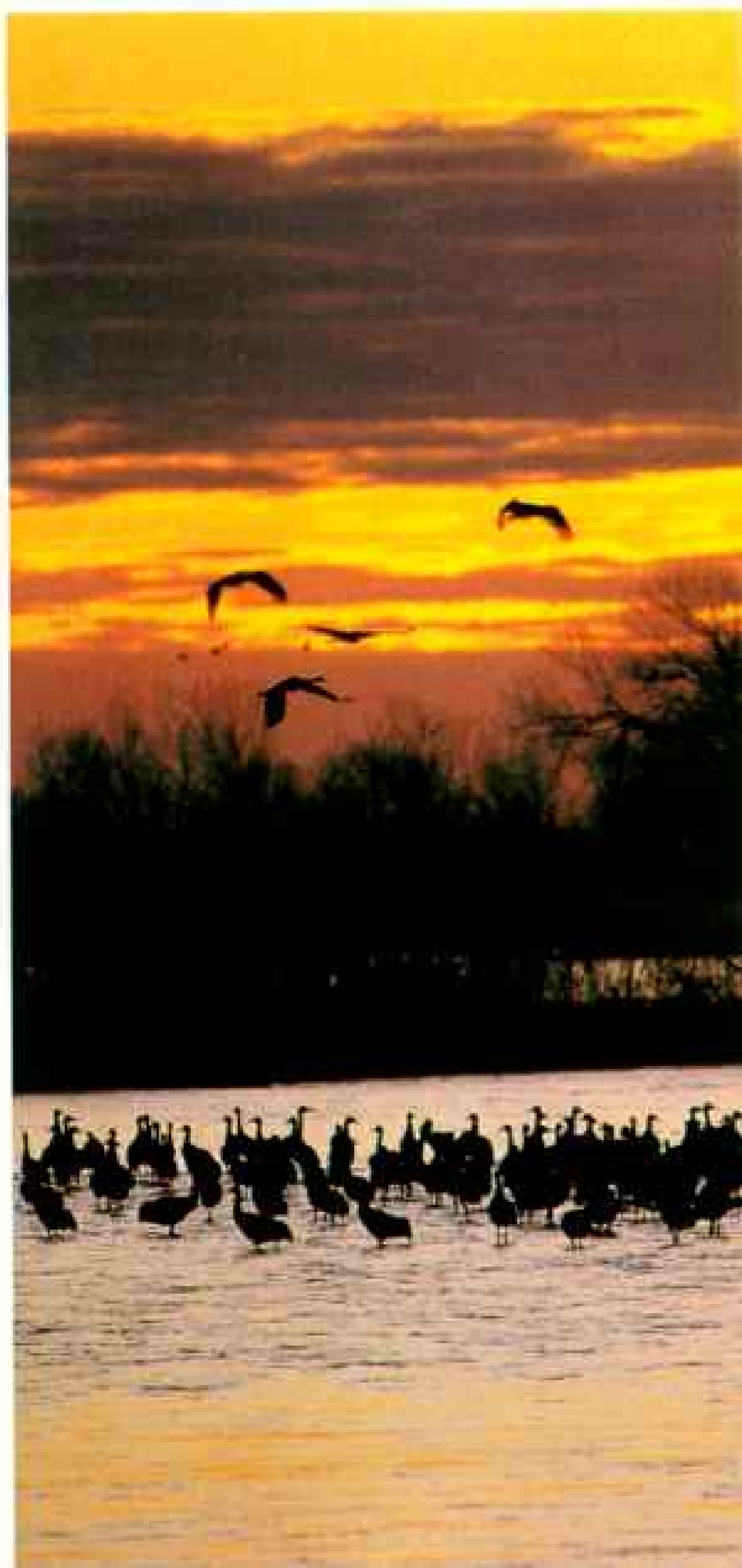
Propaganda out of the golden West sounded sweet—gentle winters, no ague, endless free land. Since the 1820s Yankee traders had been sailing back to New England from California laden with cowhides and exaggeration. A trapper admitted knowing of only one man getting the ague on

the Sacramento, “. . . and that was a matter of so much wonderment,” he said, “that they went eighteen miles into the country to see him shake.”

In the mid-1830s Protestant missionaries had hauled their piety and good intentions to the Indians on the Columbia and Willamette. (The Indians greeted this with the kind of skepticism a loan officer might reserve for a wino wanting to invest in Bordeaux futures.) The missionaries, wanting company, took to the press and the pulpit and thumped the tub for the Willamette.

Emigration societies had been forming in the Midwest, full of patriotism to bury the British presence in Oregon under the wheels of American wagons. They waved the flag

“Too thick to drink, too thin to plow” was a popular view of the Platte River, the trail’s route across Nebraska, where sandhill cranes roost today (right). With few other sources of water, pioneers often drank the “nasty, filthy stuff,” “warm and muddy, causing diarrhoea.” Other hazards awaited at river crossings (above) where many drowned or lost wagons.





PAINTING BY W. H. JACKSON, COURTESY NATIONAL PARK SERVICE (ABOVE)



and spread the word. Ague on the frontier was exceeded by "Oregon fever," soon to be inflamed by a New York journalist who coined the slogan of U. S. expansionism by asserting "our manifest destiny" to over-spread the continent.

THE FIRST WAGON TRAIN of emigrants headed out of Independence on the Oregon Trail in 1841, later dividing to California and Oregon. In '46, seeking sanctuary from the mobs, Brigham Young led the Mormons out of Illinois to Winter Quarters (now part of Omaha), and the next year to the Great Basin.

In 1849 the news of gold in California turned an emigration into a mad rush. By 1855 some 200,000 emigrants, mostly men frantic for gold, swarmed onto the trail. One of them, William Frush, stopped at Fort Laramie (Wyoming) and talked with Kit Carson. Carson told him to go by way of Oregon, as the hordes would leave hardly a blade of grass on the Humboldt River (Nevada). Frush examined the fort register. Ahead on the trail were more than 30,000 emigrants, 7,000 wagons, and 50,000 oxen, mules, horses, and cattle. Frush chose Oregon.

Most of the emigrants traveled the same overland corridor—the Platte River Valley of Nebraska—across the plains and into the Rockies, taking the Sweetwater to South Pass, before splitting off. The Oregon Trail, following the south bank of the Platte, sticks in the national memory because the missionaries stuck it there. The Mormons tended to keep to the north bank, so it was called the Mormon Trail, even though it was soon overwhelmed with Californians. The trail names got lost in the dust, for there were Oregonians and Californians on both sides of the Platte, and they often changed their destination later anyway.

Beyond South Pass the emigrants faced a high desert to the Green River—the Mormons turning off to Utah—then the long, hot arc of the Snake River Plain across all of southern Idaho.

From the Snake the Californians peeled off for the Humboldt, and eventually the Sierra Nevada. The Oregonians headed over the Blue Mountains to the Columbia River, at The Dalles, where the Columbia shot



down a gutter of basalt and breached the Cascades. In rafts and canoes they ran the treacherous river to the Willamette. Or they detoured into the forest around Mount Hood on a boggy trail of roots, snags, and precious little grass that eventually pitched them down so steep a mountain that they had to lower wagons by ropes snubbed to trees. When they finally staggered into the Willamette Valley, it was usually raining.

Abner Blackburn never stopped scratching the itch. He joined the Mormon exodus across Iowa, driving an oxteam to Council Bluffs. There Abner enlisted in the Mormon Battalion and marched south into the Mexican War. Mustering out, he worked his way north to Wyoming to trail the Mormons into Salt Lake. Then he returned to Missouri just as his parents were leaving for Oregon, rode with them into the Rockies, heard of the



Gathered on historic ground, two distinctly different caravans of history buffs circle their wagons on the trail near Bayard, Nebraska. Pioneers sometimes closed ranks at night to corral livestock or protect against Indian attack.

gold, left his parents, and departed for California. Some itch.

The crossing was different for everybody—good years and bad ones, high river crossings and drought. John Lewis arrived at South Pass in late July 1852, ready to party. “There was about 100 wagons here & we got the girls together & had a fiddle . . . and another sutch a party was never got up all for Oregon. . . . O that I cold all ways be on the plains. . . . love is hotter her than any whare . . . they love with all thare mits & some times a little harder.”

In December 1847 Loren Hastings arrived in Portland—a few log houses, fir stumps in the muddy street, “a gloomy and

strange appearance.” He met a friend from Illinois, who had buried his wife on the trail. Hastings wrote home. “I look back upon the long, dangerous & precarious emigrant road with a degree of romance & pleasure; but to others it is the grave yard of their friends.”

EMIGRANT GRAVES embroidered the trail by the thousands. On a hill in the Little Blue River Valley near Fairbury, Nebraska, I came on a granite marker. In 1849 George Winslow died of cholera and was buried here.

In Massachusetts he had helped organize the Boston-Newton party to travel to California and dig for fortune. They were

disciplined and temperate men, one of the few parties that made it to the West Coast without splintering into factions. After parading down State Street with a band, they left Boston in their own private railcar for Buffalo. Like thousands of other emigrants, they steamed across Lake Erie to Sandusky and went by train to Cincinnati, where by steamship down the Ohio and up the Mississippi and Missouri they got to Independence. They were just beginning.

The trick was to jump off from outfitting

"is oxen. . . . from three to five years old, thickset and compactly built, though not too heavy." Oh, yeah?—mules are faster. Oxen are stronger. You can pack out on a mule if the wagon has to be abandoned. You can eat an ox if provisions give out. You can eat a mule too. George Winslow's party bought mules, and wagons.

Big Conestoga wagons had hauled the first wave of settlers over the Appalachians but were too cumbersome for the distances and mountains of the Oregon Trail. The em-

igrants used small farm wagons. They often painted their wagon boxes slate blue, the wheels red, and they stretched white canvas over the bent hickory bows.

FROM THE PRAIRIE George wrote his wife, Eliza, "My health was never better than now. . . . had the good luck to draw the *best* waggon. . . . the top has two thicknesses of covering so that it will be first rate in rainy weather." He had bought an India-rubber air mattress and, like every camper since, found out what it would hold. "I always find myself in the morning—or my *bed* rather, flat as a Pan Cake as the *darned* thing leaks just enough to land me on Terra Firma by morning

—it saves the trouble of pressing out the wind, so who cares?" He advised Eliza to send her letters to Sutter's Fort, California. "Just imagine to yourself seeing me return with from \$10,000 to \$100,000."

Ten days out George's brother-in-law, David Staples, was looking for privacy: "Today I have been taken with the diarea, common now on the prara, and have been kept quite busy attending to the wants of nature, having 25 passages today. . . . George Winslow was taken with diarea and vomiting, this evening feels some better. . . . we met a party returning, haveing lost a



Tools of war and navigation—along with plowshares and water jars—traveled to Utah in 1847 with Mormons under Brigham Young, who owned this telescope and tool chest (facing page). Mormon William Clayton's journal, foreground, features a sketch of Nebraska's famed landmark, Chimney Rock (above).

towns—Independence, St. Joseph, Council Bluffs—as soon in spring as prairies were green in hopes of crossing the Cascades or Sierra before the snow. After 1846 you had only to whisper "Donner" to keep them moving. The Donner party, delayed in the Wasatch Range, staggered across the hell of the Great Salt Lake Desert into exhaustion, cannibalism, and death in Sierra snows.

The emigrants were moving on animal power that needed grass and water over vast stretches of country that had little of either. "The best team for this journey," B. Schmoelder wrote in his *Emigrant Guide*,



ARTIFACTS FROM THE MUSEUM OF CHURCH HISTORY AND ART, SALT LAKE CITY

The rush for gold beginning in 1849 jammed the Oregon Trail with fortune hunters bound for California. Vermont native Milo J. Ayer (below), a 29-year-old carpenter with the Boston-Newton party, struck gold the following year and went on to establish a stamp mill. Like thousands of others, Ayer left his mark on Independence Rock (bottom). To stay on schedule, travelers sought to reach this landmark overlooking Wyoming's Sweetwater River (right) by the Fourth of July.



PHOTOGRAPHED AT SOCIETY OF CALIFORNIA PIONEERS, SAN FRANCISCO (AR061)





husband, father, and Friend of Cholera.”

Cholera epidemics raged during the peak gold-rush years, when tens of thousands of emigrants jammed up on the prairie. Bacteria thrived in crowded campgrounds, which were often fetid sloughs of garbage and excrement from the hordes of people. Cholera killed by violent dehydration—diarrhea, vomiting, sweating. Your skin was like clay. Pluck it and it would not snap back.

Being in a hurry, emigrants often laid their dead in shallow graves that wolves and coyotes dug up. One traveler came upon a woman's head protruding from a grave, a comb still in her hair. The dying might be left with a burying party of “watchers,”

or abandoned altogether. M. L. Wisner “passed a man by the side of the road who had been attacked by cholera, when his company, panic struck, inhumanly left him to die one hundred and fifty miles from any house. He had a sack of provisions by his side, and lying on the ground, could hardly speak. . . . he could not be moved . . . all I could do for him was to bring him one of my pint tin cups full of water. . . . we learned by a man on horseback the next day, that he had recovered. . . . Much will be the suffering no doubt on this road.”

On the morning of June 8, 1849, with the company gathered around him, George Winslow died. “The company feel it hard,”



Trail detectives Karen and Chester Buck (left) collect items lost or abandoned on their land in western Wyoming. At the Parting of the Ways (below), emigrants who bore right on the Sublette Cutoff bypassed Fort Bridger and shaved 50 miles off their journey toward Soda Springs, Idaho, where a golf course preserves a swale worn by thousands of wagons (right).

wrote Staples. "Uncle Jesse and I . . . found a large sandstone and we engraved his name and where from and age on it in good deep large letters. . . . Each man deposited a green bough as a token of respect and the first earth was put on him at six o'clock."

I stood on the hill reading Winslow's headstone. Four swales—remnants of wagon ruts—crossed the hill. George Winslow was 25 years old. A few weeks before his death Eliza had given birth to their second child.



TO THE EMIGRANTS the Platte Valley was like an endless, monotonous play, with only brief and violent intermissions of tympanic hail. It was hot, "a . . . sleepy drowsyness has invaded the camp." They pulled down their hats and fell asleep with the reins in their hands. Oxen stopped in the trail and closed their eyes. People longed for something palpable on the flat terrain—a tree or a buffalo. This wasn't the romantic Hudson on canvas with soaring palisades. This was the Platte—meaning flat—a wide, shallow tongue of quicksand and hissing sediment, flowing over this pool table of a valley. Clark Thompson yawned and wrote, "I want something to read bad."

They read buffalo skulls—notes on the white bone from friends in the forward trains—or stuck messages in elaborate Spencerian script on the horns. When buffalo showed, the wagons halted, and men leapt on their horses. Everyone wanted fresh meat, but more than anything the men wanted to be in on the chase, the kill, if only to say they had shot one. Some Dutchmen, having only shotguns, peppered a buffalo in the eyes "untill they had him blind then they killed him with there knives."

Wagon trains were mobile armories of lead, powder, hundreds of guns, and bravado. "Most of the Californians make a very ridiculous display of fire-arms and other





weapons." The men got tired and careless, and shot one another frequently. At a Fourth of July celebration at Fort Laramie there were speeches and gunfire—one man had a thumb shot off. They pulled their muskets from the wagons muzzle first and got a ball in the stomach, or their skulls blown off.

The emigrants went overarmed, expecting to have to fight Indians, but relatively few did. Perhaps no more than a thousand emigrants and Indians killed each other on the overland trails. By the time the plains warfare got substantially nasty, much of the migration had passed.

Indians were hungry. They came into the camps for food and helped the emigrants cross the rivers. At night they often helped themselves to the emigrants' animals. The Pawnee in particular were good at this.

For access to emigrant journals and correspondence, the author thanks the Bancroft Library at the University of California at Berkeley; the Beinecke Rare Book and Manuscript Library at Yale; Chicago Historical Society; Huntington Library, San Marino, California; Library of Congress, Washington, D. C.; Oregon Historical Society, Portland; and University of Washington Library, Seattle.

"The Sioux. . . are trying to kill all the Pawnees," wrote S. V. Miller. "I wish them great success in that pious work." Guns came out.

Savagery was on both sides. Along the Snake River you will find monuments to a few massacres—usually small wagon parties like the Ward train, 19 tortured and murdered by Shoshone, one boy escaping by crawling 75 miles across the desert with an arrow in his side. I found no monuments to the Indians shot by emigrants, some of them picked off just for target practice.

The Indians, of course, had long been sticking knives and arrows in each other over hunting territory: the Blackfeet against the Shoshone, Crow, trappers, anyone who came within range; Sioux against Crow, Arikara, Pawnee—a territorial struggle finally eclipsed by sheer white numbers, transparent treaties, and more gore. The emigrants weren't after territory, only passing through, but they shot up game along the trails and eventually drew in their wake the stage stations, the Army, and sodbusters—inevitable sparks on a flammable plain.

The West was so dry the wood shrank



A rare sight to Indian-conscious pioneers, the blue uniform of the U. S. Cavalry rides again (above) on a trip guided by history teacher Allan Maybee (below). With few men to patrol hundreds of miles of trail, troopers could seldom provide escort and were helpful mainly as a presence. The Army's scattered forts offered essential supplies for sale and a respite from the trail.



on the wagons. Iron tires rolled off and wobbled in the dust like coins; the emigrants soaked the wheels in the rivers. "Dust is 2 or 3 inches in depth and as fine as flour. We cannot see the wagons next to us, and at times cannot even see the mules. . . ." Their lips split and bled, so they rubbed on axle grease. Ox shoes fell off and the hooves split. "Cure it with hot tar, and drawing a tarred string through the split."

Californians faced the Great Salt Lake Desert (if they took the Hastings Cutoff), the Humboldt Sink, the wall of the Sierra Nevada. One man staggered across the desert, his tongue so swollen with thirst that in his torment he had ripped off his lips. Animals dropped from exhaustion or drinking alkali water; bloated carcasses lined the trails. Holding his nose, J. Goldsborough Bruff counted 150 dead oxen in one spot.

AS I DROVE up the Platte, it occurred to me that 150 ox carcasses had not figured into my early impressions of the Oregon Trail. I remembered heroic paintings from my schoolbooks of men standing on pinnacles silhouetted



against a vermillion sky, waving their floppy hats at the advancing wagons and pointing beyond to a valley of bluebirds and apple blossoms. I remembered our grade-school pageant, entitled "Onward to Our Western Destiny," where after a square dance of some imprecision we sat on a hardwood stage around a campfire of flashlights wrapped in crinkly red paper and sang "Sweet Betsy From Pike," accompanied by a kid on a ukulele (you go with your best musicians), while some of the boys fended off the pesky savages. We were white and suburban to the core and wouldn't have known a Sioux from a Seminole. To us, Indians were simply Indians, and always pesky, or dratted. An earnest boy, dressed as an elder with a beard of cotton and Scotch tape, gave a gallant speech in a high voice to the effect that we had tamed the West, by gum, for God and the American Way. We were terrific. That was San Marino, California, about 1948, not an elephant in sight.

I CAUGHT UP with the Ackerman party at Gordon Howard's place outside Bayard, Nebraska, in May 1985. The Howards run brief wagon trips up the Platte Valley for tourists "who want the experience," but not too much, of the Oregon Trail. Dick and Trudy Ackerman, of Salem, Oregon, lead tours of recreational vehicles (RVs) over the Oregon Trail.

Like the Howards, the Ackermans belong to the Oregon-California Trails Association (OCTA), an organization trying to preserve what's left of the trails, but these RV trips usually attract non-OCTA people whose appetite for western history peaked with Zane Grey, and who simply want to go "RVing."

On the ruts of the Oregon Trail in a cow pasture, Gordon had circled his wagons, and around them Dick was trying by CB

radio to circle his band of emigrants: a Kit Classic, a Pace Arrow, a Road Ranger. Cattle wandered over to investigate. Someone asked Trudy if they would camp there. "No," she said, "these ruts make it too difficult to level the rigs." Dick suggested what it would be like setting up their lawn chairs among the piles of manure. "And those rough tongues can play hell on a good finish." That night the Howards had a good crowd around the campfire. Everyone sang "I've Been Working on the Railroad."

Most of the Oregon Trail in Kansas and Nebraska has been plowed, but out West, particularly in Wyoming, the ruts are still there—more than 300 miles of them.



THE BANCROFT LIBRARY, UNIVERSITY OF CALIFORNIA AT BERKELEY

Death came quickly to emigrants (above); at least 20,000 lost their lives, mostly to accidents and Asiatic cholera. Rarely were mourners able to bestow the care given a young pioneer woman (facing page), whose six-foot-deep grave beside the trail in Wyoming was secured by stone slabs. Nearly unearthed by erosion, her remains were reinterred nearby by Dr. Randy Seed and other members of the Oregon-California Trails Association.

In the deep ruts near Guernsey, Wyoming, I met a group of riders coming up the hill from Fort Laramie. The men, mostly Wyoming schoolteachers, wore U. S. Cavalry uniforms and rode McClellan Army saddles. The women wore gingham and sunbonnets. They were beginning a 400-mile ride on the trail across Wyoming.

Seeking the elephant, Allan Maybee occasionally comes upon "some guy in a big

air-conditioned Winnebago. He pulls up when it's hot as hell and rolls down that window just enough to stick his lips out to talk. You feel that nice cold air. He doesn't offer you a beer. He goes home and tells everybody how he has 'experienced' the trail."

They didn't mind adding another rider, so after working out the logistics (Avis and horse), I later rode with them for 12 days.

We walked as much as we rode across country of continuous sagebrush, and antelope fawns would burst from beneath our feet and race to the horizon. For almost 200 miles, except for brief macadam, we followed the ruts. My rear got raw, my knees ached, my lower lip resembled a split kumquat, and the mosquitoes practically levitated us out of the Sweetwater willows. I began smelling elephant.

We passed concrete obelisks marking the Oregon Trail. Most of them were smashed by bullets and hammers, their commemorative brass medallions removed to decorate some bozo's belt buckle. These are probably the same people who climb the bluffs to shave off the emigrants' names and carve their own graffiti: G. F. Freeman 1958.

Mike Allen rode leaning out of his McClellan, scanning the trail. He found .45-70 cartridges, a U. S. Cavalry button. Allan Maybee picked up a pewter fork and later almost got a three-foot rattler attached to his boot. The emigrants often overloaded their wagons, and stuff went overboard by the ton. The trail was a linear junkyard: "A Diving bell and all the apparatus, heavy anvils, iron and steel, forges, bellows, lead . . . bacon in great piles, many chords of it."

We came upon some modern detritus: remains of a weather balloon, cassette tapes that resembled bird nests, three one-dollar bills, Nehi Orange bottles, beer cans beyond count, and a brassiere. Trail scavengers have gotten most of the wagon iron, but occasionally you still come upon something that quickens the pulse. Allan picked it up from the sand—a piece of iron with a hook at the end. I announced that it had obviously dropped from an ox yoke during a stampede. Mike said it was a leeverite—"leave 'er right there." Allan turned it over in his hand and said, "I think it's a tie-rod from a Ford." He stuck it in his saddlebag, rode on for about an hour, and threw it in the



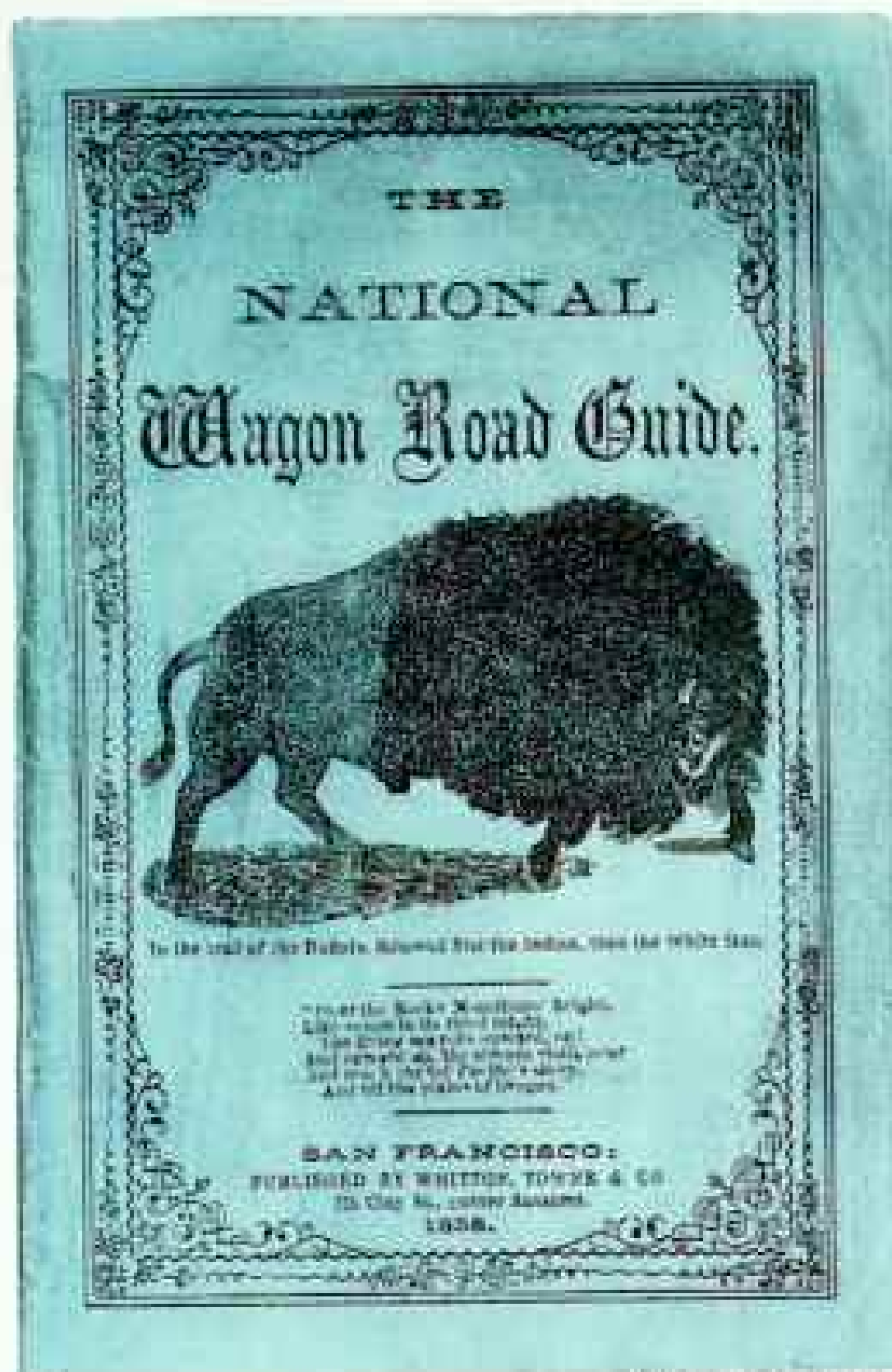
sage. Allan envisions a junk pile accreting in the Willamette. "That tie-rod probably fell off near Scottsbluff. Some guy found it, carried it a ways and tossed it, then another guy picked it up and carried it farther before chucking it. Someday it'll all end up in Portland."

FEARING GOD and Brigham Young, the bickering Mormons held together, but the fractious wagon trains bound for Oregon and California divided and subdivided like amoebas. If the trail didn't build character, it certainly revealed it, and frayed nerves could snap under the slightest provocation. At a Green River camp, Brown asked Hapet to hand him some soap.



"To keep from starving . . ." wrote Patty Reed (left), "Mother took the ox hide we had used for a roof and boiled it for us to eat." Caught by early snows in the Sierra and stranded for the winter of 1846-47 near what is now Donner Lake (above) many of the 82-member Donner party later took more drastic measures—eating their dead. The Reeds, including eight-year-old Patty, were among 47 who survived. Her wedding photo stands by a tiny doll she rescued when the loss of draft animals in the Utah desert forced her family to abandon their possessions.

COURTESY CALIFORNIA DEPARTMENT OF PARKS AND RECREATION



DENVER PUBLIC LIBRARY

The buffalo's vast herds had all but disappeared along the trail by the time this 1858 guide was published. During early years of migration, pioneers had hunted the bison for food and fueled their campfires with buffalo chips.

Hapet refused, so Brown stabbed him in the heart with his knife.

Dr. Israel Shipman Pelton Lord, riding above the gold rush, took a deep breath and described his fellow argonauts as "peevish, sullen, boisterous, giddy, profane, dirty, vulgar, ragged . . . idle, petulant, quarrelsome, unfaithful, disobedient, refractory, careless, contrary, stubborn, hungry. . . ."

Two brothers grew to detest each other so much that they sawed their wagon in half, then fought over who would get which end. Finally one hitched up to the tongue and drove off with his cart, leaving his brother "on the prairie 10 miles from timber with one yoke of oxen & the hind wheels of a wagon. . . . This trip is not boy's play."

Out on the baking Snake River Plain the emigrants were hot and thirsty, the river usually beyond reach in deep canyons of black volcanic basalt. The countryside

was parched and harsh. Their dogs would howl, the hot sand blistering their paws.

The Snake was not exactly a setting conducive to marital bliss, particularly if your spouse was wacko to begin with. Still hundreds of miles from the Willamette, Elizabeth Markham announced to her husband, Samuel, that she was going no farther.

The Markhams were traveling to Oregon with their children. Elizabeth Markham was a religious fanatic, selfish and violent. For hours Samuel pleaded with her, as the rest of the company disappeared down the trail. She would not budge. Finally he drove off with the children. Elizabeth soon caught up. He asked her if she had seen their son John, who had returned for a horse left behind. "Yes," she said, "and I picked up a stone and nocked out his brains." Samuel ran down the trail, unaware she was lying. He turned and saw flames on the horizon. Elizabeth was burning one of their wagons.

The people Rebecca Ketcham traveled with caused her "far more unhappiness than all the dangers and difficulties of the way." Young and unmarried, Rebecca crossed the continent in 1853 from Ithaca, New York, to Oregon. She was bright, educated, and sensitive, and her initial enthusiasm went into her diary. "The prairie, oh, the broad, the beautiful, the bounding, rolling prairie! . . . Imagine the ocean, when the waves are rolling mountains high, becoming solid and covered with beautiful green grass, and you have some faint idea of it."

Rebecca traveled with a small party, mostly in-laws of William Gray, their leader, who was also driving 600 sheep (he had mortgaged his Oregon farm to buy them). Gray had gone to Oregon in 1836 and recrossed the plains several times. He was experienced but abrupt, and on this trip was short of time and temper. He had jumped off late, was slowed by the sheep and contentious relatives. Rebecca's spirits sagged:

"Mr. Gray was pretty cross this morning, and got us all somewhat stirred up. He cannot seem to get along at all with any of the Godleys. . . . The day is pleasant but my own heart is heavy, for we are in the wilderness where we cannot help ourselves, and in the power of seemingly the most arbitrary and heartless man I ever saw."

The others soon got on her nerves. "I

wonder if I shall have good friends in Oregon? I don't love many in this company very much. . . . washed the thick dirt off the dishes in the cold tea that was left."

After crossing the Blues, Gray left the company. Rebecca watched him go, her heart sinking, for she had come to respect his trail experience. From The Dalles, Gray floated his sheep on a scow down the Columbia. Near Astoria a squall sank the scow and the sheep. He lost his farm, later mined in British Columbia, was a customs collector at Astoria, and wrote a history of Oregon.

Rebecca settled "pleasantly situated" on the Clatsop Plains, taught school, married, and raised two sons. "I have no doubt about there being hundreds of men in Oregon and California," she wrote her brother back East, "who would very gladly go home if they only had money enough to take them there. . . . The Society in Oregon is not very good—it is composed mostly of people from the frontiers—such people as have moved from state to state . . . moving as fast as civilization followed them. There are some exceptions to this . . . a great many fine families scattered throughout the country, but . . . there is room for great improvement in the society of most parts of Oregon."

Into this embryonic society Samuel Brown rolled by wagon to California in 1846, then by ship to the Willamette, where on French Prairie he eventually bought a farm and built a house. His grandsons, Kenneth and Samuel Brown, raise filberts there. Sam lives in the original house (next page). "Grandfather lost one ox after another to bad water and poor foraging," Ken said. "Those people suffered, but they accepted that as part of life. They grew up in a different world than ours."

This nucleus of emigrants—impatient, practical, vigorous, emphatically individualistic—endured the trail to settle the American West. Their restless energy still marks the West today.

ON THE SLATE CREEK CUTOFF, one of many used to get across the moonscape of southwestern Wyoming, the emigrants pitched over rimrock and down to a spring. Here they camped and soaked their blistered feet.

The ruts at Emigrant Springs have since



THE HUNTINGTON LIBRARY, SAN MARINO, CALIFORNIA

"Seeing the elephant" was slang for the perils of migration. George Murrell, a forty-niner, wrote on this elephant letterhead stationery to a friend back East: "Travel in an epidemic. . . . Stand guard all night. . . . And you will . . . realize what seeing the 'Elephant' means."

eroded into a V-shaped gully about ten feet deep. On the lip of the gully, embedded in silt, stood a slab of limestone, into which had been etched a crude cross. Karen and Chester Buck are local ranchers and vigilant members of the Oregon-California Trails Association. They believed this to be the headstone of an emigrant's grave. From old newspapers they knew that erosion had exhumed caskets here in the early 1900s, and were afraid that this grave might go with the next cloudburst.

After Karen obtained the appropriate legal permits, Dr. Randy Seed, a general surgeon and biochemist out of Chicago, and other OCTA members arrived to dig up the remains and move them to a safer location. On a cool August morning we addressed the gully with shovels in hand and began carefully to shave away the hard-packed silt.

Four feet down, the shovels clanked against a pile of rocks. A few bones appeared: a rib, a heel bone. Below the rocks a wood box emerged. "OK, that's the casket," said Randy. "We got us a body." Heavy rocks had been stacked against the box, and acting as a partial lid were two immense



slabs of limestone—almost a sarcophagus. The center slab was missing.

Randy put down his shovel and got out a whisk broom. A skeleton slowly appeared. The bones were slightly orange in color. The tailbone lay over the skull. "You can tell by the way these bones are disarticulated," Randy said, "that the skeleton was moved after the connecting tendons had decomposed. Grave robbers must have reached in and pulled the hands up to look for rings."

One of the rocks against the casket was chiseled with the names of four people and the date of July 17, 1854. Had it been engraved by the burial party as a grave marker? If so, why four names, and why did they bury it? It could have been just a rock the

burial party carried from cliffs above, where many emigrants had carved their names.

Randy arranged the bones to reconstruct the skeleton. "The teeth look good, skull intact, no signs of trauma, no arthritis." By the size of the bones and shape of the pelvis, he concluded that this had been a young woman. He held up the skull, joining the jaws, and continued his anatomy class. "All 32 teeth are here, which is more than I've got. No cavities. No malocclusion. Why couldn't these genes have been in my family? Would have saved us a lot of money."

As we talked about tibias, Randy's wife, Deborah, laid her hand on his arm and said sadly, "Oh, Randy, she was pretty."

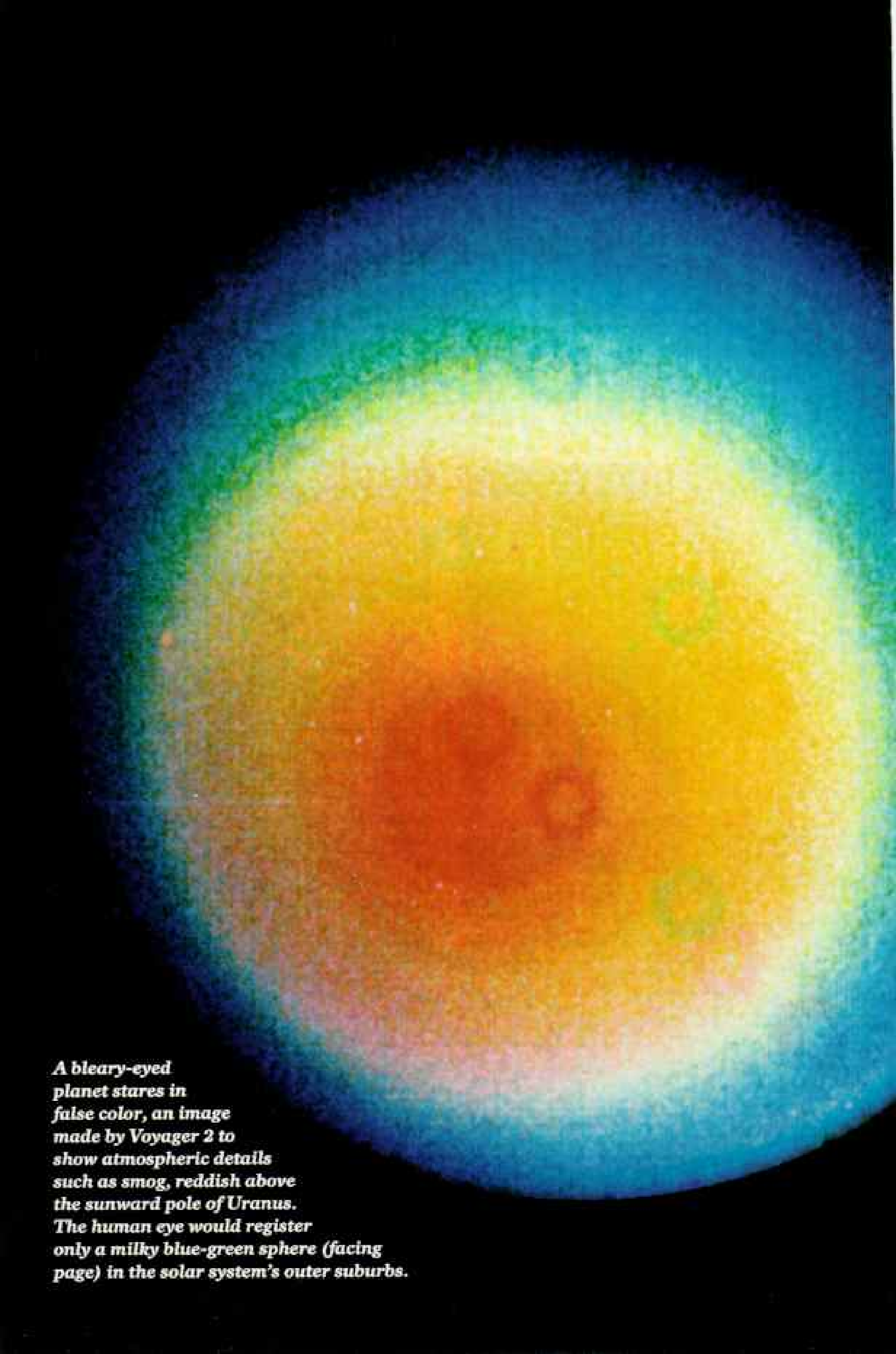
I had been caught up in bones. But Deborah was not seeing a skeleton. She was seeing a young woman, here in the middle of nowhere, caught by the elephant.

STANDING THERE in Wyoming with nothing but sage to the horizon and these bones at my feet, I thought of something a young woman had told me elsewhere on the Oregon Trail—the 1980s version. She had informed me that she was majoring in "leisure management," apparently at an institution of higher learning that was passing off as education a curriculum dressed in leotards.

Here in a gully was the shadow of a woman who had secured a different education. She had seen this country when it was as wild as the word admits of meaning. She had seen buffalo on the plains, not on a nickel. She had seen Wyoming before it was so, before it had cows, before the Broncos arrived trailing their barn-door mud flaps. She had crossed country that could kill you, as it had likely killed her. But what is memorable is not that she died, but that she had gotten this far. She had done something more manifest with her destiny than jump in place. □

Rewards were great for young Missourian Samuel Brown, who dug 62 pounds of gold in California, then moved with his wife, Betsy, to Oregon. They accumulated more than 1,000 acres and built a fine house at what would become Gervais (above left). On its porch (left) grandsons Samuel, left, and Kenneth pose with heirlooms of the trek and portraits of the pioneers whose bold dream came true.



A large, circular, false-color image of the planet Uranus. The planet's surface is a mix of colors, including a prominent reddish-orange band near the top, a yellowish-green band in the middle, and a blue-green band at the bottom. The colors are somewhat blurred and grainy, giving it a 'bleary-eyed' appearance. The background is black.

A bleary-eyed planet stares in false color, an image made by Voyager 2 to show atmospheric details such as smog, reddish above the sunward pole of Uranus. The human eye would register only a milky blue-green sphere (facing page) in the solar system's outer suburbs.

Uranus

VOYAGER VISITS A DARK PLANET

JANUARY 4, 1986. It has been four and a half years since the Voyager 2 spacecraft left the rings of Saturn, more than eight years since it left the launchpad at Cape Canaveral. Now, traveling at 50 times the speed of a pistol bullet, the indomitable spacecraft is approaching Uranus, seventh planet from the sun.

Three billion kilometers away, under dark skies near his house in Hawaii, Brad Smith, head of Voyager's imaging team, muses over this new target. In a few days he will head for the Jet Propulsion Laboratory (JPL) in Pasadena, California, and the cascade of closeup pictures Voyager will send back.

From Earth, Uranus is not visible this evening. Even were it not obscured behind the sun, it is so faint that I would probably need binoculars to observe it. But I have seen Uranus with Smith before, nearly four years earlier, through a large telescope in Chile, as he and Voyager colleague Rich Terrile looked for details to help plan Voyager's flyby.

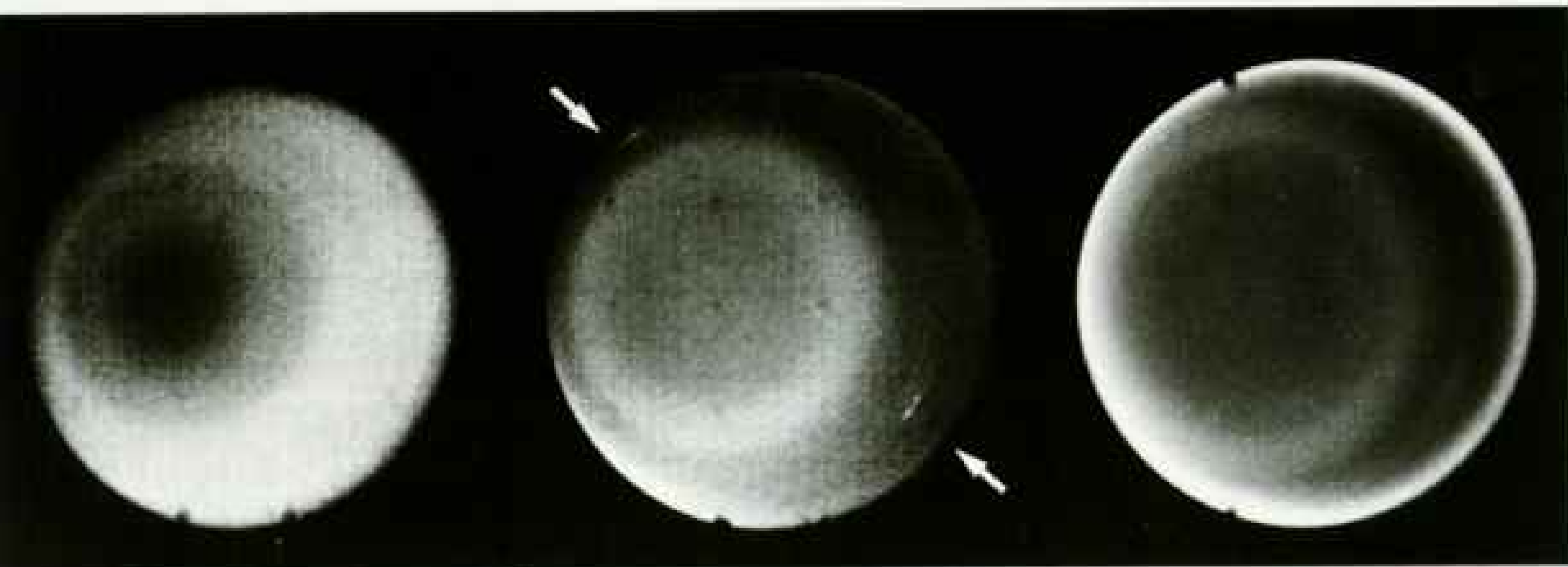
Unlike spectacular Saturn, Uranus does not dazzle through the eyepiece. Its deep, blue-green atmosphere obscures the tumultuous clouds and hot-water ocean that astronomers believe circulate within the planet. In fact, I could have mistaken Uranus for a star were it not for two dots of light around it. Those specks were the two largest of its five known moons: Titania and Oberon.

Titania, Oberon, Umbriel, Ariel, and Miranda. Four of those moons bear Shakespearean names. Umbriel derives from Alexander Pope. Yet Shakespeare, in the words of his sprite Puck, servant to the fairy king Oberon, could have been describing all these moons. "Shadows," Puck called certain spirits, who



By RICK GORE ASSISTANT EDITOR

Photographs by NASA



Faint banding of the Uranian atmosphere is evident when the planet is viewed through filters of violet, orange, and methane-selective red (above, from left). At right, haze glows as a bright high-altitude corona, while the center view in orange reveals two streaks (arrows), giant cloud tops comparable to thunderheads on Earth.

Clouds recorded in time lapse (facing page, top) were seen to move counterclockwise, faster than the planet rotates—behavior exactly contrary to expectations. One question was answered, however. The concentric bands, barely visible here, proved that the planet's rotation, not solar energy, organizes its atmospheric circulation.

"willfully themselves exile from light, and must for aye consort with black-browed night."

The Uranian realm is a dark kingdom, so remote from the sun that daylight there approximates a total solar eclipse on Earth. Imagine, suggests Terrile, that the sun is the size of a grapefruit. Then Earth is a pinhead about half a 25-meter pool length away. Jupiter would be a marble three pools out. Uranus would be a mere pea 11 lengths from the sun.

Such distance also makes Uranus unimaginably cold. Since the planets finished accreting from the dusty, gaseous solar nebula more than four billion years ago, temperatures in Uranus's domain probably have not risen much above minus 210°C (-346°F). A space traveler sticking his hand out in that environment would find it instantly freeze-dried.

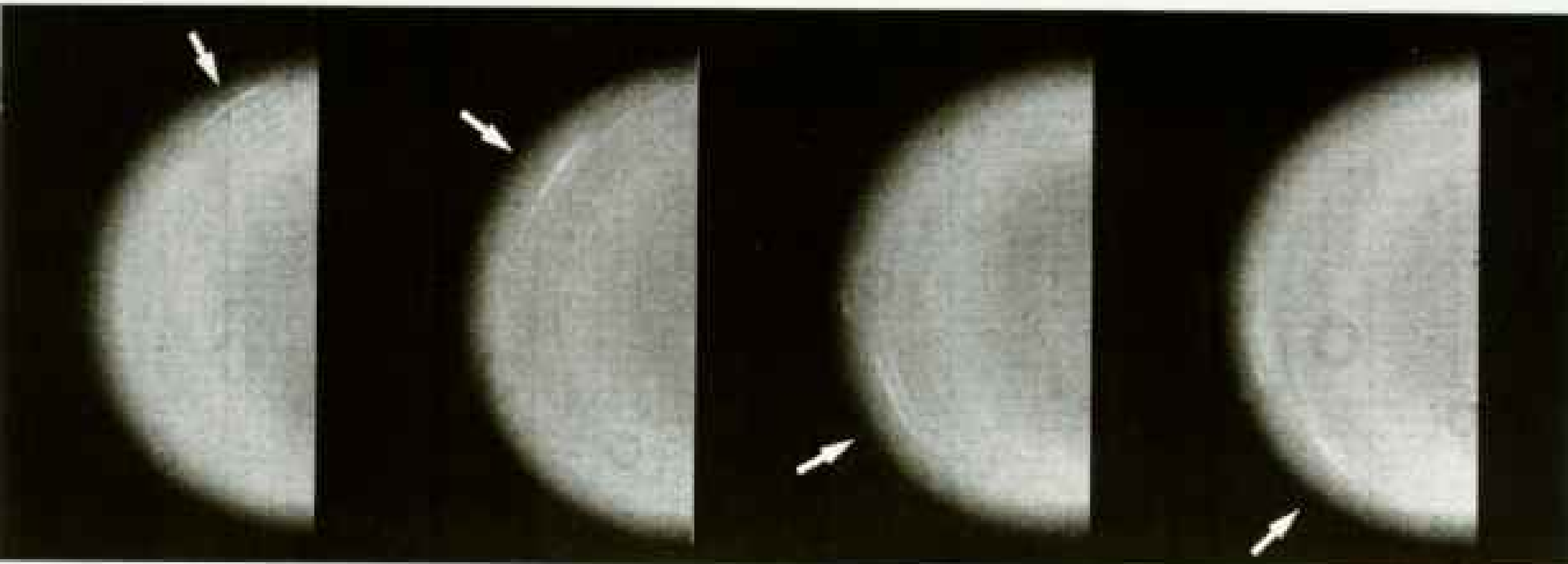
"A planet of unfathomable mystery," Smith calls this frigid world. For one thing, no one has yet determined how fast the planet rotates, and thus how long its day is. For another, Uranus lies tipped on its side. Astronomers can only guess at what knocked it over; most suspect that an Earth-size object crashed into the planet in its infancy. Like Saturn, Uranus has rings, nine narrow bands. But they are coal black and were not even detected until 1977. What are they made of? The Uranian moons are dark too, the largest but half the size of our moon.

Although Uranus is invisible to us tonight, Smith points out the year's other celestial celebrity—Halley's comet. It is not a bad substitute. For Halley's, like most comets, was probably born near Uranus. In fact, most scientists think Uranus was built from comet cores that collided, then fused together. Voyager would soon reveal how those congealed comets have evolved over the past four and a half billion years.

JANUARY 21. The encounter is under way at JPL. But the pictures of Uranus are strikingly bland. All the powers of JPL's computers can reveal only a few deeply embedded clouds and a faint smoggy haze over the pole that Voyager is approaching.

More intriguing are Voyager's early images of the Uranian moons. From a distance each looks markedly different.

Far darker than its four siblings, Umbriel recalls Pope's own



description of his "hateful gnome," who flew on "sooty Pinions, a dusky melancholy Spright, as ever sully'd the fair face of Light." Nearly featureless, Umbriel appears painted over by some dingy material. Yet a bright white ring, nicknamed the "doughnut," stands out. Could the debris that painted Umbriel have spurted out of the doughnut?

Being able to ask such a question is almost a miracle. Voyager's sensors were designed for Saturn, where sunlight is four times as bright. Project scientists knew the Uranian darkness would tax their ingenuity: "Taking pictures of the rings and some moons," explains Rich Terrile, "is like trying to photograph a piece of charcoal against a black backdrop."

"At Uranus picture exposures needed to be four times as long as at Saturn," says project manager Dick Laeser. "Since we were going to be flying by at 65,000 kilometers an hour, and didn't bring along any big strobe lights, our images were going to be badly blurred. So we developed an antismear campaign."

Voyager's navigators had to guide the spacecraft within 200 kilometers of a point between the Uranian rings and innermost moon, Miranda. Uranus would thereby gravitationally sling Voyager on toward its 1989 encounter with Neptune. More

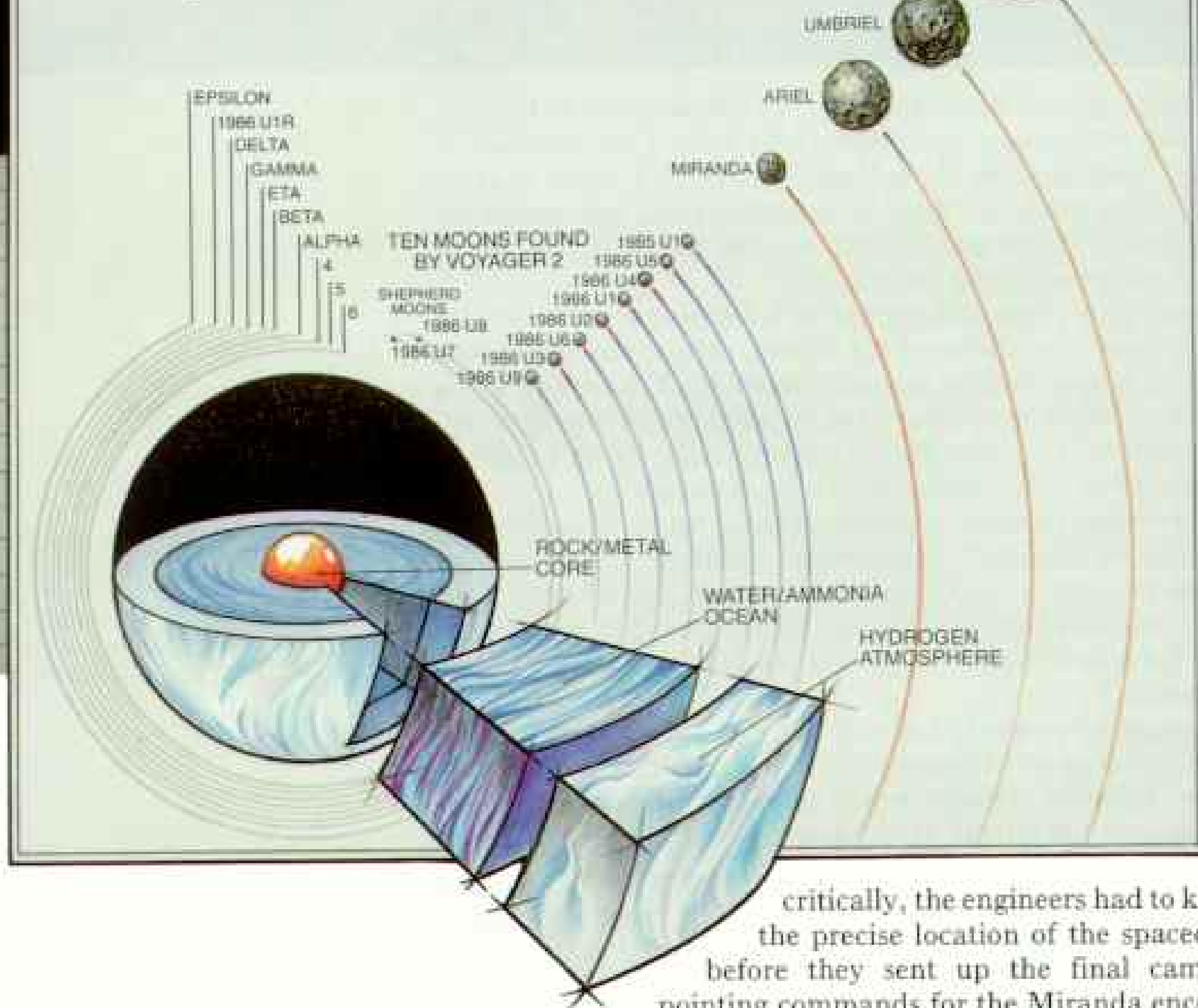


JAMES A. SUGAR, BLACK STAR, WITH GEORGE C. YON KNYOR, NLS STAFF

"I like it, but I'm not sure whether it works," comments David Stevenson (left), California Institute of Technology theorist in planetary science, of the idea that the moons of Uranus were created out of debris produced from the collision with an Earth-size body that tilted the planet about 90 degrees some 4.5 billion years ago. Stevenson is currently developing a hypothesis to explain peculiarities of the Uranian magnetic field by examining implications of the planet's odd orientation.

Uranus and family

Named for the sire of the Titans in Greek mythology, Uranus accreted in a comet-rich region of the infant solar system. Voyager found ten new moons, detail in the charcoal-colored rings, a bizarre magnetic field, and baffling features on the five largest moons.

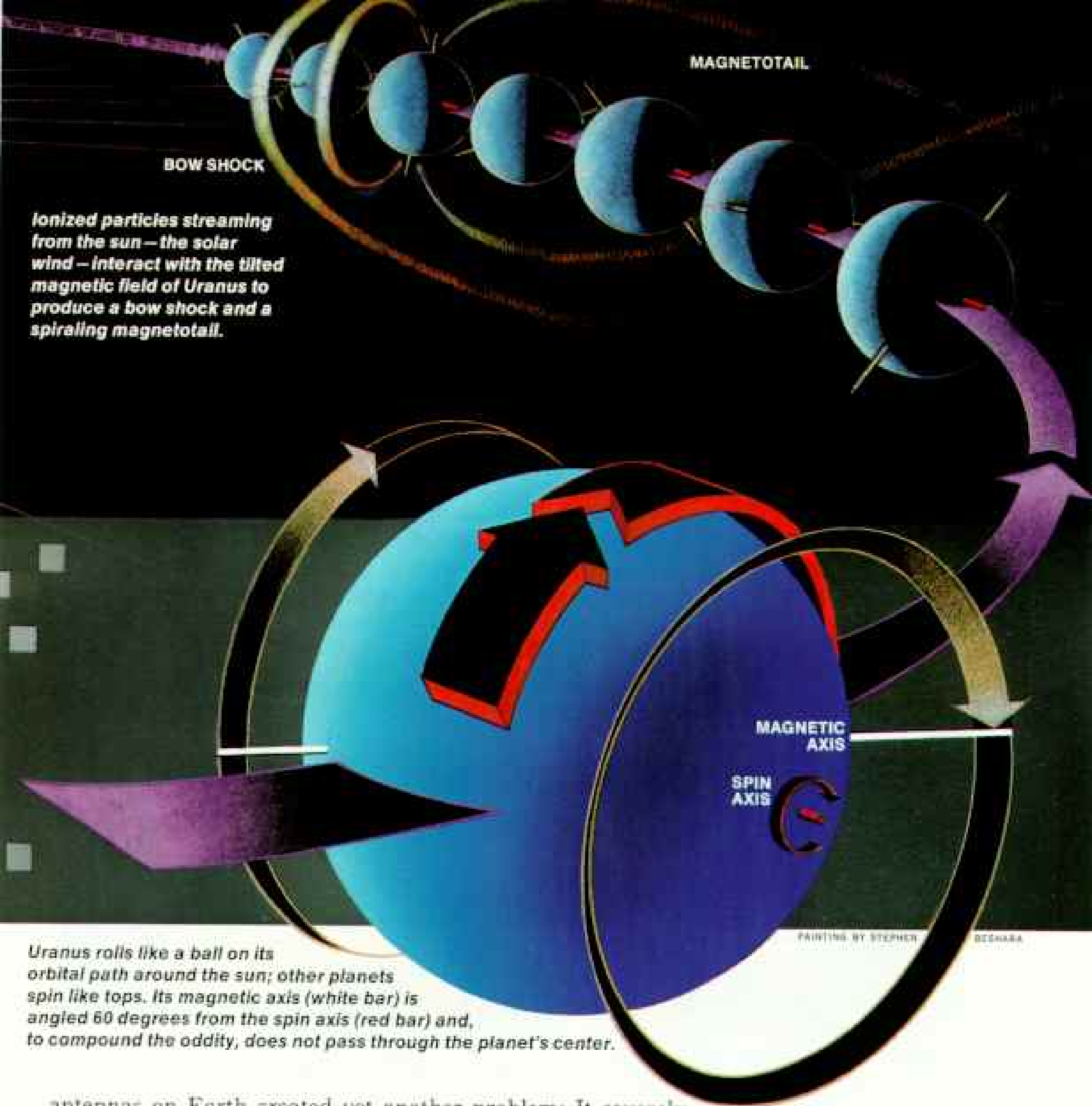


critically, the engineers had to know the precise location of the spacecraft before they sent up the final camera-pointing commands for the Miranda encounter. Otherwise, the cameras might point at black space rather than the moon. That feat is equivalent to William Tell shooting an arrow in Los Angeles and hitting an apple in Manhattan.

Sensors steer the spacecraft by locking onto bright guide stars. Tiny thrusters then routinely fire to keep it pointed on target. But the thrusters cause the spacecraft to wobble slightly, threatening to blur images taken during the long exposures.

To reduce the wobble, the team had to break into the onboard computer program that controls the thrusters—a program that had not been touched since Voyager left Earth. "It was kind of like doing remote open-heart surgery," says Laeser.

The great distance between Voyager and NASA's radio



BOW SHOCK

Ionized particles streaming from the sun—the solar wind—interact with the tilted magnetic field of Uranus to produce a bow shock and a spiraling magnetotail.

Uranus rolls like a ball on its orbital path around the sun; other planets spin like tops. Its magnetic axis (white bar) is angled 60 degrees from the spin axis (red bar) and, to compound the oddity, does not pass through the planet's center.

antennas on Earth created yet another problem: It severely weakened the radio signals—and thus the amount of data—Voyager could transmit. To cope, JPL's engineers commandeered one of Voyager's backup computers to process images onboard, reducing by nearly two-thirds the amount of data needed to be sent back to Earth to create a picture.

Help also came from the Australians, who linked up their 64-meter Parkes radio telescope with NASA antennas near Canberra, creating a much bigger ear with which to hear Voyager.

JANUARY 24. The engineers face their test as Voyager flies within 29,000 kilometers of the little moon Miranda, close enough to reveal features as small as half a kilometer across. Still no one is ready for Miranda.

Scientists were expecting a bland ice ball, little changed since its birth more than four billion years ago. But

Put Earth in a Uranian orbit—19 times as far from the sun—and our oceans would freeze, while our mainly nitrogen atmosphere would liquefy.

Uranus's thick hydrogen atmosphere exerts enormous pressure, heating and perhaps blending with the hot water-and-ammonia ocean that surrounds the planet's rocky, metallic core.

Miranda is neither stillborn nor monotonous. The moon has been wracked with turmoil. Along one horizon it looks as if fingernails of some angry Titan have gouged out a region of concentric bruises. Cleaving this region are grand canyons as deep as 20 kilometers—the starkest yet seen in the solar system.

The other moons also tantalize and tease (pages 192-3).

Ariel, the next moon out, shows a crust cracked by sinuous valleys. Glaciers appear to have flowed through those chasms.

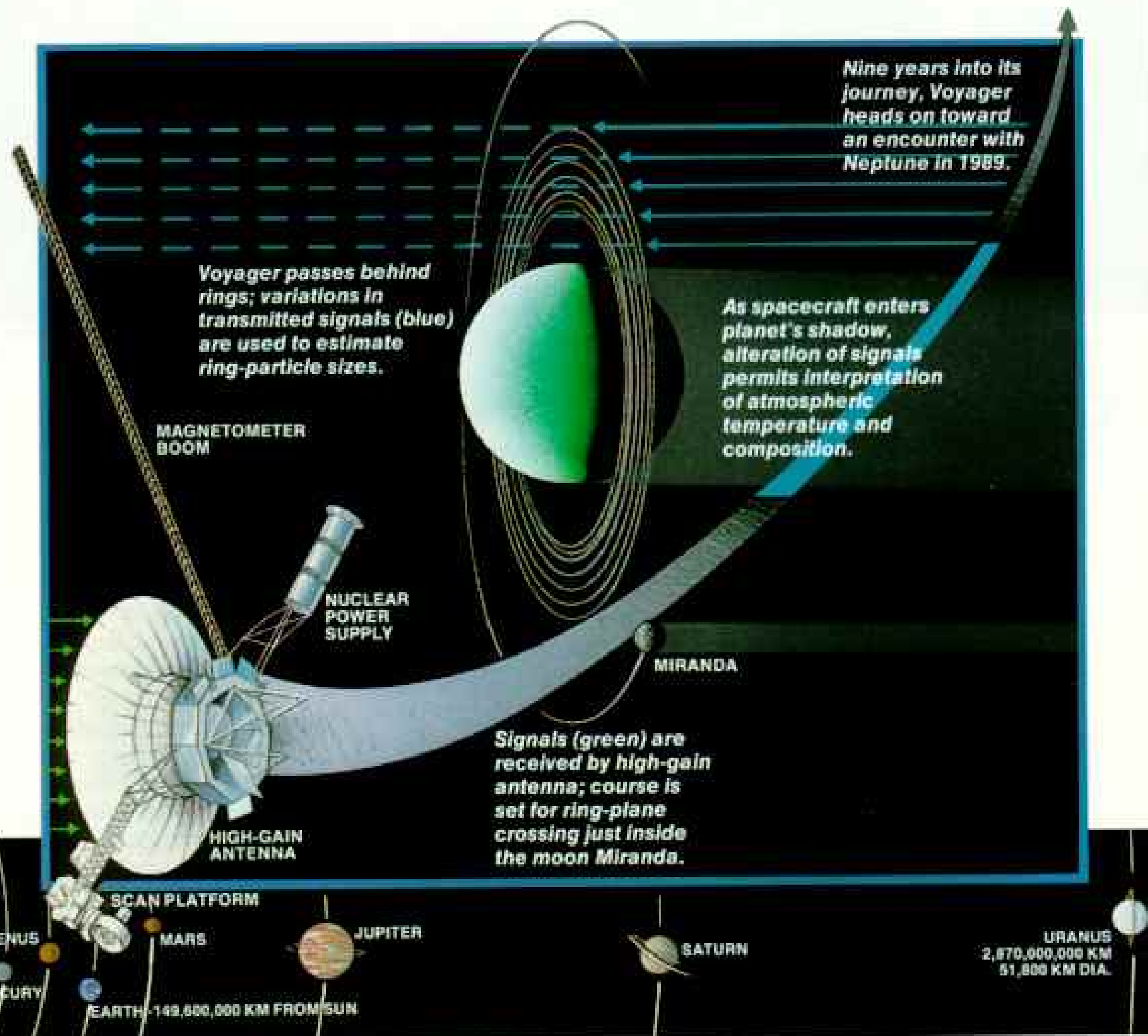
Oberon, bland except for scattered craters, better fits the classic picture of an ice moon. Puzzlingly, some craters have been flooded by a material as black as the Uranian rings.

A great trench scars much of Titania's face, and many small craters make it look old. But Titania lacks the large impact craters typical of ancient surfaces elsewhere in the solar system.

Umbriel, at first appearing unmarked and relatively young, proves to be peppered with old craters 50 to 100 kilometers across. Yet it still looks blanketed by more recent debris.

January 26. Voyager scientists are confronted with new perplexities about the rings of Uranus. Although a thin tenth ring had already been discovered, specialists knew that details in the dark rings would be hard to see. Compared with Saturn's

Even at light speed, commands took two hours and 45 minutes to travel from Earth to Voyager, a distance of three billion kilometers (1.8 billion miles). The craft, approaching its bull's-eye at 18 kilometers a second, had no margin for error. For a machine designed to function only as far as Saturn, it performed superbly and "far beyond the warranty period," as one scientist put it.



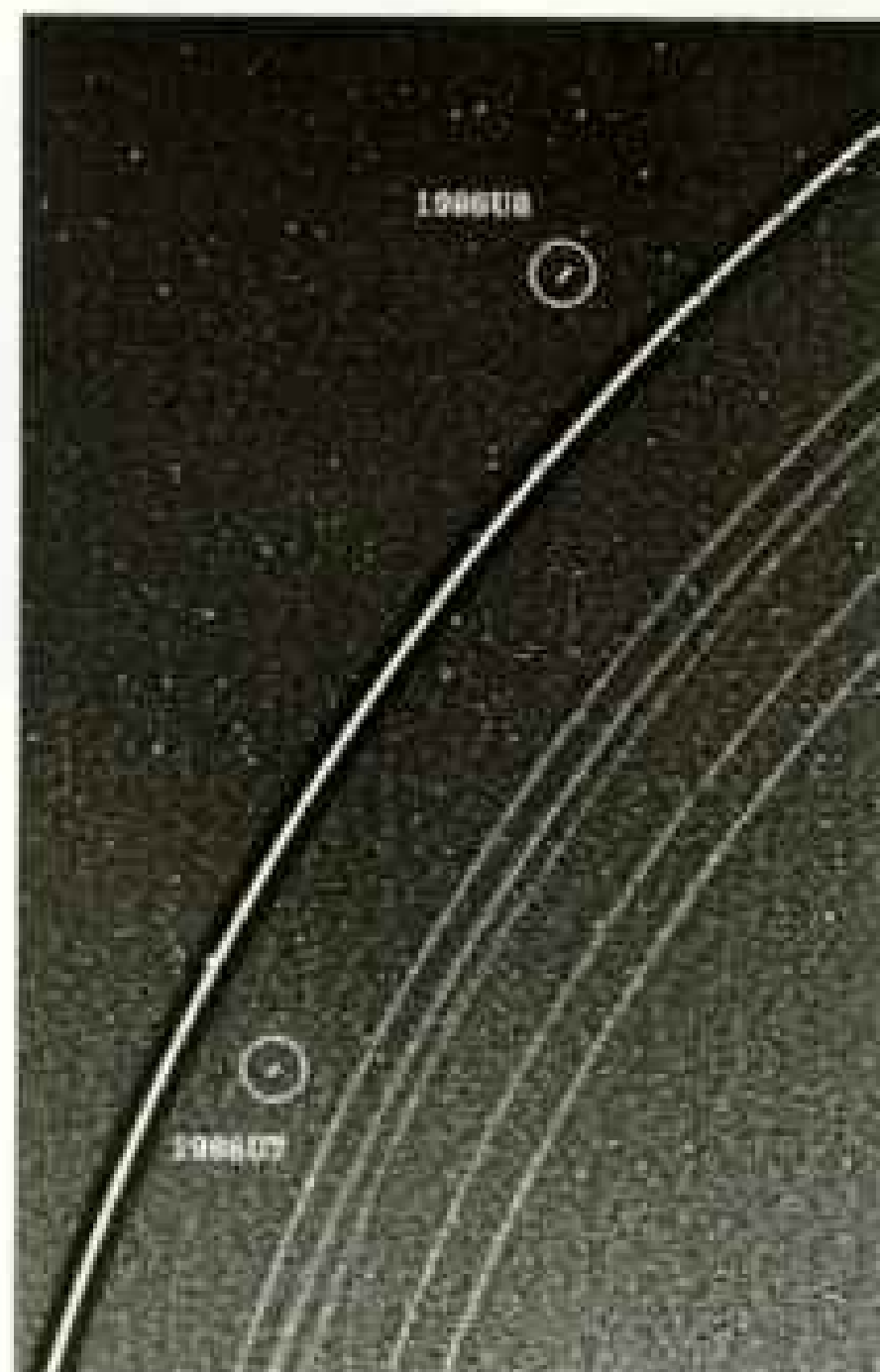
PLANETS AND ORBITS NOT TO SCALE. FIGURES ARE AVERAGE DISTANCES FROM THE SUN.

showy bands, which can measure tens of thousands of kilometers across, Uranian rings are thin strands. The irregular Epsilon ring, widest and outermost, ranges between a mere 20 and 100 kilometers wide.

Scientists had hoped to confirm a theory that between 10 and 18 small shepherd moons gravitationally confine and clear gaps between all nine known Uranian rings. At least three such moons had been discovered at Saturn. But at Uranus only one ring is obviously shepherded.

Would the scientists see strange formations of dust, as they unexpectedly had at Saturn? There the dust had been arrayed in kinks, braids, spokes, and other patterns. But at Uranus, Voyager has found no dust at all. Now the ring specialists are pinning their last hopes on an extremely long—96-second—exposure that Voyager will take looking back at the planet. With the sun in the background, tiny dust particles should scatter sunlight, much as strands of hair create an aura around the head of a person standing before the sun.

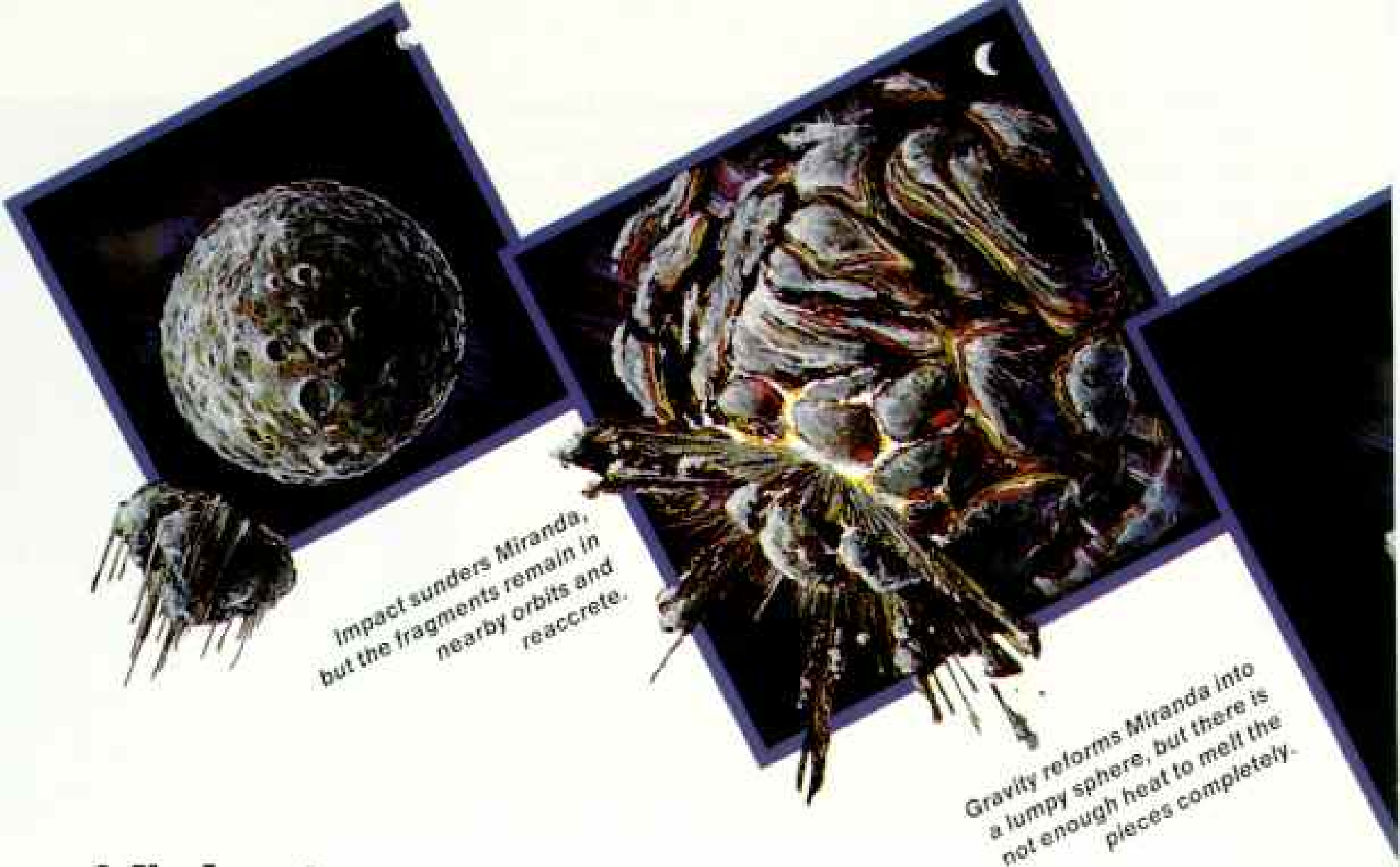
And indeed, a spectacle of about a hundred dust ringlets emerges. Someone jokes that a picture of Saturn's rings must have been put on the monitor by mistake. Even as they debate



Two shepherds, moons not 50 kilometers across (above), confine by their gravity the outermost of the nine rings known before Voyager's arrival. But what confines the other rings—undetected shepherds still smaller?

For the most part the rings are made up of fairly large objects—boulder to house size—but when Voyager ducked behind the rings, it made a 96-second exposure (left) that revealed lanes of dust and other ring details (short streaks are star images). What keeps the whole carousel of rings and dust in such orderly and well-defined lanes remains to be discovered.





Impact sunders Miranda, but the fragments remain in nearby orbits and reaccrete.

Gravity reforms Miranda into a lumpy sphere, but there is not enough heat to melt the pieces completely.

Violent rebirth of a moon

Titanic collisions—five or more—disrupted Miranda, shattering the moon's surface and scrambling its innards.

The above sequence depicts the most recent catastrophe, which produced the features observed by Voyager. Just short of 500 kilometers in diameter, this innermost and smallest of Uranus's five large moons is hit by a large piece of planetary debris. Miranda is able to reassemble itself, though its appearance is radically altered.

what might create all this dust and organize it into ringlets, the ring specialists also must explain a broad new band that Voyager detected as it passed through the ring plane. About 2,500 kilometers wide, this new band orbits well inside Uranus's other rings and may be composed of marble-size chunks.

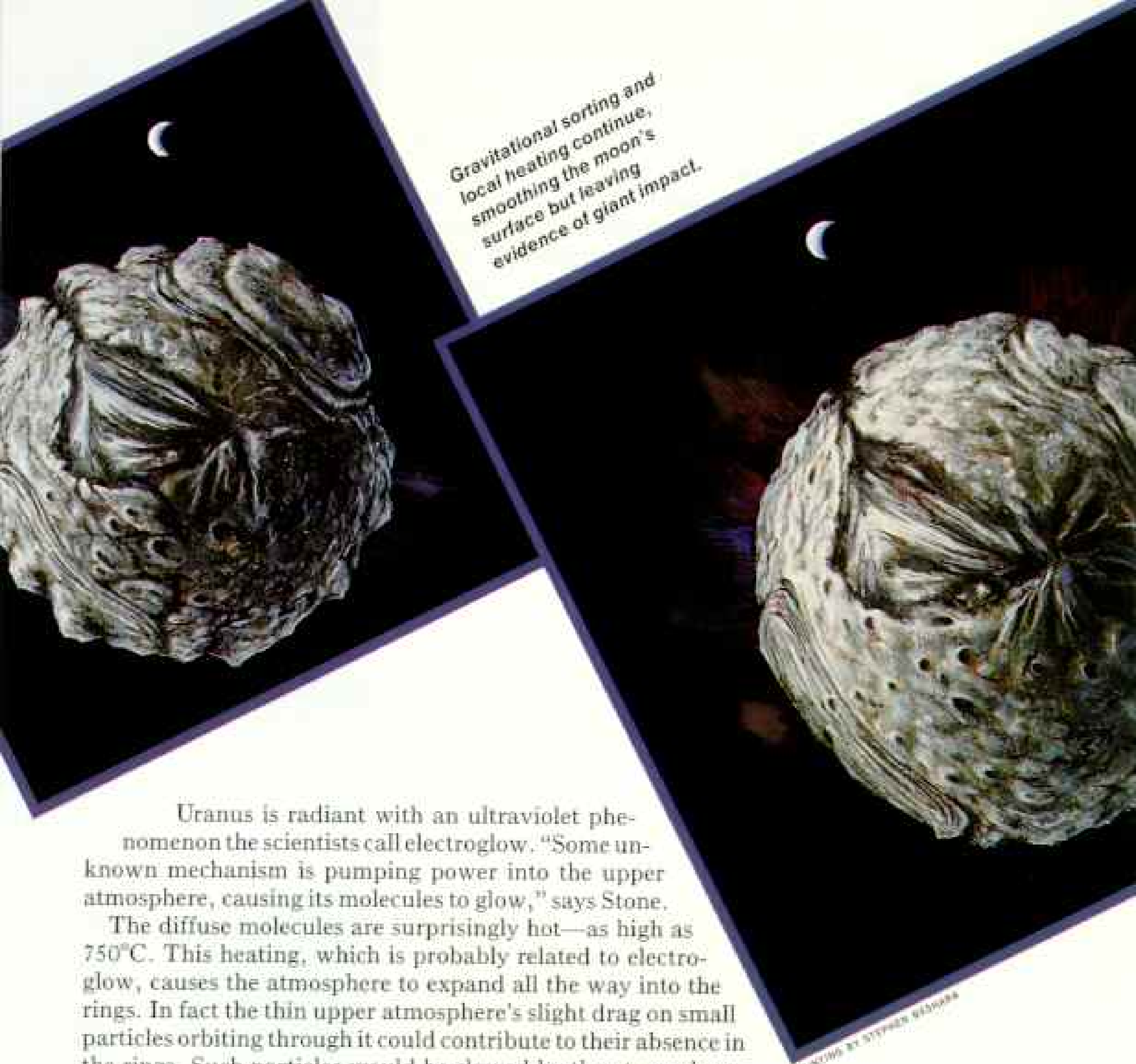
Particles of that size, which are dominant at Saturn, until now have been undetected at Uranus. In fact, measurements indicate that the Epsilon ring is made up almost entirely of black boulders, many the size of a house or larger. Since big boulders inevitably collide and grind down, where are the resulting little chunks? Could they all be swarming inward to join the newly discovered inner band?

TUESDAY, JANUARY 28. As Voyager scientists are preparing to sum up the mission for the press, the space shuttle *Challenger* explodes. Those clustered in JPL's press center share a horrible irony. On one monitor we watch replay after replay of seven lives evaporating over the Atlantic, while on an adjacent TV screen we see the latest triumphant pictures from Uranus.

As the nation mourns, Voyager's glory is eclipsed. But by mid-February Voyager scientists are preparing their first reports on what the spacecraft saw.

"We have more loose ends than with either the Jupiter or Saturn encounters," says the project's chief scientist, Ed Stone. "That's because we didn't know enough about Uranus going in to digest all the data as quickly."

For instance, Voyager revealed that the entire daylight face of



Gravitational sorting and local heating continue, smoothing the moon's surface but leaving evidence of giant impact.

Uranus is radiant with an ultraviolet phenomenon the scientists call electroglow. "Some unknown mechanism is pumping power into the upper atmosphere, causing its molecules to glow," says Stone.

The diffuse molecules are surprisingly hot—as high as 750°C. This heating, which is probably related to electroglow, causes the atmosphere to expand all the way into the rings. In fact the thin upper atmosphere's slight drag on small particles orbiting through it could contribute to their absence in the rings. Such particles would be slowed by the atmosphere, lose energy, and fall into the planet.

Scientists are also puzzling over the strange magnetic field Voyager found. The presence of a magnetic field indicates that some electrically conductive fluid is flowing within a planet, creating a dynamo effect. Imagine Earth's magnetic field, which is generated by molten iron in its core, as a bar magnet running through the center of the planet. Lines of magnetic force flow from our south pole, curve through space, and re-enter the planet at the north pole. Earth's magnetic poles are within 12 degrees of our geographic poles—our axis of rotation. But Uranus's magnetic field is tipped over 60 degrees from the axis of rotation. Moreover, its source is not the center of the planet. Uranus's bar magnet would be a third of the way between its center and surface.

One effect of this odd field, notes Voyager magnetic-field specialist Norman Ness, is that auroras, which normally appear near a planet's magnetic poles, will be equatorial phenomena on Uranus.

FRONTING BY STEPHEN WISHNER

CLEARLY something is odd inside Uranus. That notion is reinforced by another key Voyager finding—Uranus rotates once every 17.2 hours, versus the best estimate of 15.6 before the mission.

That slower rotation leads David Stevenson of the California Institute of Technology, one of the foremost theorists on planetary interiors, to speculate that the ingredients within Uranus may be more evenly distributed than suspected. Perhaps, suggests Stevenson, pieces of the Earth-size object that struck Uranus in its infancy, tipping it over, proved too hard for the planet to digest. The sudden injection of so much new rock-rich material could have disrupted the gravitational process by which planets differentiate themselves into increasingly dense layers toward the core. Further, the molten core may be smaller than theorized. And rather than an ocean, Uranus may have a superdense cloud of hot water and hydrogen swaddling its core.

The 17.2-hour rotation also creates problems for the weather scientists. The few clouds that could be seen through Uranus's thick sheath of hydrogen, helium, and haze are roaring counterclockwise, the same direction the planet spins, but faster. Theoretically that happens only on planets like Earth that receive more solar heating at the equator than at the poles. On Uranus, which should be warmer at the poles, the winds should be blowing against the direction of rotation.

"That implies the poles are colder deep down in the planet," says Voyager meteorologist Andy Ingersoll. "Or heat is leaking out from the interior along the equator. Or maybe the equator is being warmed by ring material falling in or by electric currents in the magnetosphere. We really don't understand."

Neither are scientists satisfied with the lonely pair of shepherd satellites in the rings.

"For Uranus's rings to be really ancient there need to be shepherds. Otherwise the particles would disperse," says specialist Jeff Cuzzi. "So either they are not that old, which is a good possibility, or there are shepherds too small for us to see. Or both."

If the rings are young, they are probably transient. They could be created when impacts break little moons into debris rings. Eventually, the ring material disperses or is captured by other moons nearby, and the rings vanish.

The composition of the rings still intrigues. Some think that they contain a dark, carbon-rich residue made as methane ice in ring particles was decomposed by radiation. Others suspect that the ring particles are made of exotic black rock.

They, and the moons, presumably coalesced from debris splashed out of the planet by the great primordial impact. Caltech's Stevenson suspects that the impact would have "shocked" the Uranian atmosphere, converting some of its copious methane into carbon monoxide and reducing the ratio of water in the material that splashed out. Thus he is not surprised when Voyager confirms that the moons of Uranus are denser than those of Saturn. They are rockier, dirtier objects.

Rock itself should be different at this far edge of the solar system. Here it would contain water-rich mixtures of carbon and clays, as seen in some

(Continued on page 194)





Pile of spare parts, Miranda was seen from as near as 29,000 kilometers. The cratered plains in this photomosaic are old terrain. The banded oval at lower left, ridged oval, top right, and "chevron," center right, are younger features—reflecting, as one scientist said, "all the strange places in the solar system rolled into one."

Tutor, tinker, planner, pilot

Turn on a tape recorder aboard Voyager, and that slight motion must be compensated for. Thousands of such details faced flight engineers Howard Marderness, Bill McLaughlin, and Gene Hanover (below, from left) as they planned their command sequences. They also had to reeducate Voyager to perform in a darker, colder environment than at Saturn – literally reprogramming the spacecraft while in flight.

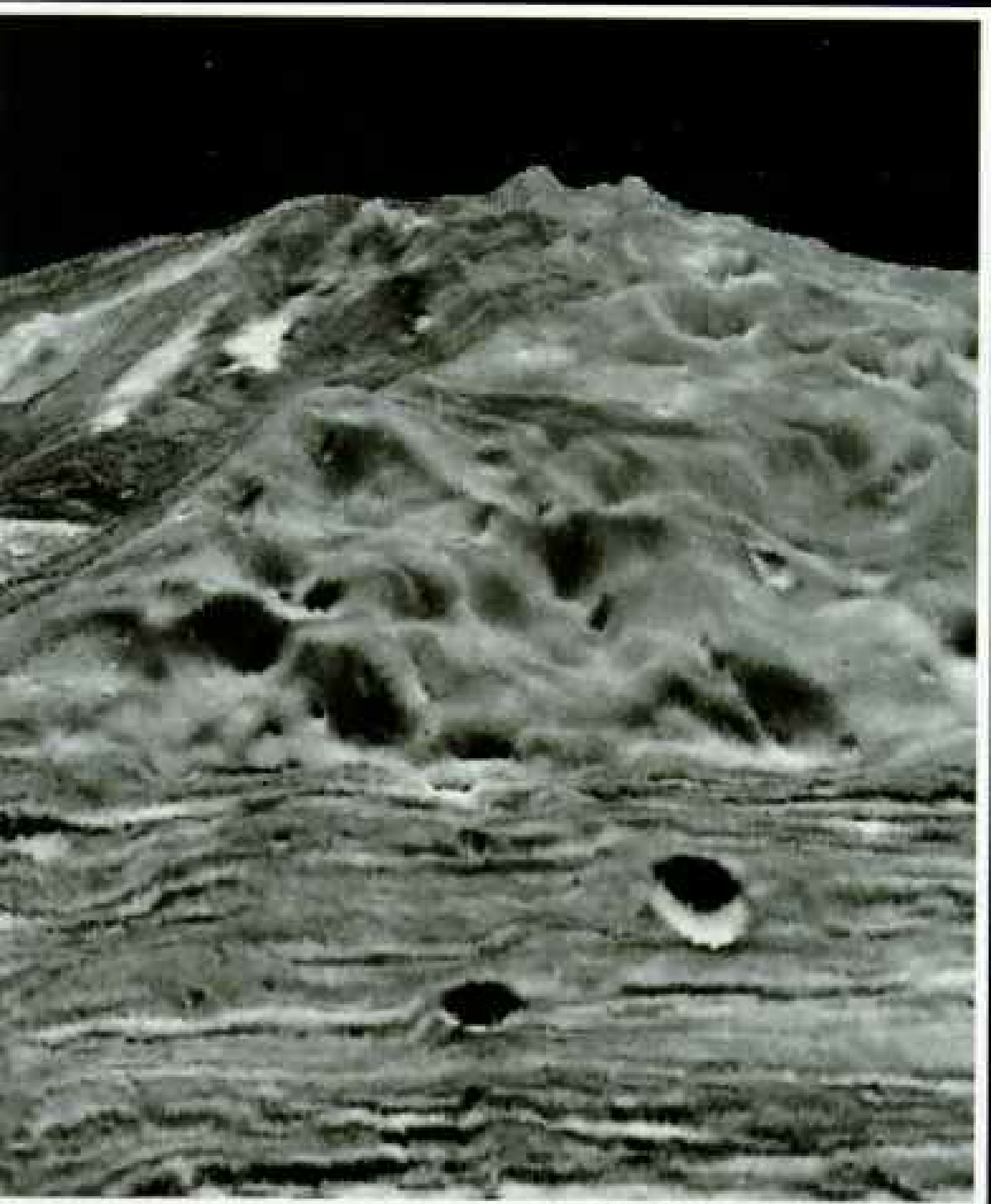


JAMES A. SUGAR





JAMES A. SUBAN



PHOTOGRAMMETRY BY USGS, FLAGSTAFF, ARIZONA

While the engineers gave Voyager a graduate degree in Uranian studies by remote control, navigators Don Gray, Tony Taylor, and project manager Dick Laeser (above, from left) managed to steer the craft through an imaginary 40-kilometer window. Proof of success came at Miranda. The cameras were not aiming at the void, but tracking perfectly to produce the most detailed close-ups Voyager had made of any object in its nine-year travels.

A corner of the chevron (above, far left) and an escarpment (above, center) ten times deeper than the Grand Canyon show clearly. When seen in a simulated three-dimensional image (left), Miranda's terrain appears even more tortured.



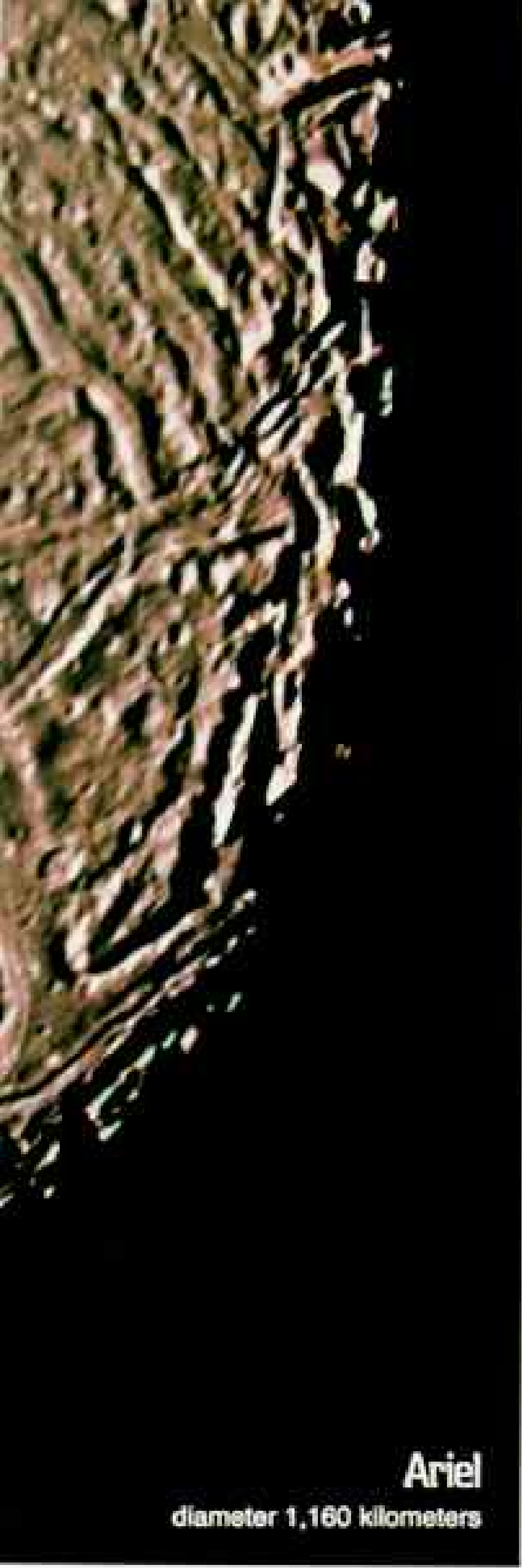
Quartet of moons out of tune

If Miranda was bizarre, the other large moons of Uranus upheld the family's eccentricity and lack of harmony. Next out from Miranda, Ariel has canyon-size systems with

floors called grabens, wedges that fall between faults caused by surface tension. These features indicate that Ariel was geologically active for several hundred million years. That activity might have been driven by a gravitational tug-of-war between Ariel, its sister moons, and Uranus — perhaps abetted by ammonia-water slush

acting the way molten lava acts on Earth.

Black sheep Umbriel looks like a textbook old moon, except that it has been covered, as if repainted, by a dark substance. The bright visible feature called the "doughnut" is perhaps the remnant of an impact that spewed a cloud of dark material out of Umbriel, material later



Ariel

diameter 1,160 kilometers



Umbriel

1,190 km



Titania

1,610 km

swept up by the moon as it continued to orbit through the dark cloud.

Titania, largest of the moons, shows evidence of geologic activity, though almost certainly much earlier than that of Ariel.

Oberon is distinguished by blackened floors in several of its craters. This could be dirty ice lava that filled the craters after comets struck.



Oberon

1,550 km

Disaster followed triumph for the space program when the shuttle Challenger exploded even as Voyager was looking back toward the sun at a crescent Uranus (facing page). It so happened that Voyager geologist Hal Masursky (below) was chairing an international committee to name newly discovered features and moons of Uranus. He holds mail sent in to request naming seven of the moons for the dead astronauts. Whatever that outcome, Voyager has an appointment for even more discovery—at Neptune in 1989.



JAMES A. SUGAR

meteorites. That rock would contain radioactive elements whose decay releases heat, just as radioactive heating keeps Earth's interior hot. If the Uranian moons have enough rock, then long ago they too could have been warm within.

THAT NEW KNOWLEDGE makes life easier—slightly—for scientists puzzled by the ferocity of geologic activity that Voyager found on the moons. For if a moon's interior had been warmer in its youth, melting ice within could have acted much like magma on Earth, creating ice volcanism and "slush tectonics." For instance, the black-floored craters of Oberon could be a slurry of the same carbon-rich rock that composes the rings. Oberon may not have had enough rock—and thus heat—to soften its icy innards and let all that rock segregate into a core. If so, the black coating could be dirty ice lava that erupted into its impact craters.

Such dirty ice flows, however, cannot explain dark Umbriel. The smooth, young-looking paint that mantles its ancient surface makes Umbriel the most perplexing moon.

"The only rational idea so far is that recently some big object struck Umbriel, creating that 75-kilometer doughnut," says deputy imaging team leader Larry Soderblom. "It blasted out dark particles that formed into a ring. Those particles would then have been painted on Umbriel's surface as it repeatedly swept through the ring. It's highly improbable that Umbriel had such a big impact so recently. But Voyager has taught us never to underestimate nature."

Soderblom's real love, however, is Miranda. Further analysis has shown two basic terrain types on Miranda—rolling, rather uninteresting plains and spectacular grooved regions. Two of these grooved regions are ovals 300 kilometers across. Both regions have cores and concentric ridges and valleys that seem to be eating into the surrounding plains.

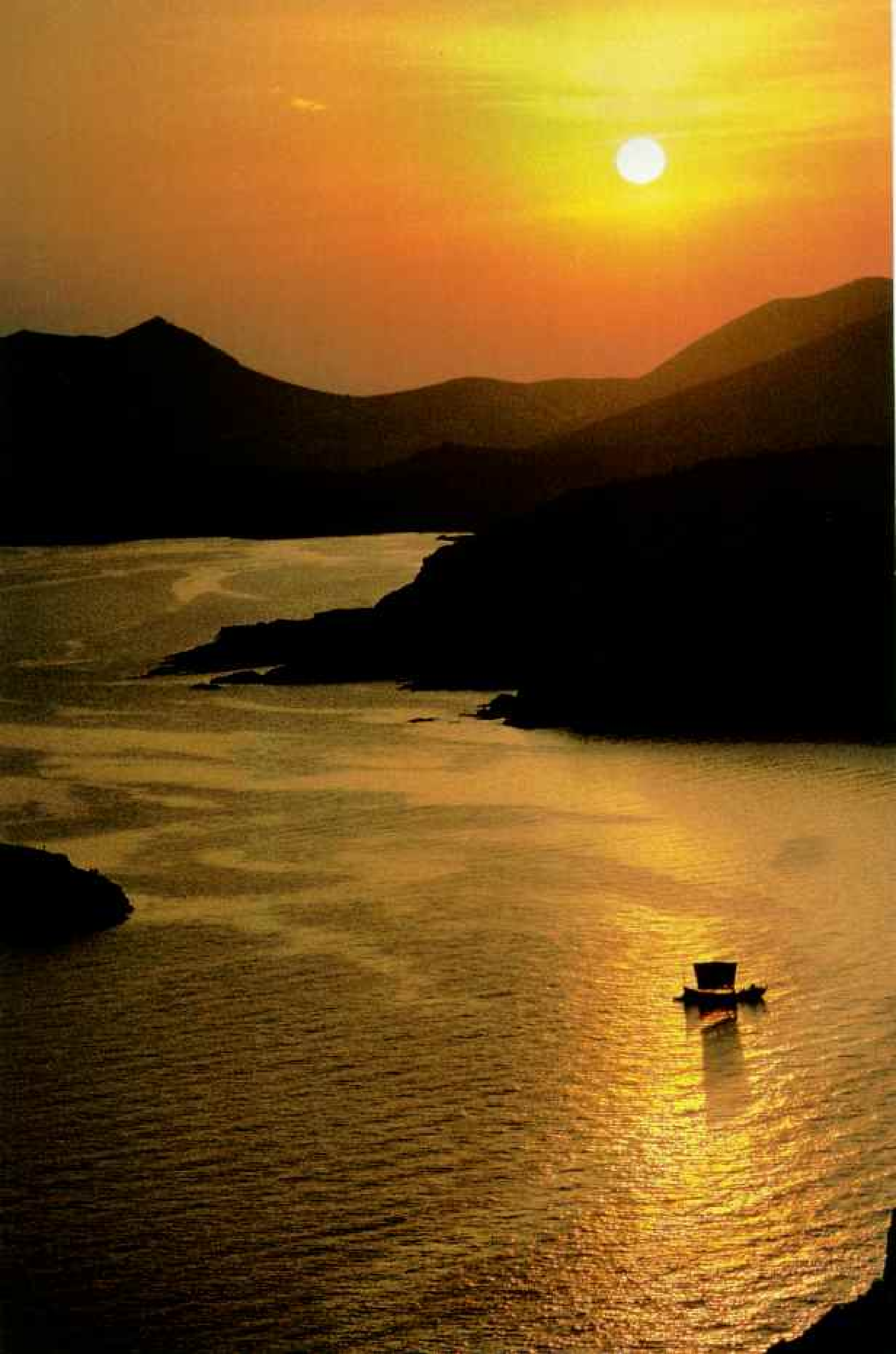
A third, smaller region, called the "chevron" because of its shape, also shows a zone of grooves. But it is broken at sharp angles, probably by the intersections of great fractures that criss-cross Miranda. One of these fractures creates that imposing 20-kilometer canyon wall. Soderblom calculates that, in the low gravity on Miranda, it would take a person nine minutes to fall to the canyon floor.

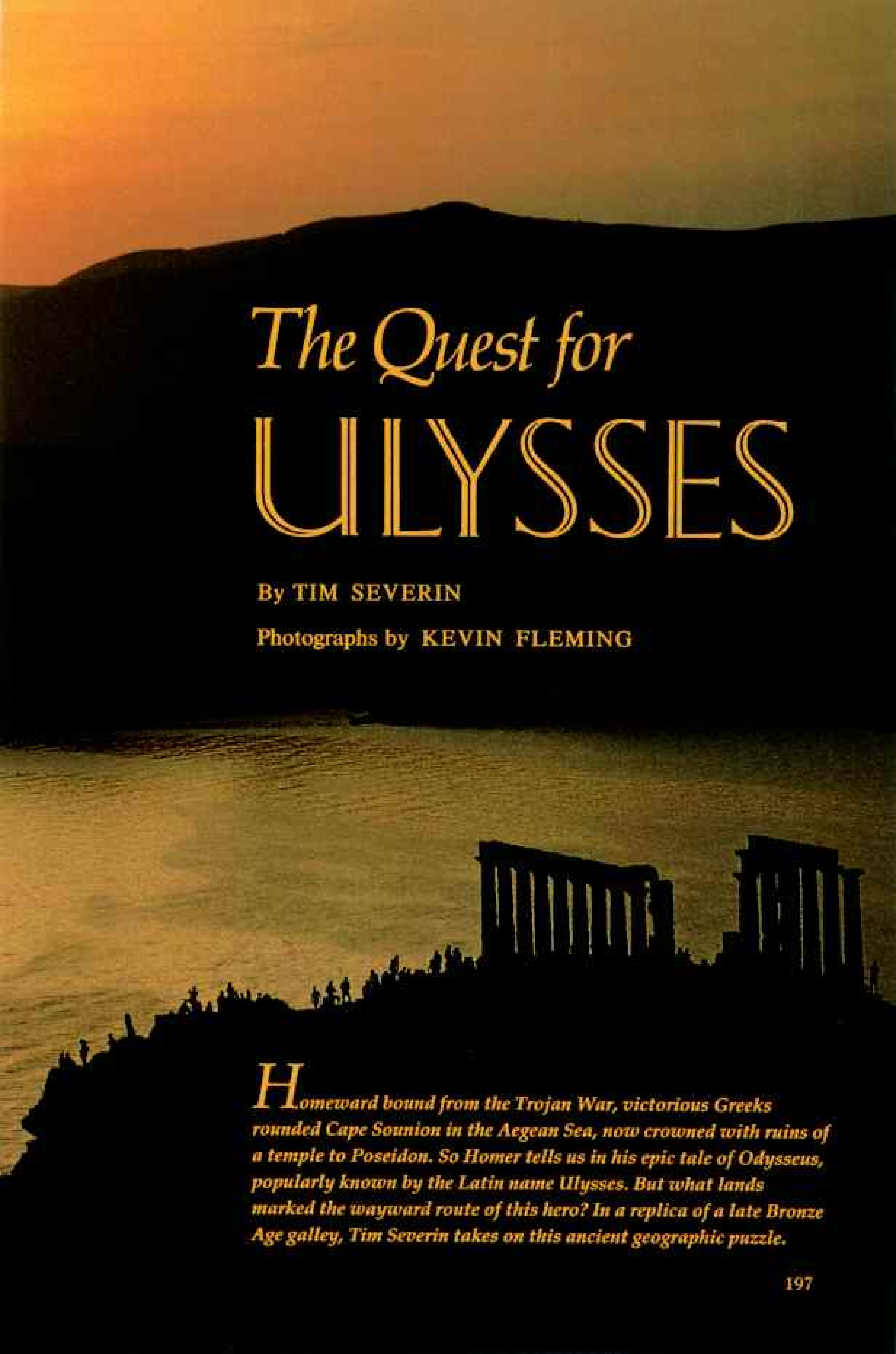
Miranda's fractures, says imaging team member Torrence Johnson, look like seams where chunks of rock and ice coalesced. He explains that Miranda was blasted apart by a huge body, then reassembled. But its pieces lacked the energy to heat up and mix together. Miranda may be a frozen record of how all planets coalesced from many pieces.

Every theory has its problems. As Brad Smith puts it: "To create a historical scenario for what Voyager saw at Uranus, we need more miracles than any thinking person will accept."

This leaves him perplexed and anxious. Anxious because it may be decades, even centuries, before we can afford another mission to Uranus. "We've got to understand Uranus with what Voyager gave us. There's not going to be anything in our professional lifetimes that will tell us more." □







The Quest for ULYSSES

By TIM SEVERIN

Photographs by KEVIN FLEMING

*H*omeward bound from the Trojan War, victorious Greeks rounded Cape Sounion in the Aegean Sea, now crowned with ruins of a temple to Poseidon. So Homer tells us in his epic tale of Odysseus, popularly known by the Latin name Ulysses. But what lands marked the wayward route of this hero? In a replica of a late Bronze Age galley, Tim Severin takes on this ancient geographic puzzle.

And now I call upon you for a true account of your wanderings.

To what parts of the inhabited world did they take you?

“LIVE OIL! More olive oil for the steering oars!” The crew took up the cry jubilantly, shouting forward to Nazem, our cook for the day. Nazem, five feet four inches tall and looking like a miniature Barbary pirate with a five-day beard and a bandanna round his head, disappeared under a rowing bench. A minute later a greasy flagon was being passed hand to hand down the length of the ship. “Here,” said John, our ship’s doctor, “a present for Ulysses.”

As I poured a liberal dollop to lubricate the leather strap that held one of the twin steering oars in place, I reflected that we were indeed a motley crew. Doc John was one of four Britons, Nazem a Syrian, Rick an American, and Theodor a Bulgarian. A Greek, a Turk, and three Irishmen completed our crew. Three weeks earlier we had begun a Mediterranean voyage aboard *Argo*, a 54-foot model of a late Bronze Age galley, to try to make sense of one of the world’s oldest geographic riddles: Where did Odysseus—or Ulysses, to use the more familiar Latin version of his Greek name—go on his homeward voyage from the siege of Troy, the journey Homer described in the *Odyssey*?

Our search for Ulysses’ route was the second voyage for which *Argo* had been built. Fashioned by a Greek shipwright on the island of Spetsai, she had carried us in the summer of 1984 from Greece to the Black Sea coast in the wake of Jason on his quest for the Golden Fleece.

Argo’s second quest had begun at Troy itself, scene of the most famous siege in literature (map, pages 200-201). For ten years, so the tale runs, the Greeks tried to capture the city and win back fair Helen, whose abduction from Sparta had launched the war.

To the consternation of those who thought Homer spun pure fiction, German archaeologist Heinrich Schliemann in the 1870s found the ruins of Troy on a low hill in Turkey several miles from the Dardanelles.

For me there had been a special lesson—how *small* Troy was. It measured barely 600 feet across. You can walk the circuit of its ancient walls in less than five minutes. Yet one scholar has calculated that Homer’s verse describes a metropolis of 50,000 inhabitants. Nor was Troy built on a lofty crag as Homer would have us believe, but on a bluff merely a hundred feet high. With the magic of his poetry Homer took a small citadel and turned it into the towering city of our imagination.

Perhaps, I thought, the sites of the *Odyssey* were equally modest spots that Homer had exaggerated for the purposes of a wondrous yarn. But there had been a real Troy, so why not a real Ulysses? Homer tells us that Ulysses led the Greek contingent that had come farthest, from the Ionian Islands on the western fringe of Greece. He devised the stratagem of the wooden horse that caused Troy’s fall, and boastfully called himself sacker of cities. His character was important to our quest. Renowned as ruthless, resourceful, crafty, Ulysses was also cautious. He would seek gain, but with the least risk. Such a man does not take chances with the sea.

Tim Severin has combined scholarship with exploration to shed new light on the voyages of St. Brendan, Sindbad, Jason, and Ulysses. His findings and adventures have been reported in NATIONAL GEOGRAPHIC articles. A resident of Ireland, he is an honors graduate of Oxford and the author of nine books. Award-winning Kevin Fleming, an avid sailor, has photographed extensively in the Mediterranean Sea.

*“It’s the logical route,” says Tim Severin, nearest *Argo*’s stern, of his interpretation of Ulysses’ landfalls. He places most in Greece, believing that Ulysses was trying to return home as soon as possible, “not traipsing off exploring.” As the legend spread westward with Greek colonists, Italy became identified as the scene of many of Ulysses’ adventures, a tradition Severin contests.*





CATTLE OF THE SUN

PHAEACIANS

TRIUMPH



THE TROJAN HORSE

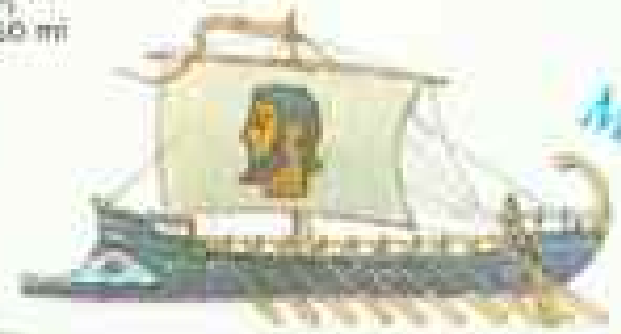


POSEIDON



Argo's landfalls followed a different order than Ulysses' and excluded Libya, probably the realm of the Lotus-eaters, and Malta, traditional home of the lustful goddess Calypso.

▲ Archaeological site
Historical names shown thus: TROY



Mediterranean



SCYLLA

ARGO'S SEARCH FOR ULYSSES



CICONES

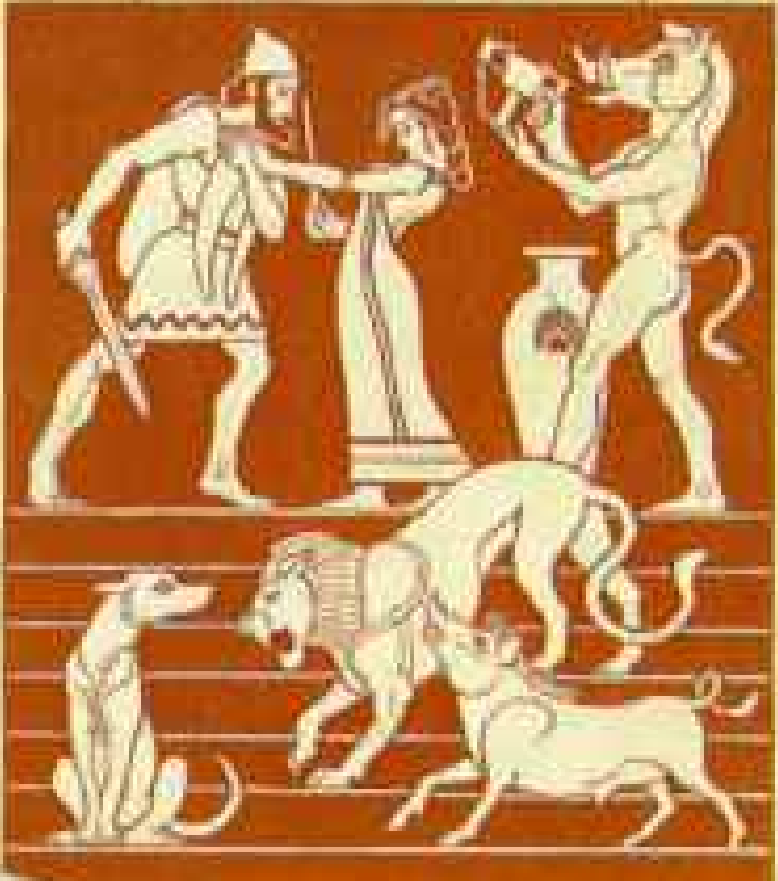
LOTUS-EATERS



MAKING BY JAMES M. BURDET
 MERCANTORAPHIC DIVISION
 RESEARCH: WALTER CROWL, LINDA BRITS
 PRODUCTION: ELLEN LANGOMAN
 MAP EDITOR: JOHN BLUETT



CYCLOPS



CIRCE

"THE WHOLE WORLD talks of my stratagems, and my fame has reached the heavens," boasted Ulysses, who devised the Trojan horse to sneak Greeks into Troy, thus finally ending the decade-long conflict chronicled by Homer in the Iliad. The map frieze portrays scenes from the Odyssey, the story of Ulysses' ten-year-long journey home to Ithaca. His 12-ship squadron first plundered "a generous supply" of wine in an attack on the Cicones of Ismarus.

"Accursed winds" at Cape Malea pushed them "across the fish-infested seas" to the land of the Lotus-eaters, whose "honeyed fruit" caused men "to forget that they had a home to return to." Escaping, they sailed to Crete, Severin believes, where they encountered the Cyclops Polyphemus. He devoured several crewmen before Ulysses blinded the giant's single eye and helped the men slip away.

The spellbinding goddess Circe transformed crewmen into animals, but Ulysses foiled her magic and lingered as her lover for a year on her island—probably Paxos in Severin's theory.

Six men were lost to the jaws of Scylla as Ulysses' only surviving ship passed beneath her lair to avoid the adjacent whirlpool, Charybdis (inset).

Poseidon, god of the sea, sent fierce storms to punish the hero for blinding Polyphemus, his son. Only Ulysses survived when Zeus destroyed the ship after its crewmen slaughtered the prized cattle of the sun god, Hyperion. The kind "sea-faring Phaeacians" ferried him home, where, in a contest among suitors courting his wife, Penelope, only the disguised Ulysses could string his powerful bow. Slaying the dozens of competitors, he reclaimed his throne.



"Look at the route Ulysses chose to go home," I remarked to Theodor, our Bulgarian crew member, when he joined us on the first leg of our journey. "It's entirely in character. Homer tells us that Ulysses chose a different homeward route from the rest of the Greek fleet. He took his 12-ship squadron northwest along the coast of Thrace. This was a safe course, in sight of land all the way, and just what a prudent captain did aboard a Bronze Age ship. This also brought him conveniently to the land of the Cicones, allies of the Trojans. He could plunder them on the way."

Theodor nodded. "That's where he picked up the powerful wine that was to save his life when he met the giant one-eyed Cyclops, isn't it?" He smiled. "Many traditions link Thrace with Troy. In fact, my own surname, Troev, suggests a Trojan origin."

AFTER ULYSSES pillaged Ismarus, the city of the Cicones, he urged his men to take to their heels with their loot. But they kept on drinking wine and butchering sheep and cattle. The Cicones counterattacked, killing several men from each ship.

Fortunately no such attack met us when *Argo* passed along the same Thracian coast, though we did get our share of the famous wine. On the Greek island of Thasos, townsfolk presented honey, flasks of black Thasos wine, and miniature bottles of ouzo, the anise-flavored liqueur.

"After the heroic Jason, how does it feel to be following the wily Ulysses?" asked the mayor. "Let's hope you are shrewder than Ulysses—that it won't take you ten years' voyaging to get home!"

That is one of the popular misconceptions about the *Odyssey*. Homer says it took Ulysses ten years to get back to "sea-girl Ithaca." But when you take the actual sea time in the story, it barely adds up to a single sailing season. The rest of the *Odyssey* he spent ashore, seven years of it with a beautiful and amorous nymph named Calypso.

Ulysses' troubles began at Cape Malea, the southeastern prong of the Peloponnesus, which hangs down into the Sea of Crete like a root of a tooth. This is the last point where we can positively trace him by Homer's place-names. "When you double [round] Malea, forget your home," warns the Greek adage, aptly.

"I should have reached my own land safe and sound," Ulysses recounts, "had not the swell, the current, and the North Wind combined, as I was doubling Malea, to drive me off my course and send me drifting past Cythera."^{*}

From Malea, gale winds drove Ulysses south. "For nine days I was chased by those accursed winds across the fish-infested seas. But on the tenth we made the country of the Lotus-eaters. . . ."

Where was this? Most scholars place the Lotus-eaters on the coast of North Africa. But we have no precise landfall. We only know that the natives ate a "honeyed fruit" that caused men to forget their homelands. This narcotic plant has been variously identified as hashish, jujube, the lotus lily, even the common date.

Nine days of drifting in a galley—if we accept the nine days—would raise the North African shore. This had been a controlled drift, not a helter-skelter rush before a gale, because the squadron had stayed together. At a drift speed of one and a half to two knots—*Argo's* pace in similar conditions—a north wind would have brought them to the coast of Cyrenaica, today in Libya.

At the Libyan People's Bureau in Athens I had sought visas for our international crew. But we received no reply from Col. Muammar Qaddafi's officials in Tripoli.

The absence of Libyan visas proved a blessing in disguise, for while *Argo* was off Crete, a premature *meltemi* struck. A seasonal wind of the eastern Mediterranean, the *meltemi* blows fiercely from the north for days on end. This could have been the

^{*}Homer quotations are from the Penguin Classics edition of *The Odyssey*, translated by E. V. Rieu.

"Golden Mycenae," in Homer's words, was probably the strongest of the petty kingdoms that ruled Greece in Ulysses' day, about 1250 B.C. Hailed as the home of Agamemnon, who led the fight against the Trojans, this citadel yielded gold treasures in the 1870s soon after Troy was unearthed, lending credence to Homer's tales.





*Far from planning to come
here, we meant to sail
straight home.*

Under the gaze of a Mycenaean noble painted on the sail and the charm of a lucky eye on the bow, Argo cuts through the Ionian Sea, staying—as Bronze Age boats sought to do—in sight of land. “It was not unknown for ancient sailors to be blown off course,” says Severin, “but they were not lost or helpless. They could track their direction by winds, wave patterns, the sun, and stars.” Sailing in 54-foot Argo, he and a 12-man international crew could motor when necessary, unlike Ulysses’ men, who would “dash in with their oars . . . to save their skins.”

wind that drove Ulysses off course. Argo took a daylong battering, as wind and waves inexorably drove us down on Crete’s rocky, sparsely inhabited west coast. For the first time in all her voyaging I ordered the storm anchor readied. I could see nowhere to shelter, only sheer cliffs broken by an occasional shallow, unprotected inlet. Was that a wind shadow under one cliff? We headed for it. “Let go the anchor!”

Cormac, six feet four inches of Irish fisherman, tossed it overboard like a toy. It plunged into foul ground, a mass of rocks and boulders, but held firm.

For seven days we clung on grimly in the same spot, taking turns going ashore to a village an hour’s walk into the hills to pick up supplies, while the onboard watch lay on the oar benches with the wind shrieking unceasingly overhead. Ulysses’ men had once done the same. Their sails shredded, they rowed



for land where “we lay for two days and two nights on end, with exhaustion and anxiety gnawing at our hearts.”

Not the irrepressible Cormac. Derry, his compatriot, notorious for his appetite, was bitten by a snake while hiking inland, but was unhurt. Next morning Cormac cheerfully shook him awake. “Derry, I’m off for breakfast. Will you come ashore for a bite?”

Homer does not say that Ulysses was lost when he got to the land of the Lotus-eaters. The sun by day, the stars by night, and the wave pattern would have told an experienced Bronze Age mariner the general direction he had been drifting. As soon as the weather eased, he could retrace his course back to Cape Malea and head homeward. In fact, later Greek ships used a well-defined return route from Cyrenaica. They followed the African coast eastward until it fell away on their right hand, then struck out northward. This brought them by the shortest sea

crossing to Crete. And it was there, by my reckoning, that Ulysses and his squadron would have met their next adventure—the encounter with the Cyclops.

WE SCoured Crete’s south coast, looking for the cave in which Ulysses met the one-eyed giant. One clue suggested we were on the right track: the wild goats of Crete. Homer states that Ulysses’ squadron made a landfall on an offshore island swarming with goats. Never having seen humans before, they made easy prey for the hungry sailors, who feasted on more than a hundred. Crete is still the home of the *agrimi*, the original wild goat of the Mediterranean. Its massive curling horns and muscular body provided a favorite subject for Bronze Age painters, sculptors, and metalworkers.

Something else in Crete still survives from

the Bronze Age—the Cyclops himself, or a legendary creature astonishingly like him.

Mihalis Fasoulakis, schoolmaster at the village of Pitsidia, told me about the *triamates*—ogres from Cretan folklore still feared by shepherds in the mountains.

"Two local men," Mihalis began, "were traveling to Iraklion, the capital of Crete. On the way the pair came to a village called Skylochori, where two fierce dogs guarded each house."

The men asked a woman for shelter. She would fetch her husband, she said, and left them with her son. As they waited, one of the travelers touched the boy's head. To his horror he noticed the boy had a third eye in the back of it—the mark of the *triamates*!

"The boy," Mihalis continued, "let on that his mother had gone to fetch other *triamates* to slaughter and eat the travelers. Instead, the men killed the boy and escaped by feeding pieces of his body to the guard dogs. Then they raised a posse and returned to slay the monstrous inhabitants of Skylochori.

"The place was on the road between Dafnes and Iraklion," Mihalis assured me. "Near here, at Drakotes—the place of the monster—you will find a line of caves in the clifftop where Ulysses met the Cyclops."

THE TALE of Ulysses and the Cyclopes is familiar to every schoolchild, yet it never grows old. Homer describes the one-eyed giants as "fierce, uncivilized people" who dwell "in hollow caverns in the mountain heights."

Ulysses climbed up to the cave of Polyphemus, one of the Cyclopes, and found him absent. In the cave were baskets of cheese, pails of whey, and folds full of kids and lambs. His shipmates were eager to steal the cheese and drive the flocks to the ship. But Ulysses was curious to meet their owner.

He got more than he bargained for. When the giant returned, he sealed the mouth of the cave with an enormous boulder, grabbed two of the sailors, dashed out their brains on the floor "as though they had been puppies," and ate them raw. Then he settled down to sleep.

Next day was no better. Polyphemus kept the intruders trapped behind the boulder while he went out to tend his flocks. On his

return he killed and ate two more of the men.

By now the wily Ulysses had worked out an escape plan. He made Polyphemus drunk with the potent wine from Thrace, and when Polyphemus fell into a drunken sleep, Ulysses and his men heated a great stake in the fire and thrust it into the giant's eye, blinding him.

Next morning, when Polyphemus rolled back the boulder to let his flocks out to pasture, the sailors escaped by clinging under the bellies of the animals, Ulysses hanging on to a great ram.

But as his ship rowed away, Ulysses rashly shouted taunts at Polyphemus, and the enraged blind giant hurled jagged boulders that only just missed the ship.

In dozens of places in the Aegean, even in the Black Sea, fishermen have confidently pointed out to me, "These are the stones the Cyclops threw." At Drakotes too: Offshore rocks seemingly broken off the cliff were claimed to be Polyphemus's missiles.

Homer certainly knew of the area, for he mentions both Phaistos and the nearby cliffs elsewhere in the *Odyssey*. Had he picked up the Cretan folktale of man-eating *triamates* and worked them into his tale?

Kostis Paterakis, a former partisan, showed me another candidate for the giant's cave. He came to meet us at Sougia on the south coast of Crete, just as he and his comrades-in-arms used to meet Allied agents landing from submarines to wage guerrilla war against the German occupation. Kostis and his brothers had hidden the agents and their weapons in a cavern known as the Cave of the Cyclops (page 210). Today Kostis looks more like a benign bank manager than a crack shot. But he strode up the ankle-turning rock faces like a man half his age as he brought me to the grassy ledge outside the great cavern. "Before the war," he told me, "we would gather a thousand sheep in this single cave."

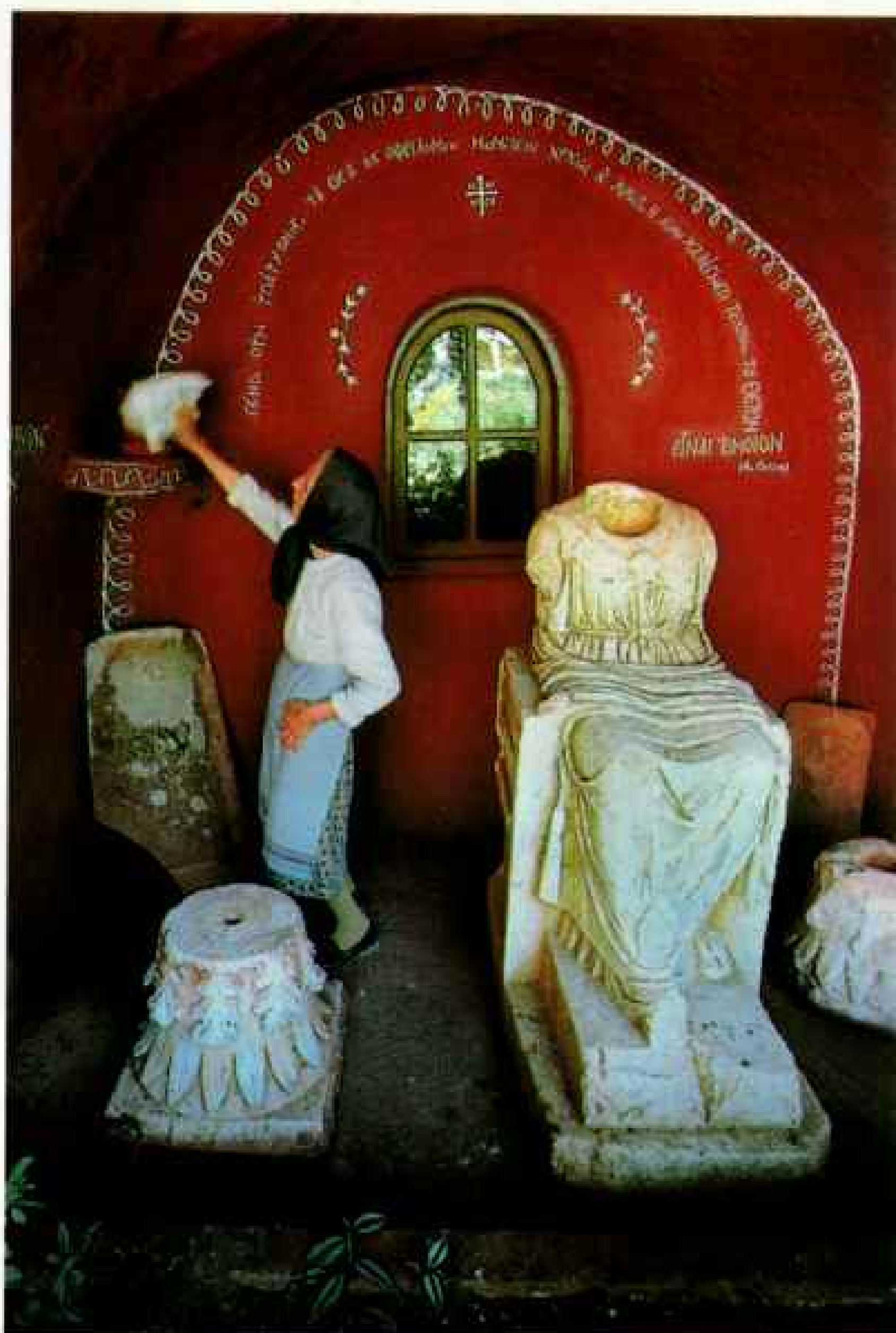
The resemblance to Homer's cave was uncanny. A great boulder nearly blocked the entrance. The vaulted roof high overhead was streaked with the smoke from countless shepherds' fires. Fresh water dripped from it into a basin hollowed from a log, and there was even a corral built of rough stones where sheep were caught and milked as Homer had described. Indeed, no carpentry squad

preparing a set for a film on Ulysses could have done such a good job. And here's the question—which came first? The story or the cave? Was it called the Cave of the Cyclops because it looked like Homer's cave? Or had it inspired the story?

THE ISLAND of Aeolus, the keeper of the winds, was Ulysses' next landfall. "All round this isle there runs an unbroken wall of bronze, and below it the cliffs rise sheer from the sea," relates Homer. Ulysses and his squadron stayed a month, hosted by Aeolus and his six sons and six daughters, who feasted on roast meat and lived untroubled by neighbors. On the logical return route from North Africa via Crete, one spot that matches this description is the old pirate stronghold of Grabousa off the northwest corner of Crete.

Grabousa looms sheer from the sea, just as the *Odyssey* describes it. I asked Will Stoney, the expedition artist, to sketch the island stronghold. "The rock face looks almost man-made," he commented. "The strata and the vertical cracks are so regular they look like the work of giant stonemasons. And I suppose it's the quality of westering light from the setting sun across open sea that turns the rock that remarkable rich red-brown"—the very color of Homer's bronze wall (pages 212-13).

In terrain, position, and color Grabousa fits Aeolus's island. But the real surprise came later, when I checked the island's history. As ruler of the winds, Aeolus bottled up the gales in a leather bag, which he gave to Ulysses. He then summoned a gentle



"I will stand at your side," promised the goddess Athena, who helped the "wise but unlucky" sailor finally make his way home. A monastery on the eastern Peloponnesus preserves her headless statue but adds a halo of words from the Apostle Paul: "Forasmuch then as we are the offspring of God, we ought not to think that the Godhead is like unto gold, or silver, or stone, graven by art and man's device."

wind to blow him on his way. Homer makes much of this bag, fashioned "from the flayed skin of a full-grown ox" and secured tightly "with a burnished silver wire so as to prevent the slightest leakage."

Eratosthenes, a third-century B.C. Greek geographer, convinced that the *Odyssey* was imaginary, scoffed, "You will find the scene of the wanderings of Odysseus when you find the cobbler who sewed up the bag of the winds." I discovered that classical Greeks knew the island of Grabousa as Korykos. In ancient Greek Korykos means "leather bag." *Argo* had found Eratosthenes an answer. We hadn't discovered a cobbler, but we had located the leather bag.

NOW WE SOUGHT the cove of the Laestrygonians. Here 11 of Ulysses' ships sailed into a harbor "closed in on all sides by an unbroken ring of precipitous cliffs, with two bold headlands facing each other at the mouth so as to leave only a narrow channel in between."

It was a death trap. Locals lining the cliff-tops tossed down rocks that smashed the thin-skinned galleys. And "the groans of dying men could be heard above the splintering of timbers."

Only Ulysses' vessel escaped. Prudently he had moored his vessel to the point outside the harbor. "I drew my sword from my hip, slashed through the hawser of my vessel, and yelled to the crew to dash in with their oars if they wished to save their skins. With the fear of death upon them they struck the water like one man, and with a sigh of relief we shot out to sea and left those frowning cliffs behind. My ship was safe. But that was the end of all the rest."

The massacre cove, I felt, should be unmistakable. It would be surrounded by high cliffs, large enough to fit 11 galleys "close together," yet so small that boulders could be tossed down it, almost like a well shaft. In 20 years of sailing I had never seen such a place.

We took *Argo* north from Grabousa, tracing the route Ulysses would logically follow if he were taking his squadron home by the shortest path.

Near the tip of Mani Peninsula we came upon what surely must be the massacre cove—the incredible harbor of Mezapos.



*When they drank this red and
honeyed vintage . . . those
were occasions when abstinence
could have no charms.*

The wiles of wine served Ulysses on his journey, soothing his crew and befuddling enemies. On Ithaca today the Digaletou family gather and crush their grapes much as Ulysses must have harvested his vineyard, "when the branches felt their weight under the summer skies."





*For I had an instant foreboding . . .
that we were going to find
ourselves face to face with some being
of colossal strength and ferocity.*



PHOTOGRAPHED AT BADISCHES LANDESMUSEUM, KARLSRUHE

Riddled with caves, the southwestern coast of Crete beckoned Severin as the land of the Cyclopes, the one-eyed giants "to whom the law of man and god meant nothing." Ulysses plied the Cyclops Polyphemus with wine until he "toppled over and fell face upwards," and then blinded him with an olive-wood stake hardened by fire. Argo's American crew member, Rick Williams, fuels a similar blaze (right). The men escaped the Cyclops' cave clinging to the undersides of his sheep. The largest ram hid Ulysses, here painted on a sixth-century B.C. krater (left). In this cavern (above), locally called the Cave of the Cyclops, shepherds still pen sheep. In World War II it sheltered anti-Nazi guerrillas and their weapons.





*All round this isle there runs an unbroken wall of bronze,
and below it the cliffs rise sheer from the sea.*



"This place gives me the shivers," muttered Derry as we squeezed *Argo* through Mezapos' narrow entrance. Two headlands enclosed a circular pool just big enough to have held Ulysses' galleys. Here was a freak of nature. Cliffs rising a hundred feet loomed over us menacingly. It was like sitting inside a barrel.

"Ulysses' ships never had a chance," Rick commented. "Two men with spears could close the entrance, and the other tribesmen could drop rocks straight down from the cliffs. It was sheer butchery." I found the airless cove spooky in the extreme—sultry, claustrophobic, and dead, despite the handful of fishing boats moored here. Even Cormac was affected. "Let's find a taverna and get some cold beer. This place needs cheering up," he announced.

Three hours later I found him with shipmates in the taverna. "The people around here are still pirates," Cormac growled. "You should see what they charge for beer—not even cold at that. Worse yet, we've drunk up their entire stock."

WWE TRAVELLED ON in utter dejection," says Ulysses after the massacre by the Laestrygonians, until his galley came to the island of Aeaëa, home of the sorceress Circe. Homer does not say how far it was, and indeed obscures its position. "East and West mean nothing to us here," Ulysses told his men after they landed. "Where the Sun is rising from when he comes to light the world, and where he is sinking, we do not know." Here lived the bewitching Circe in a forest glade where the wild animals came to fawn on her.

She cast a spell on Ulysses' first exploring party and turned the sailors into swine. Then she herself fell victim to Ulysses, who evaded her magic and threatened her life. She restored his men to human form, and for a whole year the crew idled on Aeaëa while Circe became Ulysses' lover.

The best clue to Aeaëa's location comes when Circe sends Ulysses and his men to visit the Halls of Hades to seek advice of the Theban seer Teiresias. One day's sail brings them to the mouth of the River Acheron. There they land and march upriver to its junction with the River Pyriphlegethon, the

"The boisterous energies of all the Winds" were trapped in a leather bag and given to Ulysses by Aeolus, warden of the gales. The description of his home fits tiny Grabousa off northwest Crete. Its ancient name, Korykos, means "leather bag."



*All day long . . . the courtyard
echoes to the sounds of
banqueting within.*

As Aeolus feted Ulysses, so Severin and crew feasted with Cretans who gather wild goats and sheep on Grabousa (below).

Only Ulysses' ship later survived the Laestrygonians, who crushed his squadron by hurling boulders from surrounding cliffs. The anchorage at Mezapos on the Greek mainland (left) matches Homer's portrayal.



River of Flaming Fire, and Cocytus, the River of Lamentation. Here, at the foot of a great rock, Ulysses makes sacrifices and consults the spirit of Teiresias.

Of all the locations in his wanderings, the Halls of Hades are least in doubt. The Greek writer Pausanias noted in the second century A.D. that the place Homer had in mind was near Parga on the Greek mainland. It was the Necromanteion, or Oracle of the Dead. Three miles inland the River Acheron—which still bears the same name—was joined by two streams around the base of a rocky outcrop. One of the two streams, the Cocytus, is now called the Vouvos. The other, until being diverted for agricultural purposes, was described by local people as phosphorescent, “rumbling and echoing”—clearly the River of Flaming Fire. Here archaeologists have recovered the remains of a Mycenaean burial inside what was later a renowned oracular shrine to the dead.

If the Halls of Hades were at the Necromanteion, then Circe's home is likely to have been on the island of Paxos, an easy day's sail away. Paxos is still a seductive island, small, green, and intimate. The single permanent spring of drinking water on the island is at Ipapandi at the head of a mossy glen overhung with ferns and trees. This, if anywhere, is the spot where legend would locate a fairy figure like Circe.

WHEN ULYSSES finally left Circe's island, she directed him how to get home to Ithaca. First he was to sail to the place where the Sirens lured men to their deaths by the beauty of their song. If he plugged his crew's ears with wax and they lashed him to the mast so that he could not leap overboard, he could ravish his senses with the Sirens' singing as his men rowed past. Then he had to choose one of two routes: Either he went past the Clashing Rocks, where the sea heaped dangerous swells, or he could risk the narrow passage between the monster Scylla and the whirlpool Charybdis.

Classical geographers located Scylla and Charybdis in the Strait of Messina, between Italy and Sicily. But this is 250 miles—a colossal distance for a Bronze Age galley—away from the Oracle of the Dead in

But before I can send you home you have to make a journey of a very different kind, and find your way to the Halls of Hades.

Greece, where archaeological evidence is so strong. Besides, Homer's Charybdis is small enough to have a fig tree hanging over it, while the Strait of Messina is more than two miles wide. Significantly, *another* Scylla lies just 24 miles south of the River Acheron on the coasting route to Ithaca.

Sailing to investigate this Cape Scylla, we stumbled across another coincidence that helped make sense of the legend. At *Argo's* helm as we passed along the west coast of the island of Levkas, I glanced to my left when we drew level with the islet of Sesoula. My eye caught a column of light shining through a great hole in the tall gray rock.

Rick took the rubber dinghy to investigate. "It's not a cave," he returned to report, "but a huge crack about nine feet wide. The flat sides go down as far as I could see, at least a hundred feet underwater."

The Clashing Rocks, another sea myth of antiquity! These two masses of rock threatened to crush any ship that tried to pass between them. Jason is said to have threaded them on his way to fetch the Golden Fleece. But Homer has Jason sailing between them on the homeward leg, which calls for the impossible feat of sailing from the Black Sea up the Danube and out into the Adriatic. Yet here by a quirk of nature was the living image of the Clashing Rocks in the Ionian Sea!

I took another look at the chart. Two tantalizing pieces of the jigsaw puzzle were at hand—Cape Scylla and a candidate for the Clashing Rocks. Suddenly the whole picture fell in place: Circe's instructions to Ulysses for getting home to Ithaca were in fact the sailing directions for going past Levkas. Either you must go by the open sea, then pass Sesoula Rock, which looked like the Clashing Rocks, or you must take the tortuous

inner channel between Levkas and the mainland, and pass Cape Scylla.

SO WHERE was the place of the Sirens? According to Homer, it was a seaside "meadow piled high with the mouldering skeletons of men." Here, Circe said, Ulysses had to change course. On the north point of Levkas, where a sailor had to choose the inner or seaward passage, stands Gyrapetra, meaning the "rock of turning." Our chart marked three tumuli—ancient burial mounds. What better place for mouldering skeletons?

Windsurfers now skim past the sands of Gyrapetra, riding the afternoon breeze that sends rollers bursting onto Plaka Spit, a ruler-straight dike of conglomerate two miles beyond Gyrapetra. To enter the inner channel between Levkas and the mainland, you must round the spit or cut through a foaming gap in it.

"We had no sooner put this island [of the Sirens] behind us than I saw a cloud of smoke ahead and a raging surf," Ulysses recounts, "the roar of which I could already hear. My men were so terrified that the oars all dropped from their grasp. . . ."

I couldn't resist the challenge. Kevin Fleming, our photographer, went ahead with the dinghy to take up position, standing waist deep on the rocks amid the breakers. I aimed just inside the telltale foam, and *Argo* hurtled toward the spit. Two fishermen in a skiff gaped in awe as the galley shot past. Then I saw their net—directly in our path. If the net fouled the steering oars, *Argo* would crash into the reef.

Too late to stop. *Argo* was going flat out. There was just room to squeak through, if *Argo* could be made to swerve. I wrenched

Venturing to the mouth of the underworld, Ulysses made sacrifices as instructed by Circe. The Odyssey locates Hades at a junction of streams along the Acheron River. On that river in western Greece an 18th-century church—here lit by flares—lies atop a Mycenaean burial and a later Oracle of the Dead. This archaeological evidence helped Severin plot Ulysses' voyage: Circe's island of Paxos lies a day's sail to the west and Levkas, site of Scylla and Charybdis, to the south.





the twin steering oars over. As she responded, a round-shouldered swell picked her up and carried her over. We saw the dark shadow of the rocks flash under us, and the blacker patch of *Argo's* shadow flicker over them. "Cast off main sheets!" I yelled, and the sail billowed out with a clatter.

"You probably had six inches between the steering blades and the rocks," announced first mate Peter Wheeler. "For the first time in my career," added Kevin as he climbed aboard with his cameras, "I will *not* ask someone to do it 'just once more.'"

A MODERN CAUSEWAY has severed the ancient channel behind Plaka Spit, but you can still see traces of the route Ulysses may have taken between the spouting vortex, Charybdis, and the cave high on a cliff face where the monster Scylla lurked,

snatching mariners from their decks with her six long necks and six heads. The hill overlooking the channel is called Lamia.

"What does Lamia mean?" I asked our Greek, Costas.

"A monster," he replied. "It swallows people." Theodor added, "In Thracian mythology the Lamia's a monster that attacks the hero. With many heads."

Just as we had found on Crete with the Cyclopes and the triamates, here was a creature of folklore that echoed Homer's strange monster. Now I felt certain that we would find a cave of Scylla.

Three fishermen were in the shallows in a punt, spearing eels and flatfish with long-handled tridents. "Where's the cave?" I called to them. They looked at one another. Then I caught the word "Antonis." "The church. St. Anthony Church," they shouted and pointed upward. I climbed a zigzag



path to a balcony and entered a chapel built inside a cave.

“Half-way up the crag,” relates Homer, “there is a misty cavern, facing the West. . . .” I turned to look back. Out the door the sun was sinking over Plaka Spit and the site of the tumuli, due west.

With the channel silted up, there is no way of knowing how the currents and eddies ran and perhaps formed whirlpools in Homer’s day—as they still do five miles to the north at Preveza, where the Ambracian Gulf empties into the Ionian Sea. But every other element was there. The lesson learned at Troy seemed confirmed: Homer’s geography was small-scale. We were finding the *Odyssey* under our noses.

Scylla gobbled up six of Ulysses’ sailors as he passed the cliff. Their shipmates lasted little longer. Landing on the island where the sun god kept his sacred cattle, they

*Thus we sailed up the straits,
groaning in terror, for
on the one side we had Scylla,
while on the other
the mysterious Charybdis.*

“No more than a bowshot,” Homer judged, separated man-eating Scylla and the whirlpool Charybdis, long identified with Italy’s Strait of Messina, more than two miles wide. Severin places the site at Levkas, where fishermen work shallows (above left). Above a light at the base of the hillside lies a cave matching Scylla’s, today a chapel dedicated to St. Anthony (above). The hill is called Lamia, a long-necked monster of local legend.

*My men were flung overboard
and tossed round the black hull
like sea-gulls on the waves.*



PHOTOGRAPHED AT STAATLICHE ANTIKENSAMMLUNGEN UND GLASSTISCHER, MÜNCHEN

"With a blinding bolt out on the wine-dark sea," Zeus struck down Ulysses' ship to punish the crew for roasting the sun god's cattle. Clinging to the keel, Ulysses drifted to the isle of Ogygia, where for seven years he lived captive with the nymph Calypso. A similar scene decorates the neck of a small Greek vase, here examined by Munich conservator Berthold Kaeser (above) and unrolled by a special strip camera (above right). Painted about 730 B.C., it may predate the Odyssey, a reminder that Homer expanded upon stories that had been recited for generations.



slaughtered animals for food and paid with their lives. The island's name? Thrinacie.

Gerassimos Robotis, a Levkas fisherman for 55 years, immediately knew the island of the "Three Points." "It's Meganisi. As you approach from the north, you see three headlands projecting, one after another." This island, on the way to Ithaca, has yielded much pottery dating from Ulysses' time.

The sacrilege of killing and eating the sun god's cattle was punished with a howling wind and lightning bolt that smashed Ulysses' vessel. He alone survived, clinging to the keel. The south wind swept him back to Charybdis. The whirlpool sucked down the keel, but Ulysses saved himself by clinging to the overhanging fig tree until the vortex spewed it back. Then he was borne away for



nine days, drifting to Ogygia, the magical isle of the nymph Calypso.

For seven years the goddess tended him with loving care in her vaulted cave. Finally she let the homesick Ulysses build a small boat and set sail for Ithaca once again, urging him to keep the polestar on his left hand.

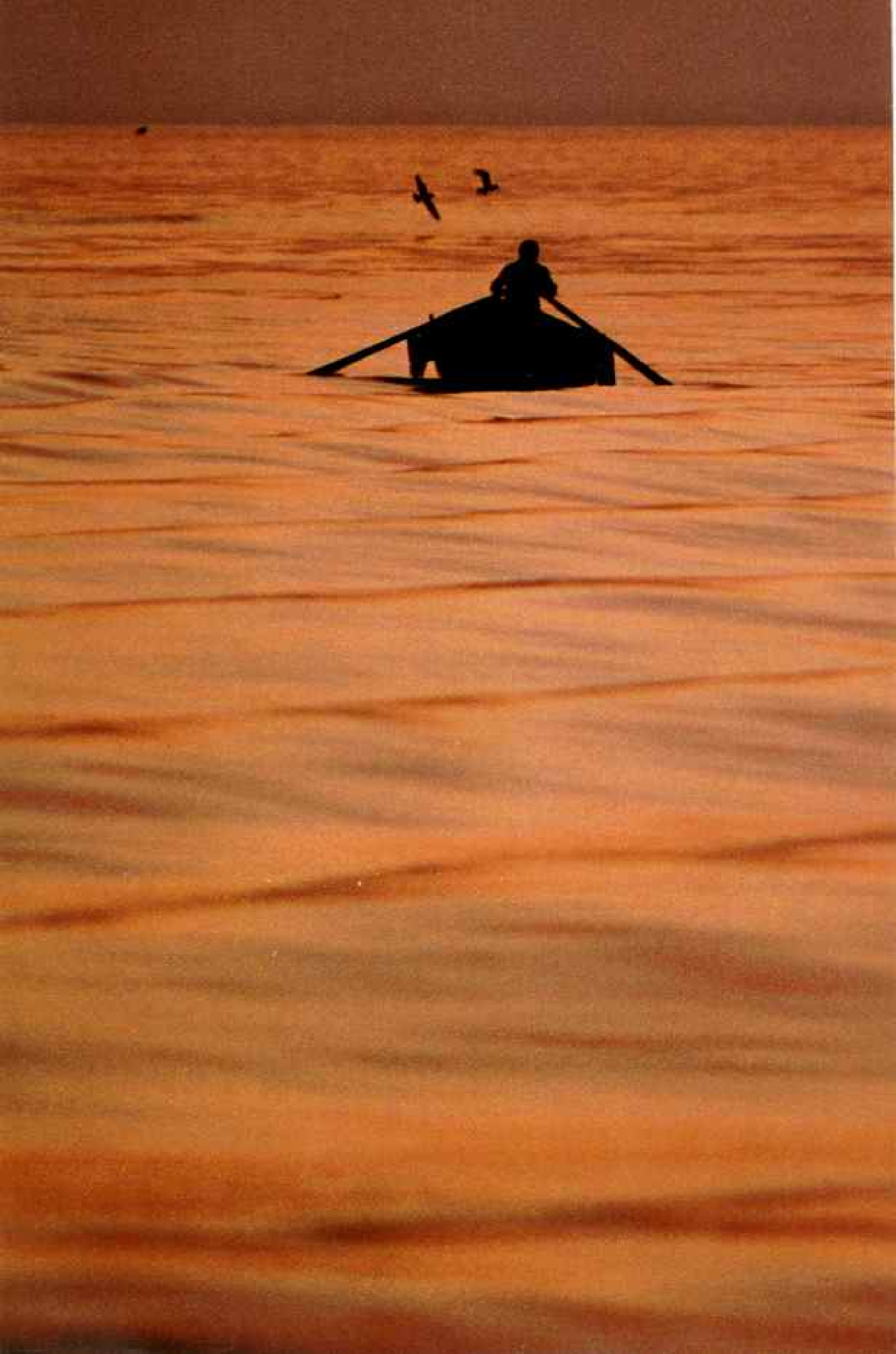
The island of Gozo, near Malta, has often been identified as the abode of Calypso, and conforms with the sailing directions that Ulysses gives. But there are so few geographic clues that perhaps with Calypso we really do enter the realm of goddesses. So it is my supposition that Ogygia may have been pure fairyland.

Not that Ulysses' troubles were ended. His implacable enemy, the sea god Poseidon, sank his makeshift boat, and Ulysses

was cast up in the domain of the "sea-faring Phaeacians." There the king's daughter, Nausicaa, rescued him.

Traditionally Corfu has been claimed as the Kingdom of the Phaeacians, though as yet there are no Mycenaean finds on the island to support this theory.

THE LAYOUT of Ulysses' kingdom still puzzles scholars. Several locales do fit episodes of his homecoming—the sheltered bay where a Phaeacian ship deposited Ulysses, the cave where he hid the treasure they gave him, the place where he met his loyal swineherd Eumaeus and plotted the overthrow of the suitors who had importuned his wife, Penelope, during the long



*For in my day I have had many
bitter and shattering experiences
in war and on the stormy seas.
So let this new disaster come.
It only makes one more.*



*“He shall make it in hardship, in a boat
put together by his own hands,” Zeus
decreed. So Ulysses was freed from
Calypso and set out once again for home.
A blast from Poseidon cast him ashore in
the land of the Phaeacians, traditionally
the island of Corfu, where a fisherman
leans into his oars (left). Also washed
ashore on Corfu, an Albanian dugout
finds new life as a park bench (above).*



years of his absence. But Mycenaean remains are sparse, and four sites lay claim to the distinction of being Ulysses' mansion.

Don't expect riches from poor Ithaca, sagely counsels the modern Greek poet Cavafy. It has given you a wondrous journey through the far world, full of self-discovery. Fear not monsters nor implacable gods unless you carry them in your soul:

*Setting out on the voyage to Ithaca
You must pray that the way be long,
Full of adventures and experiences. . . .
Better that it should last many years;
Be quite old when you anchor . . .
Rich with all you have gained on the way.**

*From "Ithaca" in *The Poems of C. P. Cavafy*, translated by John Mavrogordato, Grove Press.

Argo's voyage revealed a rational route behind the "great wanderings"—Ulysses' travels from Cape Malea to Ithaca. The geography of Homer's *Odyssey* was based on an early Greek belief that the western edge of their lands marked the limit of the real world. Beyond it ran Ocean, the all-encircling river, on whose banks dwelt demigods and monsters.

How, then, did such sites as the Harbor of the Laestrygonians, the Cave of the Cyclops, Scylla, and Charybdis, to name only a few, come to be transferred to the coasts of Sicily and Italy by classical writers? The answer to that question lies in Greece's overseas expansion.

During the eighth century B.C., Greeks were launching an explosion of westward



colonization. They took their legends with them and applied them to the places they found, because in their tradition Ulysses was the greatest traveler of all and must have gone before them. But 500 years earlier, in the time of the Trojan War, the reality would have been different. A late Bronze Age ship commanded by a careful captain returning from Troy would certainly try to hug the coast.

By following that logical route, *Argo's* crew had shared good times and dangers, humor and new perceptions, and we had found site after site whose appearance and folklore, I believe, may well have provided the sources for Homer's inspiration. *Argo's* voyage had brought the *Odyssey* home to Greece. □

*We two shall surely recognize
each other . . . for there are
tokens between us which only
we two know.*



PHOTOGRAPHED AT MUSÉE DU LOUVRE, PARIS

Disguised as a beggar, Ulysses reached Ithaca 20 years after he sailed to war. Though named as his kingdom by Homer, the rugged island has yielded few Mycenaean ruins. One possible site of Ulysses' palace lies on the island's southwest coast (above left).

Reunited with his son, Telemachus, Ulysses slaughtered the suitors who had harassed his wife, Penelope, then gently revealed his identity. A fifth-century B.C. terra-cotta sculpture depicts their reunion (above). That night the goddess Athena held back the dawn until "he had had his fill of love and sleep in his wife's arms."

Argentina's New

IN WESTERN ARGENTINA, not far from the old provincial capital of San Juan, I visited the shrine of a handsome young mother who died of grief and madness during some forgotten war. Legend says she wandered across the desert in search of her vanished soldier-husband. Rescuers found her with a newborn infant suckling her lifeless breast.

This melancholy miracle has made La Difunta Correa—literally, “the dead Correa”—an unofficial patron saint of new beginnings for thousands of pilgrims who visit her shrine each year during Holy Week. Some come deep in mourning, but others bring offerings of wedding dresses, boxing gloves, musical instruments, and similar cheerful evidence of prayers answered and ambitions gained.

The face of San Juan's sad madonna reminded me of another young Argentine woman who had died more lately of madness not her own. She was a pretty 24-year-old named Mónica Mignone. I'd seen her small black-and-white portrait on the mantelpiece of a Buenos Aires apartment. Her father, human rights leader Emilio Mignone, had told me of the night of May 14, 1976, when heavily armed men stormed in to arrest her for questioning about her activities as a Roman Catholic social worker.

She was never seen again.

Mónica is one *(Continued on page 232)*

Protest erupted outside a courthouse in Buenos Aires last December as radio reported the light punishment given convicted members of the military junta that murdered thousands of civilians from 1976 to 1982. A grieving mother bears a picture of a lost son, one of the “disappeared” still haunting a nation striving to replace tyranny with democracy.



Beginning

By BRYAN HODGSON

Photographs by
JAMES P. BLAIR

BOTH NATIONAL GEOGRAPHIC STAFF







“GREATEST TRAGEDY of our history, and the most savage.” So wrote a government commission of Argentina’s “dirty war,” the military’s campaign against terrorists and dissidents that left 8,960 unaccounted for and presumed dead.

Isabel F. B. de Ghezan (above left) told the commission of her 1978 kidnapping by army officers who held a gun to

the head of her infant son, forcing her to set a trap for her husband. The couple were held for six months at Olimpo Prison, one of 340 clandestine detention centers, but were never told why. Some victims met their deaths in this police morgue in Buenos Aires (left).

It took defeat by Britain in the 1982 war over the Islas Malvinas (Falkland Islands) to loosen the junta’s grip. A 1985

court-martial for malfeasance in waging the war brought prison sentences for former President Leopoldo Galtieri (above, third from right), Brig. Gen. Basilio Lami Dozo, to his left, and Adm. Jorge Anaya, on his right.

The three were earlier cleared of all charges in the dirty war, for which five persons were punished. Charges are still pending against more than 600 others.

A FRESH START under a new democracy led by civilian President Raúl Alfonsín (below) brought ecstatic hope. On March 23, 1984, a crowd of 70,000 filled the Plaza de Mayo (right) to hear Alfonsín, a moderate,



He will speak from the balcony of Casa Rosada, the presidential palace, on the hundredth day of his administration.

Here crowds once cheered the late Juan Perón, the charismatic president whose appeal tapped a volatile undercurrent that still must be reckoned with. Other problems facing the new government include an economy saddled by a staggering national debt, restive labor unions, and demands for harsher punishment of the ousted leaders.





RAJON

RAJON

RAJON

RAJON

(Continued from page 226) of an estimated 10,000 *Desaparecidos*—"disappeared ones"—who were kidnapped, tortured, and secretly killed by military and police terror squads in a "dirty war" against suspected subversives between 1975 and 1982.

Two former rulers, Gen. Jorge Videla and Adm. Emilio Massera, had been jailed for life for ordering this hideous inquisition. More than 600 lower ranking officers faced courts-martial or civil suits on charges that read like a gazetteer of psychotic behavior.

But I had met survivors too, young men and women whom I had come to think of as *los aparecidos*—"the appeared ones."



Ten of a kind became one in a bid for monetary stability. Distribution of the new austral note, equal to ten million old pesos, accompanied wage-and-price freezes and government spending cuts, all designed to curb inflation.

Betrayed by malign messiahs of the left and right, they asked simply to be allowed to work, and their ideology seemed best summed up in a slogan I had seen on a wall in the province of Tucumán, where the dirty war began.

"¡No Mas Fanáticos!" it said. "No More Fanatics!"

I offered it as a prayer at the shrine of the saint, in memory of the lost ones and in hope for democracy's new beginnings in this vast and fruitful land.

Argentines tell many wry jokes about their beginnings, and perhaps the oldest one is this:

*Mexicans descended from the Aztecs.
Peruvians descended from the Incas.
But we descended from boats.*

About 95 percent of the nation's 30 million people descend from Spanish, Italian, and other European stock. In 170 years of independence they have turned a million magnificent square miles of grasslands, mountains, deserts, and tropical forests into one of the world's richest agricultural nations. Their capital, Buenos Aires, shines by the Río de la Plata, and I was fortunate enough to see it in December, when graceful jacaranda and *tipa* trees spangled its boulevards with blossoms of lavender and gold.

THE CITY'S European heart beats most strongly on Calle Florida, a stroller's paradise of comfortable old buildings, cafés, and stylish shops. Now it glittered with Christmas decorations fashioned like giant credit cards, which reflected in windows filled with imported luxury goods. Street musicians set their rhythms to the gait of women shoppers wearing fashionable costumes that looked like brightly colored second skins.

At one end of Florida Street, enormous trees shade the plaza honoring Gen. José de San Martín, hero of Argentina's war of independence. Near the other end, the pink presidential palace called Casa Rosada overlooks the Plaza de Mayo. Exultant crowds of "shirtless ones" gathered here in 1946 to hail the fascist-style revolution of Juan and Evita Perón. Nine years later hundreds of them died when planes of the Argentine Navy bombed the plaza to help drive Perón from office. That ignited a cycle of chaos and violence that seemed to end only in 1982, when furious mobs howled for the heads of Gen. Leopoldo Galtieri and other military leaders whose humiliating defeat in the Malvinas war had wasted more than a thousand Argentine lives.

The current tenant of Casa Rosada was a doctor of law named Raúl Alfonsín, elected to replace the disgraced military junta in October 1983. Among the many problems he had inherited from the epoch of chaos and military misrule was a seemingly impossible fact: Argentina was bankrupt.

How had it happened? Over the previous



VEGETATION

- MOUNTAIN VEGETATION
- WOODLAND
- SCRUBLAND
- GRASSLAND

ARGENTINA

Spanish and Italian immigrants established the strong European flavor of this land of stark diversity, the world's eighth largest country in area. The swampy Gran Chaco of the north gives way to the grassy Pampas sprawling westward from Buenos Aires and to the windswept Patagonian desert. Argentina's share of the Andes includes some 30 peaks higher than 20,000 feet.

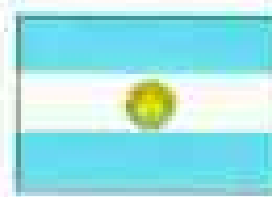
The dominance of Buenos Aires, home to one in three Argentines, has renewed a drive, supported by the government, to move the capital to the Patagonian city of Viedma.



Argentina, Chile, and the United Kingdom have overlapping claims to parts of Antarctica.



Falkland Islands (U.K.) (Isles Malvinas) Claimed by Argentina



AREA: 2,766,889 sq km (1,068,302 sq mi). **POPULATION:** 30.7 million. **MAJOR CITIES:** Buenos Aires, 10.7 million (metropolitan area); Córdoba, 982,000; Rosario, 954,600. **ECONOMY:** Grain, livestock, food processing, motor vehicles, petroleum.

NSC CARTOGRAPHIC DIVISION
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Regal ranch house stands alone near Pergamino in the Pampas, Argentina's breadbasket and greatest source of wealth. This broad plain's topsoil, among the deepest and richest on earth, supports an immense cattle industry. In grain-and-oilseed exports the region trails only the United States.

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five years foreign banks had showered Argentina with some 37 billion dollars in development loans. But the generals had spent 20 billion dollars of this *plata dulce*, "sweet money," to build South America's most powerful military force. Many loans were diverted from their stated goals. The government simply printed money to pay 1.6 million government employees—26 percent



of the work force—and subsidize costly state-owned corporations that produce almost half the nation's goods and services. Speculation had flourished like a disease, while inflation had soared to a 1,000 percent annual rate.

"In 1980 you could send one million dollars to Argentina and earn \$600,000 on it in one year—60 percent interest paid in U. S.

dollars," I was told by Dr. Armando Ribas, a conservative economist. "The speculation had nothing to do with real investment. Capital became completely detached from the economy."

Meanwhile, Argentines secretly sent an estimated 30 billion dollars to private overseas bank accounts, leaving their homeland the richest poor country in the world.





"Great water" to the Guaraní Indians, Iguazú Falls stretches for two miles in the jungle near the border with Paraguay and Brazil. Parrots, toucans, jaguars, and tapirs share this orchid-embellished national park.

The nation is self-sufficient in oil. It earns a 4.5-billion-dollar annual surplus as the world's second largest exporter of grain and oilseeds. But a 50-billion-dollar foreign debt—some nine billion dollars of it owed to private U. S. banks—swallows most of that surplus in interest payments alone. To qualify for new assistance from private lenders and the World Bank, the government froze wages and prices, increased taxes, and pledged to reduce public spending.

This Austral Plan—named for the new currency that replaced the worthless peso—had reduced inflation to a mere 30 percent annual rate. But it had also reduced real wages by 26 percent. Labor unrest was growing. Leaders of the opposition

Justicialista Party, founded by Perón, were accusing the Alfonsín government of sacrificing the workers to foreign banks.

"Most of the inflationary forces are still in place, but at least we no longer have to watch our currency rot," I was told by Daniel Friedenthal, one of Argentina's leading private industrialists.

"But we cannot ignore the reality of our society. In Argentina five million people live at the top level. Either they are wealthy landowners or they collect some of the three billion dollars in interest earned every year on overseas investments. This money has a big impact on the economy. Without it our recession would have been much bigger.

"But the rest of our people have real economic problems. There aren't enough jobs, because former governments forced many first-rate Argentine industries out of business by allowing unlimited cheap imports of electronics and other goods.

"That is why Argentines prefer to invest their capital overseas. Brazil is taking over as Latin America's leading industrialized



country—the role we could have had.

“Our traditional value is to look down on development. Our society still doesn’t see success as a goal. Only as a sport.”

ARGENTINA has always lived from land to mouth. Agricultural exports earn 80 percent of the country’s foreign exchange. In 1985 farmers produced 43 million metric tons of grain and oilseeds and exported an all-time record 30 million tons—including 8.6 million tons to the Soviet Union, which became Argentina’s biggest grain buyer after an embargo on U. S. sales imposed by President Jimmy Carter in 1980.

“Our crop yield per acre has been high because our climate permits double-cropping,” I was told by Jorge H. Cazenave, who operates a private agriculture consulting firm in Buenos Aires. “But we have been cropping land continuously for ten or more years, depleting organic content. We are copying the U. S. system and can’t go back. So our need for fertilizer is increasing.

“To increase production by 40 percent, to 60 million tons of grain, we need to invest at least two billion dollars in private farms and about three billion dollars for rail and road transportation. Storage is critical as well—we cannot store even one year’s crop.

“The question is whether we should make this investment in traditional agriculture when there is a growing world surplus of food. Production costs no longer matter—the European Economic Community gives massive subsidies to farmers and exports wheat and beef more cheaply than we can.

“I believe we could turn our climate into a profit factor—our summer is winter in the north. We have grapes in January, also melons and cherries and peaches. Asparagus is very valuable, but it must be delivered to consumers within four days after picking.

“These crops have never been fully developed because of the instability of our economy, our wild inflation, and exchange rate fluctuations. But I hope that we will develop them now. Farmers can no longer live on nostalgia.”



"City of fair winds" towers over sailors setting out from Buenos Aires in the Regata a La Panela, a nonstop run to Montevideo, Uruguay, and back on the broad Río de la Plata. In the early 1500s explorers Amerigo Vespucci and Juan Díaz de Solís sailed this "river of silver," actually a 180-mile-long estuary.

Two hours flying time south of Buenos Aires, the autumn sun raised a bloodshot eye on the sheep-speckled plains and stark coastline of southern Patagonia. As we crossed the Strait of Magellan, icy blue-gray clouds veiled the island of Tierra del Fuego, which Argentina shares uneasily with Chile.

This is the nation's most fragile far frontier, officially called the National Territory



of Tierra del Fuego, Antarctica, and the Islands of the South Atlantic. Within it Argentina claims the British-held *Islas Malvinas* (or Falkland Islands), as well as some 400,000 square miles of Antarctica itself.

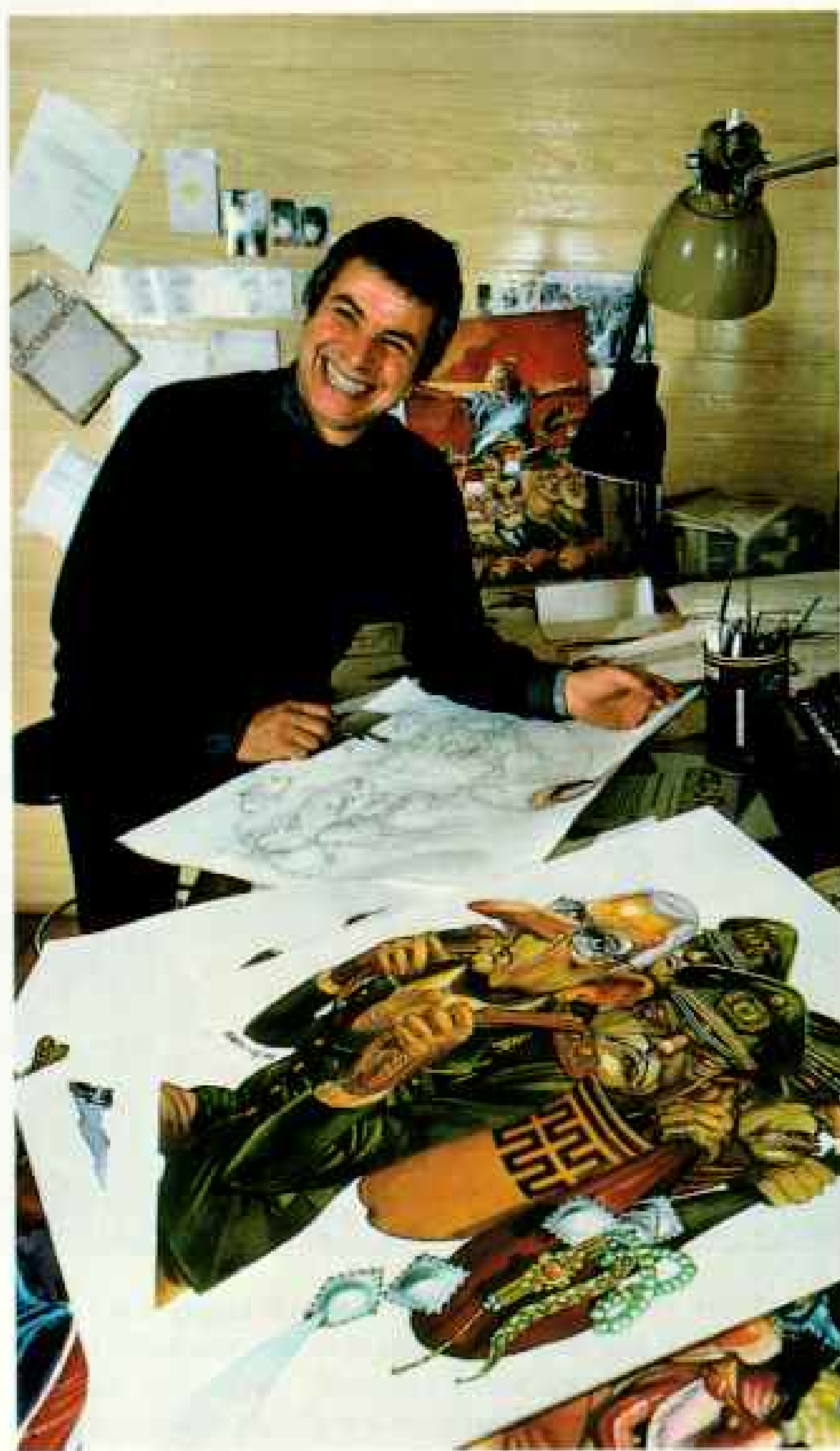
The capital of this antipodean empire is Ushuaia, the southernmost city in the world. To get there, I drove south and west from Río Grande on a rutted dirt track, fish-

tailed perilously through boggy lowlands and stunted groves of lichen-shrouded trees, then climbing gradually past misty lakes to cross a miniature cordillera whose jagged peaks are the smaller brothers of the Andes.

At the brink of the Beagle Channel I found a bustling city, its shops filled with duty-free imported perfumes, liquor, and clothing and its streets crowded with young

Barbed pen of editor and cartoonist *Andrés Cascioli (below)* enlivens the satirical magazine *Humor*. The drawing takes a jab at former President Reynaldo Bignone and a bagful of Bolivian generals, reportedly cronies during his 1982-83 administration.

On Calle Lavalle in Buenos Aires' cinema district (right) crowds throng to movies that now more freely bare the body and divergent political views.







Opulence sets the stage for both commerce and the arts in Buenos Aires. The Argentine Rural Society, an influential ranchers association, lunches beneath a portrait of revered liberator José de San Martín (above). The group's annual cattle and agriculture shows draw more than two million visitors.

Teatro Colón (above right), lauded as one of the world's great opera houses, draws the upper crust to a production of Bomarzo, written by Argentine composer Alberto E. Ginastera. A tale of psychological violence spiced with mild eroticism, the opera premiered in 1967 in Washington, D. C. It was scheduled to open in Buenos Aires later that year but was canceled by the military government.

men and women in winter finery. Nearby, in metal-roofed factories, workers assembled television sets and radios from Japanese kits. It was not what I expected at the end of the inhabited world.

"These industries are all state supported, purely to attract immigrants," said 34-year-old José Arturo Estabillo, then mayor of Ushuaia. "The wage scale is double that of Buenos Aires. Our population has increased 155 percent since 1979. Our average age is 24. For the first time in history Ushuaia is Argentine. Before, Chilean workers outnumbered us by far."

Like Alaska—which it very much resembles—Tierra del Fuego has been federally administered for most of its history. Alberto Garófalo, the territory's director of economic development, feels strongly that it should start earning its own way.



"We have been living on artificial incentives," he told me. "To plan a real economy, we must gain some control of our resources. For instance, the government allows the entire membership of the United Nations to fish off our coasts but has made no investment in our own fishing industry.

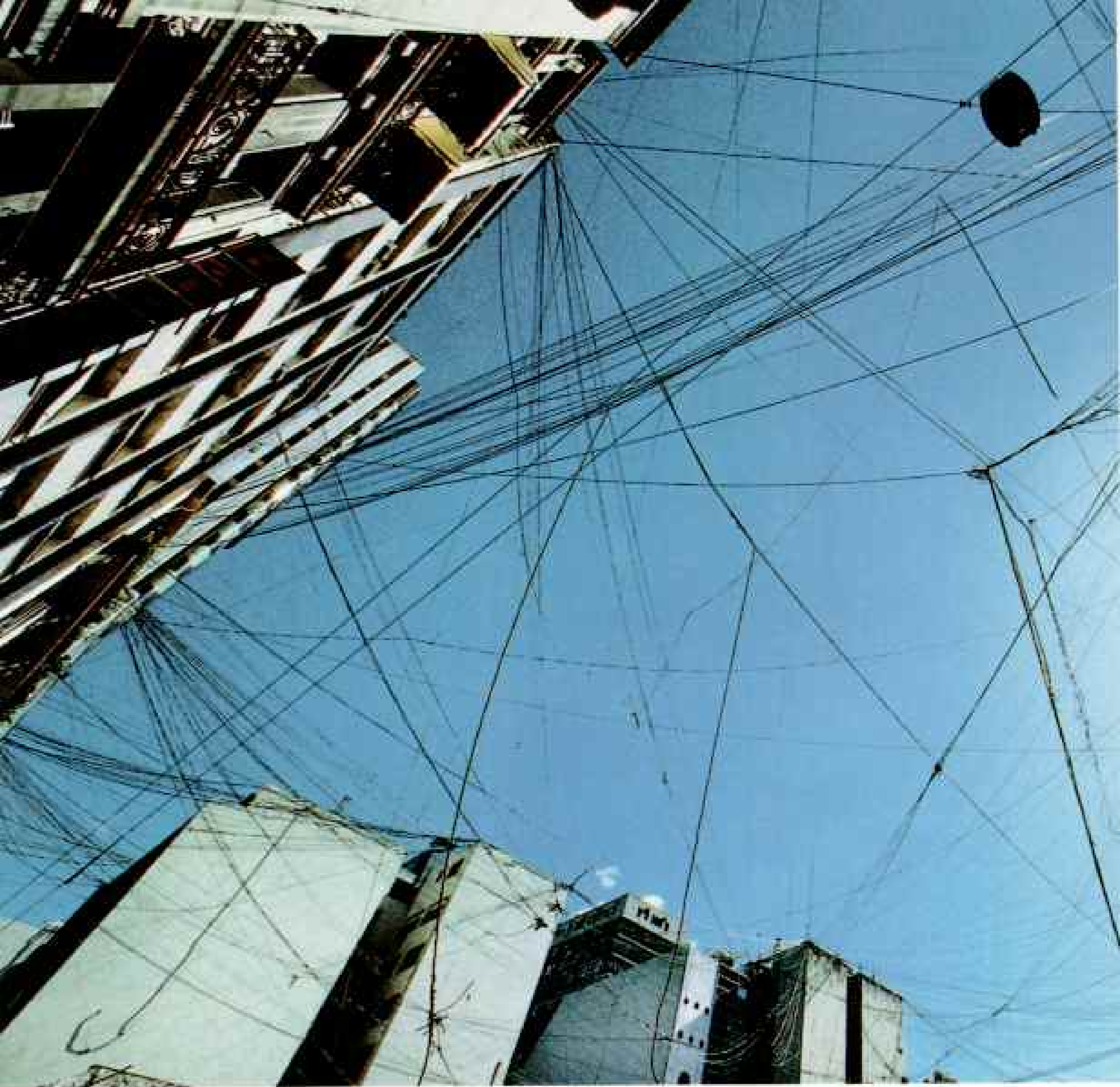
"Tourism is a natural industry for us. But we need money for roads, hotels, and other facilities. With our huge sheep production, it would seem logical to start a woolen cloth industry here, but at present the government allows tax-free imports of nylon and rayon textiles, and we sell our wool overseas on a declining market."

Much of the island's budget comes from the huge Cerro Redondo oil field, which underlies both sides of the border with Chile. Production on the Argentine side is falling rapidly, partly because much of the natural

gas produced with the oil is burned, while Chilean operators reinject it into the oil-bearing formations to maintain the pressure that causes oil to rise in the wells.

"We burn 56 million cubic feet of gas a day, worth about 50 million dollars a year if we could sell it, or turn it into methanol and urea," Señor Garófalo told me. "It is a very expensive way to justify the famous name of this island—the Land of Fire."

THE FIERCER fires of nuclear energy have warmed Argentina's leaders since the 1960s, when they began a five-billion-dollar program to build six nuclear power stations with 3,300-megawatt capacity. Two have been completed. In November 1983, shortly before the junta left office, it confirmed what many nuclear experts had suspected: Argentina



Cat's cradle of jury-rigged wiring in the Buenos Aires financial district (above) grows out of frustration with the country's notoriously bad telephone system. The illegal network connects the offices of stock traders, commodity brokers, and the often sub-rosa operations of currency exchanges.

A worker takes full advantage of break time (above right) in an unfinished unit at a government-run refrigerator plant in the capital. Chronic inefficiency has prompted efforts to sell some state-owned industries, which produce nearly

half the country's goods and services. But most potential buyers have viewed the risks of privatization as too great without government subsidies.

National union leader Saúl Ulbaldini (right) exhorts workers at a Buenos Aires rally. Posing one of the biggest challenges to the new government, the heavily Peronist unions, united under a national confederation, are quick to call general strikes. Alfonsín must balance demands for higher wages with austerity measures some think crucial to satisfying the nation's impatient creditors.



A place in the sun is still a scarce commodity at Mar del Plata beach during March, the waning days of the austral summer. In the high season of January and February, crowds of more than 200,000 are common at this Atlantic coast resort, 250 miles south of Buenos Aires. The cavernous casinos in the hotels that line the beach welcome the money of Argentina's sizable middle class.



had secretly developed its own capacity to enrich uranium, giving the generals the option of developing nuclear explosives.

Much of the homegrown brainpower came from the Bariloche Atomic Research Center and the Balseiro Institute, amid the magnificent alpine scenery of the Andes.

Bariloche could be a Swiss tourist town, complete with chalets and chocolate shops. I arrived as icy Andean winds whipped up waves and surf on 45-mile-long Lake Nahuel Huapí, and clouds of sea gulls made it seem that I had discovered a fabulous west coast for Argentina.

Calmer waters cool the 500-kilowatt research reactor, designed and built at Bariloche in 1982 with no assistance from outside experts.

"This is not a program for Argentina alone," said the director, Dr. Edgardo Bisogni. "We have exported a similar reactor

to Peru and have been negotiating others for Colombia and Uruguay. In addition, about 10 percent of the institute's students come from other Latin American countries.

"We do world-class work here in solid-state and low-temperature physics, electron-spin resonance, metal physics, atomic collisions. We publish about 60 papers a year in international journals."

I saw some of that brilliance pouring from a young student as he reported to his classmates the mysterious movements of electrons. It was not a dry recital, but a delighted sharing of a search.

Afterward he said to me with equal energy: "I want to talk politics!"

But he told me of six 18-year-old classmates in another province who were killed during the military regime. "They were like me," he said. "They believed in liberal causes. They were against violence. But

they were taken for questioning and never seen again. I was questioned once just for writing a letter criticizing school fees. The *militares* let me go. But they told me, 'Everyone who *thinks* is a guerrilla!'

"These men banned the teaching of liberal philosophy, psychology, and sociology. You know, our research reactor was opened in 1982—the same year we were forbidden to read George Orwell's *1984*."

The mountain scenery of Bariloche is magnificent, but the Andes rise to their most awesome splendor farther north, in the provinces of Mendoza and San Juan. Mendoza gets most of the publicity, possessing both the continent's highest peak, 22,834-foot-high Mount Aconcagua, and a reputation for growing Argentina's finest wines.

San Juan has its own measure for high standards in a native son named Domingo Sarmiento, who served as Argentina's president from 1868 to 1874. He imported 64 American schoolteachers to help him found the nation's public-school system, and he had a special goal in mind.

"If . . . patriots, instead of making revolutions, would begin by founding common schools, in imitation of the United States, as the cement of the future Constitutions," he wrote, they "will make useless the ancient aristocracies and the modern repressive governments. . . ."

ARGENTINA WAS PIONEERED from the west, when Spanish conquistadores trudged down from Cuzco, Peru, in the 16th century. The northwestern city of Tucumán was founded in 1565, when Buenos Aires was little but a mudbank. Savage battles of the revolutionary war raged there in 1812, and on July 9, 1816, the nation's founding fathers gathered in the city to sign their declaration of independence.

Today a tattered draft of that historic document hangs in the reconstructed colonial house where it was written. Behind this simple display, doors open to a tree-shaded Spanish patio glad with birds, and I sat there peacefully to consider Tucumán's delights. It is the largest lemon-growing region in South America, and one of the nation's largest sugar producers as well. It pleased me to think the conquistadores had discovered a

true fountain of youth for the lemonade lovers of the world.

The province of Tucumán has some more recent history. In a small police museum I found faded photographs of a formidable lady named Agata Cruz Galifi de Lucchini, captured when her gang of bank and train robbers tried to tunnel into a Tucumán bank vault from a nearby house in 1944. There were some crude figurines called *muñequitos del amor*, confiscated from local Indians whose witchcraft—even for would-be lovers—is forbidden by law.

Next to them I found a few dusty guns, some small homemade bombs, and a giant catapult used by Tucumán university students to hurl Molotov cocktails at police. These were mementos of political witchcraft that had plunged all Argentina into chaos.

In the early 1970s guerrilla groups calling themselves Montoneros and the People's Revolutionary Army (ERP) launched full-scale assaults against the military regime. With perhaps 12,000 members, financed by multimillion-dollar kidnap ransoms and trained in terror schools abroad, they caused, by one estimate, at least 6,000 casualties. The Montoneros, urged on by exiled Juan Perón, created havoc in the cities. In the mountains of Tucumán the Trotskyite ERP formed an 800-man combat unit designed to capture the province and win international political recognition.

"I believe we lived violence here more than other parts of the country," said Enrique R. García Hamilton, editor of Tucumán's evening newspaper, *La Tarde*. "The ERP unit was founded in our university, at the Faculty of Exact Sciences. It was never a peasant movement. This was the only area where uniformed guerrillas fought face-to-face with regular army. At the same time there were many terrorists—very bloody. Thousands died—nobody knows exactly how many, because there were many foreigners. Almost every family was touched, from both sides. If there is new violence in Argentina, Tucumán would be the last place for it to happen."

Journalism has not been the easiest of professions in this birthplace of independence, Señor García Hamilton told me. *La Tarde's* morning brother, *La Gaceta*, was founded in 1912 by his grandfather, who had fled



Uruguay under sentence of death for his journalistic efforts there.

"We have been attacked by everyone. In 1916 the democratic Radical Civic Union party sent a mob to try to destroy our presses. The same party tried to censor us in 1960, but we published blank space where censored articles would have been. Under Perón party officials controlled our paper supply. The military censored the press from 1976 until the end of the Malvinas war. We refused everybody's propaganda."

Today, with 80,000 circulation, *La Tarde* is the second largest evening paper outside Buenos Aires. "We are also the most modern in the country—first to use offset printing in South America and first to be fully computerized," Señor García Hamilton said.



"You know, Tucumán had telephones and electricity before Buenos Aires. Sometimes I think our capital is still in the dark."

ON A SUNDAY morning I drive south from Tucumán through sugar plantations and small towns where families stroll quietly home from Mass. Turning west toward the Andes, I am suddenly surrounded by a rain forest, where the sun strikes golden shards from multicolored mosses and air plants that make each tree a garden unto itself. A mountain stream glitters prettily below, disowning the washouts and landslides it has caused in a recent flood.

Now the forest dwindles, and suddenly I am driving through mountain pastures where horses and sheep graze quietly in the sun. This is Tafi del Valle, a vast amphitheater studded with tall stone pillars erected by Indians who worshiped here for centuries before the Spaniards launched their colonial invasion.

The road climbs northward and then descends into a desert world with tall cactus plants that look exactly like the saguaros of the southwestern United States. There are other eerie reminders of home: Coca-Cola and Pepsi-Cola fight their global billboard war, and Ford pickup trucks, suitably battered, slump beside split-rail fences and dusty shacks. I drive three miles off the main road to visit the elaborately terraced ruins of a fortress built by the Quilmes Indians, who fiercely resisted Spanish conquest for more than 200 years.

I enter the wine-growing city of Cafayate through autumnal lanes of poplars and weeping willows and a welcoming arch that proclaims, "*Aquí Vive el Sol—Here Lives the Sun.*" But the Andes are making short work of sunset. For six dollars I check into a tidy motel and breakfast at dawn on hot rolls

Careened at continent's end, the unlucky Duchess of Albany (left), a British cargo ship, ran aground in fog on Tierra del Fuego in 1893 while attempting to sail around Cape Horn.

Foremen's housing lines a street on Estancia María Behety (above left), whose 153,000 acres make this renowned producer of championship breeds only the third largest sheep ranch on Tierra del Fuego.

and *dulce de leche*—a delicacy made of sugar and boiled condensed milk.

A few miles north and west of Cafayate, the road passes through shining white sand dunes and comes suddenly upon a miniature Grand Canyon, carved by the Río Calchaquí through eons of scarlet rock. This is Garganta del Diablo, and the resident demons hurl a malevolent storm of dust down the

canyon walls to hasten me at last into a plain of sleepy villages and peaceful plowlands, whose galaxies of sunflowers light my way to Salta.

I find the city plaza filled with army officers in riding boots, naval officers in 19th-century frock coats and spats, and soldiers massed in battle gear and black berets. It is May 25, anniversary of the day in 1810 when the chief men of Buenos Aires rejected the authority of a puppet king appointed by Napoleon.

Now marching units of students, firemen, and machine-gun-carrying cops compete with servicemen in a wrist-snapping, foot-stamping medley of marching styles that dramatize this exhilarating first step to nationhood.

All are upstaged by a brigade of gauchos, red cloaks flowing in the wind, whose wiry ponies seem to fly on leather wings that shield their bare-soled riders from desert thorns. In earlier times these gauchos were the savage cavalry of endless civil wars that scourged Argentina for almost 50 years after independence, angels of death who preferred the intimate warfare of knife and spear. Now they are a thrilling reminder of a more chivalrous past.*

Many in the crowd of onlookers wore miniature versions of La Bandera Immaculada, Argentina's "immaculate flag," whose colors mirror the virginal blue and white of Andean skies and snows, pierced by a genial sun. It contains no shade of red, and I wondered if that reflected the feeling of its designer, Gen.

Manuel Belgrano. In 1813, when his troops trapped a Spanish army in Salta's plaza, Belgrano granted parole, saying, "I see no glory in spilling my brothers' blood. . . ."

The government awarded him 40,000 pesos for this act, and he used it to establish four provincial schools to teach "the basic

*See "The Gauchos," by Robert Laxalt, in the October 1980 NATIONAL GEOGRAPHIC.



Ghostly greetings from a lost culture brighten rocks along Río Pinturas, or "river of paintings." Believed to be the earliest inhabitants of southern Patagonia, the Toldense people sprayed solutions of ocher and other minerals around their hands, leaving these signatures 7,000 to 9,000 years ago.

rights and obligations of man that make society and government strong."

My northward journey ended at a white-washed village called Iruya, where scattered plots of barley, lima beans, and potatoes cling to hillsides of the 12,000-foot-high Altiplano near the Bolivian border.

There, seated on church steps beneath a Spanish crucifix, I met a young government doctor named Tomás Torres, an exile of sorts. For five years he had served a chain of 30 medical outposts throughout the hills, touring them by muleback twice a month, treating the tuberculosis and parasitic diseases that afflict Indians at these altitudes and training his patients in sanitation and midwife skills.

Why had he come?

"I was a medical student in Córdoba until 1976," he said. "The violence was very bad there. It reinforced my feeling that working is the only effective form of revolution. So I chose this."

As I left, Bolivian flute music floated faintly along cobblestone streets, haunting and sprightly all at once.

MISIONES PROVINCE, in the far northeast, shines like a tropical flower behind Argentina's ear. Its blood red earth nourishes great gardens of the bitter tea called yerba maté, and of tobacco as well. Endless man-made groves of North American pines soften the low rolling hills where primeval forests stood. Even the roads are red, exotic pathways through tidy towns built by Swiss and German and Polish immigrants whose industry tamed much of this great valley of the Río Paraná.

But this Old World tidiness seemed ephemeral when I came to the cataracts of the Iguazú (pages 236-7), which hurls itself over a two-mile-long palisade on its way to join the Paraná near the point where Brazil and Paraguay and Argentina meet.

Iguazú's endless thunder and furious clouds of spray and mist signal the enormous power that engineers must tame 150 miles downstream at Yacyretá Island. There construction is proceeding slowly on a 40-mile-long earthfill dam designed to produce 2,700 megawatts of electricity and protect millions of acres of farmland from annual floods.

So far, the most impressive sight at Yacyretá is the brand-new subdivision at Ituzaingó, where suburban-style homes, neat lawns, civic center, and shopping mall are largely unoccupied, thanks to mysterious construction delays that may double the budgeted cost of four billion dollars.

Such delays don't surprise Misiones Governor Ricardo Barrios Arrechea. "We are no longer a European colony. We are colonized now by Buenos Aires," he told me. Governor Arrechea had recently announced formation of a regional foreign trade commission uniting the northern provinces of Santa Fe, Chaco, Corrientes, Misiones, Formosa, and Entre Ríos in an effort to force the federal government to allow them to sell agricultural produce and timber directly to markets in surrounding nations.

"There are 20 million people living in foreign countries on the borders of Misiones. But we must ship our goods first to Buenos Aires, then north again to Brazil or Paraguay. Why, when there is only a river between us?"

The geography of Misiones and Corrientes, jutting into Brazil between Uruguay and Paraguay, is a reminder that rivers and mountains have never been the main barriers to progress in Latin America. The early history of Argentina is a catalog of wars fought to maintain the borders of the vast Spanish Viceroyalty of Río de la Plata. But Paraguay was lost to revolution in 1811, Bolivia in 1825; Uruguay became independent in 1828 following a war between Argentina and Brazil. Savage civil wars erupted as other provinces sought freedom from the economic domination of Buenos Aires.

One of the most notable casualties of those wars was Gen. José de San Martín, the man who made Argentine independence possible. He was born in Corrientes. His statue contemplates almost every town square in Argentina, and I had come to feel enormous respect for him, and a sense of sadness too, because this genius of Argentina's independence had been reviled as a traitor, a bribe taker, and a would-be king.

The revolution against Spain was faring badly until, in a legendary feat, he took his troops across the Andes to join with Chile's liberator, Bernardo O'Higgins, and drive the royalists into the mountains of Peru.



Icy intruder, three-mile-wide Moreno Glacier invades an arm of Lake Argentino. This valley in the southern Andes echoes with the crash of constantly calving ice.

But the rulers of Buenos Aires savagely denounced him for disobeying orders to fight for them against the provinces.

Later San Martín would write of "this heroic but wretched people," whom he refused to lead because "if victorious, I could never be permitted to use the clemency I see necessary, but be obliged to be the agent of high passions that think of nothing but vengeance. . . ." Rather than be "the instrument of such great horrors," he exiled

himself to Europe, dying there in 1850.

RETURNED to Buenos Aires to find that those horrors he feared were the subject of an exquisitely made historical film called *Camila*. It was set in the days of a tyrant named Juan Manuel de Rosas, who ruled Argentina—but for a brief interruption in the early '30s—with a bloody hand from 1829 to 1852. He was called Restorer of the Laws and Institutions of the



Glacier National Park preserves this and 12 other major glaciers descending from an ice field that measures 250 miles long and as much as 40 miles wide.

Province of Buenos Aires, and his portrait hung beside the crucifix in Buenos Aires churches while his squads of scarlet-robed assassins sliced the throats of his enemies in the streets.

The film told the true story of 19-year-old Camila O'Gorman, who seduced a young priest in 1847 and ran away with him to teach the poor and bear his child in Corrientes Province. For this immorality Rosas had them executed side by side.

Film audiences had gasped at the film's explicit sexuality and murmured at the ghastly view of human heads impaled in very familiar streets. But the final scene, showing the blood-spattered couple tumbled brutally together into a crude coffin, left the crowd stunned.

The director is Maria-Louisa Bemberg, elegant and seemingly frail, but possessed of a steely determination to tell the truth.

"First of all, *Camila* was about love and

freedom. But, of course, it was a statement about human rights also. People had started to talk about the atrocities, but our 14- to 20-year-olds were still fearful or—even worse—indifferent. So I wanted the film to provoke memories, thoughts, feelings.

"Our new freedom came home to me most strongly when we finished shooting one of the erotic scenes. I turned to the cameraman and said, 'Now we'll shoot a quiet one for Argentina.' Suddenly I realized that we no longer needed to sanitize the past. On TV during the Malvinas, we saw how we had been lied to. People are tired of myths. They have curiosity now, searching for truth."

IN AVELLANEDA CEMETERY, near Buenos Aires, photographer Jim Blair and I hurry down rain-slashed narrow streets whose mausoleums look like town houses in a miniature village of the dead. The squat concrete bunker we are looking for is hidden behind a hastily built brick wall. Inside, wind howls through shattered windows, and dead leaves scuttle around stainless-steel embalming tables encrusted with what looks like blood. A huge refrigerator sags open to reveal sliding drawers scattered with fragments of human bones.

This is a police mortuary, abandoned since 1983. I have read about it in a book called *¡Nunca Más!—Never Again!*—published by the National Commission on the Disappearance of Persons. A policeman who had worked there remembered incidents like this:

"... the three bodies of the subversives, still alive, were thrown to the ground; the doctor administered two injections to each, directly to the heart, with a red, poisonous liquid. Only two died, but the doctor said all three were dead. They were loaded in a truck of the Brigade and taken to Avellaneda. . . . Afterward we went to clean up and change clothes, because we were covered with blood. . . . Shortly we went to the

Police Headquarters where . . . a priest . . . told me that the thing we had done was necessary, that it was a patriotic act and that God knew that it was good for the Nation."

On a high windowsill I see a single geranium in an old tin can, a small, immaculate spot of red in this place of death. Somebody has scratched a huge "N.N." on the wall. It stands for No Name, the only epitaph for at least 10,000 young Argentines who vanished into dozens of facilities like this.

Mónica Mignone was the first whose name I'd learned. Her father, Emilio, had shown me her school portrait, propped amid family mementos on the mantelpiece.

After her disappearance he had founded the Center for Legal and Social Studies to begin a slow, implacable, and very dangerous process of collecting evidence against individual government kidnapers and murderers. The dossiers were instrumental in the government's investigations and in the trials of the military dictators.

"We never learned anything about Mónica," he told me. "But the commission report and the trial were good results. Not just because Videla and others were jailed, but because of the impact on Argentine society. Suddenly we all *knew* about the crimes.

"There is strong military pressure to avoid trials of men on active duty. They want a law of amnesty, protection for people who 'just obeyed orders.' We are struggling against this idea.

"For the future I'm idealistic without illusions. I believe the people have finally rejected totalitarianism. But a defect in the Argentine people has always been that we are not conscious of the difficulty of politics and democracy. I'm a lawyer by trade but an educator by profession. My personal contribution now is writing textbooks on civics, to communicate the realities of politics, not just the ideals.

"If we are to succeed, we must learn not to look for miracles, but to work." □

Stealing a tender moment during a busy day, Jorge Campos caresses his daughter Mabel after returning from his shift at the government refrigerator factory. At night he moonlights as a waiter. Throughout Argentina's years of anguish and uncertainty, Campos has worked to expand and improve his family's small house in Buenos Aires. For him and his countrymen, attempting to ensure a better future for their children, such persistent efforts may yet be rewarded.



HIGH ROAD TO “Victory”

Soviet and U.S. Climbers Conquer Pik Pobedy

By WILLIAM GARNER

Photographs by MEDFORD TAYLOR



PLUNGING DOWN the shifting sea of snow, I tried vainly to glimpse the safety of our tents, several miles away on the icy ridge beneath us.

As night fell, the minus 30°F temperature and winds gusting to 80 miles an hour began to freeze ominous white bands across our noses and faces. My Soviet rope partner, Viktor, held fast as the gusts occasionally knocked me off my feet. Around ten o'clock that night, exhausted from 14 hours of continuous battling in the thin air, we halted our search for the tents and huddled together to talk over our situation.

We were lost, three Americans and 12 Russians, at 23,000 feet on Pik Pobedy—Peak of Victory—in Soviet Central Asia. Some of us thought we had already passed the tents, others that the tents had blown away. We began to discuss the urgent need to dig snow caves for shelter.

Suddenly Pasha shouted that Oleg—a veteran of 27 ascents above 7,000 meters (22,965 feet)—had just fallen through a cornice some 20 feet from where I was standing. I could barely discern Pasha through the driving snow as he belayed a badly shaken Oleg back up over the edge of that mile-high precipice. Oleg's near miss further drained everyone's already low reserves of physical and mental energy. I remember my sudden realization in that moment that some of us might not survive the ordeal of being forced to bivouac through the night.

Triumph at hand, a Soviet-U. S. team approaches the 24,406-foot summit of Pik Pobedy along a perilous ridge dividing China, left, from the Soviet Union. For climbing the U.S.S.R.'s four highest peaks, Americans William Garner and Randy Starrett received the coveted award (above) that earns them the title Snow Leopard.

DAVID BREADHEART







Convinced that the tents were still ahead, David, our American cinematographer, took the initiative. He handed me his packful of film equipment and roped up with Nicolai and Valentin, the two leaders of the Soviet team. The three veterans of Mount Everest—two Russians and the only American who has climbed it twice—set off together in a redoubled search for our elusive high camp. The rest of us advanced more cautiously, steering away from the corniced side of this disputed boundary between China and the U.S.S.R.

Ironically, it took us only another 20 minutes to find our tents, which had been lying all the while just a few hundred yards over the next rise. Pik Pobedy, a treacherous mountain that has killed some 45 Soviet climbers, had played with us—and allowed us to win.

DAVID BREASHEARS, Randy Starrett, and I, we three Americans, had just become the first Westerners to climb Pik Pobedy. It is the world's most northerly mountain above 7,000 meters in altitude, and it stands in the Tian Shan range of Central Asia.

For Randy and me this climb culminated our four-year quest to become the first from outside the Soviet Union to earn the title of

Snow Leopard—and a medal awarded by the Soviet Sports Committee to those who conquer the four highest Soviet peaks: Pik Kommunizma (24,590 feet), Pik Pobedy (24,406 feet), Pik Lenina (23,405 feet), and Pik Korzhenevskaya (23,310 feet). Perhaps most satisfying of all, we had achieved this in a joint Soviet-American expedition along with 12 world-class Soviet climbers, among whom we counted some close friends.

I had first learned about Pik Pobedy at a dinner in Moscow during the summer of 1981. Boris Gavrilov, who has twice climbed the four highest peaks, had shown me photographs of our future route up Pik Pobedy. He told me of the tragedy of his friends who reached the top but afterward died of exposure below the summit ridge.

That year I was in the Soviet Union as an exchange scholar, researching my doctoral dissertation on Soviet defense policy. After dinner I immediately telephoned home to Randy, my climbing partner for many years and a trial attorney in Washington, D. C. Randy agreed as a first step to attempt Pik Kommunizma the following summer. "I have long wanted to climb it," he said. Thus began our quest to become Snow Leopards.

In 1982 Randy and I climbed to the summit of Pik Kommunizma. Because we were just two Americans climbing alone and I could speak Russian, we soon found ourselves making good friends with Soviet climbers, among them Oleg Borisyonok and Viktor Masyukov, with whom we were later to climb Pik Pobedy. In 1984 we returned to the Pamirs and in a single summer climbed both Pik Lenina and Pik Korzhenevskaya. Only one mountain remained—Pik Pobedy.

Victory Peak was so named in 1946 to commemorate the survival and victory of the Soviet Union in World War II. In 1955 a major attempt on Pik Pobedy met with disaster, when 11 members of that expedition were killed in a blizzard. Only in 1956 did a Soviet team led by Vitaly Abalakov finally

William Garner is a specialist and consultant in Soviet foreign and military affairs. He is fluent in Russian and has made more than a dozen trips to the Soviet Union. Photographer Medford Taylor has covered assignments in Africa, South America, Thailand, and the Philippines. He has also contributed to NATIONAL GEOGRAPHIC TRAVELER and WORLD magazines.



Crossroads of high ranges, the Soviet republics of Kirghiz and Tajik hold the Soviet Union's four loftiest mountains. Second highest, Pik Pobedy, or Peak of Victory, is the most hazardous to climb because of its extremely harsh weather. On summer pastures in the shadow of Pik Lenina, the author befriended several Kirghiz (facing page and below), descendants of one of Asia's great nomadic peoples.



succeed in reaching the summit. But the mountain proved an apt symbol of the Soviet people's wartime sacrifices: Some 180 Soviet climbers have conquered Pik Pobedy; 45 have lost their lives in the attempt.

With Pik Pobedy our next goal, Randy and I called on Michael Monastyrsky, the director of the Soviet International Mountaineering Camps, in Moscow. Despite an adventurous spirit, Michael never became a climber, since World War II left him with a wooden right leg. He showed us a hollow steel cartridge that Soviet climbers had fashioned out of scrap metal from the crucial Battle of Stalingrad in 1942-43. Inside was a bag of earth from Mamayev Hill, the memorial graveyard for Russians who died at Stalingrad. The following summer, Michael

told us, Soviet climbers planned to place the cartridge on the summit of Pik Pobedy to commemorate the 40th anniversary of the Allied victory over Germany in 1945. Holding the cartridge in my hand, I asked Michael, "May I carry this up with them?" He readily agreed.

Early in 1985 the Soviet Sports Committee began to organize the first joint Soviet-American expedition to Pik Pobedy. Our team flew in to Moscow on July 22. Randy and I were delighted to learn that our old friends Oleg and Viktor were to be among our fellow climbers.

Anatoly Ovchinnikov would be the overall expedition leader, and Nicolai Chorny of the Sports Committee would be the team captain on the mountain.



Tragedy and hope meet in a glacial valley in the northern Pamirs, where the expedition went for preparation and acclimatization. Like all non-Soviet climbers, the Americans gathered at the International Mountaineering Camp in the valley center (right). In the foreground a memorial recalls eight of the U.S.S.R.'s top women climbers who died in 1974 while ascending Pik Lenina, faintly visible in the background at right. Their deaths struck a crippling blow to women's climbing in the Soviet Union.

In a camp yurt, the leader of a Japanese expedition (top right) wishes American members success on Pik Pobedy, where they arrived (above) at base camp several weeks later.





Our first task was to adjust our bodies to high altitude. We would take no oxygen with us. We decided to acclimatize in the Soviet style for two weeks on Pik Kommunizma in the Pamirs.

Unlike the approach sometimes summarized as "climb high, sleep low," the Russians believe that acclimatization is achieved more efficiently by sleeping progressively higher than your comfort level and intermittently descending back to base camp to allow these "inoculations" to take effect. During our acclimatization climbs we spent two nights at 18,000 feet, another four on Kommunizma's plateau at 20,000 feet, and one at 22,000 feet.

Our stay in the Pamirs wasn't all work though. During evening songfests at base camp Randy's wife, Margaret, passed around her guitar, while David swapped stories with the Russians about their climbs in the Himalayas. We made friends quickly, knowing that we would soon share the same thin lifeline on a very dangerous mountain.

From the Pamirs we flew some 400 miles

to Pobedy via the cities of Osh and Przhvalsk. At the Osh bazaar we stocked up on melons and other fresh fruits, for which the Uzbek merchants smilingly refused payment when I told them I was an American.

On August 14 a helicopter delivered us to our camp on the Inylchek Glacier, beneath the forbidding mass of Pik Pobedy. There we found our friend Viktor Masyukov on a Soviet team that had been trying for a month to bring down as many as possible of the bodies left on the mountain from previous expeditions. Storm after storm had pinned the team down in snow caves, permitting it to get no higher than the 19,000-foot camp. One member broke a leg, another several ribs. My own hopes began to fade as this strong team of Soviet climbers flew off in defeat. But the 47-year-old Viktor and several others stayed behind to join us. "This year might be my last chance," Viktor told me. "I certainly can't let you try it without me!"

Whether we should try it at all became the central question the next day. At our morning meeting, despite the first blue sky



Across a rock-strewn glacier the author, left, and Randy Starrett return to base camp at the 13,000-foot level beneath Pik Kommunizma, after an "inoculation" climb to 22,000 feet. Seven days of strenuous training at high altitude prepared the Americans for their assault on Pik Pobedy, 500 miles to the northeast.

in weeks, the weight of mountaineering experience counseled against it.

"Under these heavy-snow conditions we have almost no chance for success on Pik Pobedy in the two remaining weeks," declared expedition leader Anatoly Ovchinnikov. Instead, he recommended that we attempt neighboring Pik Khan-Tengri, the fifth highest Soviet mountain, just five meters short of 7,000.

Nicolai Chorny was even blunter: "Last year there were excellent weather and snow conditions on Pobedy, and six climbers died. This year conditions are the worst in memory. The odds are not acceptable."

Our discussion was interrupted now and then by the sound of avalanches far above us. They underlined the irony of our situation: Despite heavy snowfall over the past weeks, there had been no big avalanche to clear the most dangerous slopes, between 16,000 and 19,000 feet. "What do you Americans want to do?" Anatoly asked.

The final commitment to climb any mountain is both intensely personal and an intricate group decision. Each climber not only risks his own life but also assumes a heavy responsibility toward his teammates.

"Let's think it over until tomorrow," I said, wondering if perhaps we should climb Khan-Tengri after all.



The mountain thunders several times virtually every day of the year, as avalanches roar down a 7,000-foot chute on Pik Kommunizma's north side.

THAT AFTERNOON a tragedy altered my perspective: A huge avalanche on Khan-Tengri killed a Soviet climber. The event seemed to equalize the dangers of the two mountains. In any case, as Randy put it that night, "I'd rather fail trying to climb Pobedy than succeed on Khan-Tengri."

Several of our Soviet teammates agreed, but they made it clear that we Americans would have to speak out strongly to reverse the shift to Khan-Tengri.

The morning of our originally planned departure I sat down next to Anatoly, who was warming his fingers around a hot cup of coffee as the sun crept up into its second day of cloudless skies. I told him that we had talked it over and wanted at least to march the 12 miles across the glaciers and examine the snow conditions on Pobedy from close up.

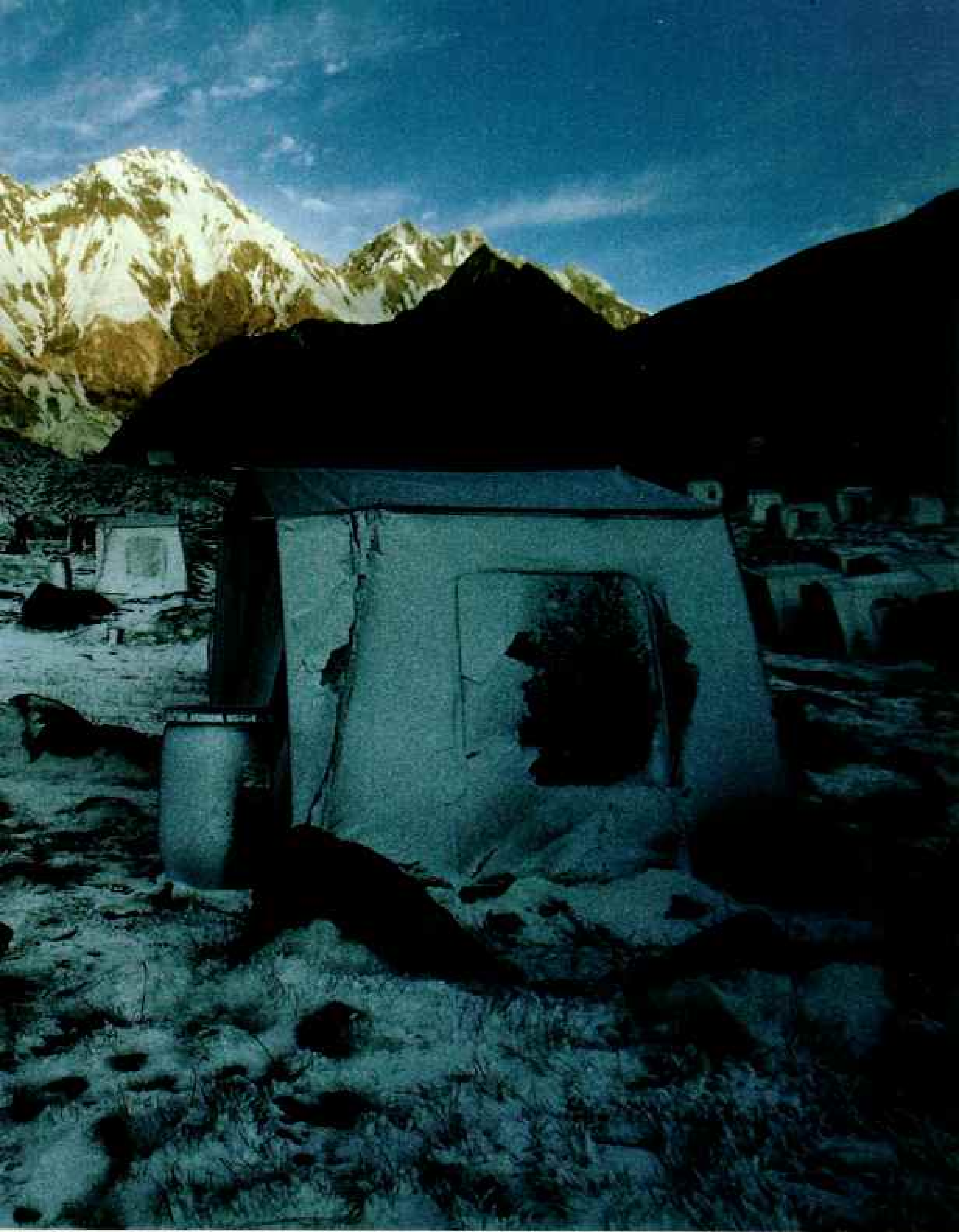
Anatoly nodded. "But that would use up two days and rule out any realistic possibility

of climbing Khan-Tengri," he warned. Valentin Ivanov, our senior trainer, gave his latest assessment of the chances on Pobedy: "Even this clear weather can't change the bad avalanche conditions for another several days," he said. "The storms will return; there are too few days left. At best we have a 4 percent chance of success." But I knew from the smiles of my Soviet teammates that the momentous decision had been made: The Soviet-American team would go for it.

That night under starry skies we celebrated our arrival at the first camp on the north side of Pik Pobedy's base. Our Soviet teammates had carried nearly all the food to leave us room for our film equipment. We were



Snowy fallout from a powerful avalanche sticks like frosting to the 13,000-foot Fortambek climbing camp, a departure point for expeditions in the region. When the author and his American teammates descended from the 20,000-foot plateau on Pik Kommunizma where the avalanche



originated, they found the camp completely dusted. Snow facing on supply barrels indicates the direction of the mountain and the avalanche. After acclimatizing, the Americans flew, by way of the Soviet cities of Osh and Przhivalsk, to join Soviet teammates at the base of Pik Pobedy.

astonished when they broke out a variety of treats remarkable by any mountaineering standards: red and black caviar, cured ham fat they called *salo*, dried and salted Volga fish, and black bread. Not to be outdone, we dipped into our reserve of old American standbys—hot Tang and Jell-O pudding.

“Good food coloring for signaling on the snow in an emergency,” snorted Nicolai. But he liked most to tease us about American technology. When we boasted about the incredible strength of our 5.5-millimeter Kevlar rope, he jokingly asked: “Why do you even bother with that bunch of string?” But he couldn’t conceal his genuine admiration for the North Face dome tents we’d brought as gifts for the team.

The next two days we climbed to the 19,000-foot camp over ice walls and up

avalanche tracks. Randy and I stayed roped together, following closely behind Oleg. At one point we came to a 40-foot ice overhang. Oleg disappeared straight up over it. Randy spied a path to the right side and disappeared that way. Through the whistling wind I soon heard them both yelling down to me from opposite directions—one in English, one in Russian—telling me which way to go. After trying unsuccessfully to loop Randy’s rope back over the top, I started to crampon straight up a fixed rope he had dropped. Suddenly I missed a step. As Randy drew taut my belay, the rope wrenched to the right and then dropped me smack against the wall ten feet below. I shook myself off and started up on the right side, when David appeared beneath me. “Why don’t you try going straight up?” he amicably



BOTH BY DAVID BREACHGATE

Home for two nights on Pik Pobedy, the camp at 19,000 feet sparkles in sunlight just before a storm delays further ascent. While Soviet members admired American tents, Randy Starrett (above) acquired a taste for their salted fish. After the storm and agonizing debate, the climbers decided not to retreat.



suggested. "No more advice!" I growled.

DAVID QUICKLY PROVED to the Russians that he was much more than a cameraman. Roped with Valery Khomutov and Volodya Puchkov, he did his full share of leading through the waist-deep snow. He also analyzed the snow structure for avalanche danger by digging test pits and took turns being sent out alone on 300-foot double ropes across stress fractures on the slopes. If the leader were swept away and buried, the ropes could guide his rescuers to the spot at which to dig him out.

At the 19,000-foot camp we chopped out deep platforms and anchored our tents with ice screws and ice axes just minutes before a storm hit. For a night, a day, then another

night, we were imprisoned under a three-foot snowfall. Inside we munched gloomily on cookies and caviar, while fretting over what to do once the storm abated.

"Going down now risks near-certain avalanche," warned Nicolai. Above us the snow cover made it impossible to see—much less scale—the 4,000 vertical feet of rock and ice that separated us from Pobedy's west ridge.

David and I were talking over plans in Nicolai's tent, when suddenly we heard Randy's faint shout through the storm: "While you fools chatter in there, I was just half-buried in my tent by an avalanche!"

Nowhere was safe. Randy, until his mishap, had been in favor of staying put. David advised us to go down if conditions did not improve. I voted to go up. "You don't know a damn thing about avalanches!" protested





David. That was true. I just felt lucky, I guess.

"What do the Americans want to do?" Anatoly's voice from base camp crackled over the radio. Nicolai answered with disgust: "You know that crazy American democracy—everybody's got his own opinion!"

Luck prevailed. The storm finished with tremendous winds, which swept clean a path through the icy rocks above us. Surveying the scene, Valentin announced: "Our chances for the summit have improved to 5 percent!" But our confidence swelled. Two days later we could peer over into Chinese territory from atop the 23,000-foot west ridge and joke about dropping into a

Xinjiang restaurant. We made camp midway along that ridge, only 1,400 vertical feet to go, but still four miles away from where it began its abrupt rise to the summit.

That night David and Randy had to fix me hot-water bottles to quiet my shivering after I stayed out too long tent hopping among our Soviet friends. Despite a high-altitude headache and occasional vomiting, I was clearly overexcited with the expectation that our dream was about to come true.

"If God is good, the weather will hold," Oleg observed as we started toward an invisible summit under a light snowfall the next morning. But the wind soon picked up. Around noon we stopped to rest and snack



DAVID BREASHEARS (ABOVE); COURTESY SOVIET-AMERICAN EXPEDITION

Beating the odds, team members near the summit (above) and victory—a 20 to 1 shot, said the Russians, given weather conditions. An hour later David Breashears (right, at right) and Yuri Golodov wave their national colors from the peak, as foul weather closes in. Unable to linger, Soviet climbers hastily buried a cartridge of soil from Stalingrad, commemorating the 40th anniversary of the Allied victory in World War II.



beneath the summit ridge. Then I saw him: A frozen shapeless form sitting upright a hundred yards away. No one said anything about his presence. There was no way we could get the body down, and by unspoken agreement we left it in peace. But the sight prompted Nicolai to warn us:

"Many have died coming back from this summit after dark. We will turn back at 4 p.m." At that moment Pasha asked me if he could carry up the Stalingrad cartridge the rest of the way to the summit. I understood.

Randy and I roped together for the final pitch. David took the lead with Valery and Volodya. As we pressed up the wind-packed snow, our crampons barely left a mark.

My eyes fixed on the trail of blood Randy was spitting up. Its red color was getting brighter, a dangerous sign that it might be coming from his lungs. When I pulled up to him to check how he felt, he feistily retorted: "It's a nosebleed—let's go!"

David and six Russians had disappeared

over the farthest rise, while Nicolai and five others lagged behind us. With lingering concern I watched Randy's determined steps lead us up to the first summit tower. As we arrived, I heard a shout from behind me and turned to see Viktor approaching. He had broken loose from Nicolai and Valentin's rope. I looked down at my watch. It was 4:40 p.m., August 22, 1985.

Randy shouted that he could see the others across the gully near the tower ahead. As the smiling Viktor drew near, I asked him: "Doesn't it look higher over there?"

"Leopard," Viktor replied simply, "we've arrived!" In the distance Yuri was hastily burying the cartridge when Nicolai gave the signal to regroup and descend.

After our harrowing nighttime return to the high camp when we couldn't find our tents, our two-day descent from there to base camp seemed like an airy dream. My thoughts floated apart as my arms and legs fell into the jerky rhythms of lowering



themselves down the rock faces and plunge-stepping down snow slopes. The last day was windless, clear, and relatively warm.

"Only one such day in a decade on Pobedy—it must be a sign," mused Oleg. The peace in the heavens seemed to reflect our minds, swept clean by near defeat followed by victory.

That night at the welcoming banquet in base camp, Americans and Russians proposed toast after toast of champagne. The sentiments behind each toast were nonpolitical and extraordinarily heartfelt. Many echoed the message that David, Randy, and I had left on the summit for those to follow:

We, the American team on the first joint Soviet-American expedition up Pik Pobedy, have climbed this mountain to illustrate for the peoples of our two countries how much . . . value there is in our learning to take risks together. . . .

It was a victory that all could share. □



WILLIAM GARNER (BELOW)

Den of Snow Leopards: The author, at left, Yuri Golodov, Viktor Masyukov, and Randy Starrett congratulate one another on their success. At the base of Pobedy, near animal tracks, a Soviet teammate left a reminder of the author's new status in the U.S.S.R.'s distinguished ranks of climbers.

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Marauders of the Jungle Floor



ARTICLE AND PHOTOGRAPHS BY MARK W. MOFFETT

LAY on the jungle floor, watching a battle more strange and terrible than any fantasy writer's dream. Before me, a two-inch-long centipede was caught in the jaws of death. While little ants fought to pinion the victim, a giant soldier crushed it between powerful mandibles (*left*). The predators, among the most impressive ants I have ever seen, belonged to the species *Pheidologeton diversus*. I call them marauder ants. Along with my wife and assistant, Deborah Fletcher, I had come to the island of Celebes in Indonesia to observe them.

My understanding of the marauder ant had progressed enormously since my initial studies of dried museum specimens at Harvard University, where I am a doctoral candidate. During two years in tropical Asia, I had grown to admire how the multisize worker ants divide the colony's labors, uniting in an intricate foraging strategy.

Exhibiting a trait known as polymorphism, the species has evolved with different physical castes, each specializing in its own social tasks. Most of the workers are tiny minors, just over

a tenth of an inch long (*above*). Then there are intermediate-size workers, called medias, and ferocious-looking majors, like the soldier at left, about three-quarters of an inch in length.

Amid the many active minors, the larger ants resemble giant beasts of burden, like elephants parading through hordes of men. Indeed, observing marauder ants along one of their foraging trails is much like visiting an Asian bazaar. One sees the commotion of the ants working on the construction of the trail and the constant rush of all sizes of workers to and from the nest. The returning workers are laden with an astonishing variety of foods in different colors, shapes, and sizes. In some cases minors stand guard at the trail edge, warding off intruders. Studying *Pheidologeton* and other ants in habitats from India to New Guinea has deepened my appreciation of the amazing complexity of ant societies.

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PHIDOLECTON SYLVIVS
ABOUT EIGHT TIMES LIFE-SIZE

UNCOVERING a marauder ant nest in the Philippines, I discovered a seething world of adult workers busily tending the next generation, still in the formative stages of eggs, larvae, and pupae (*left*). Scattered chambers around the core are packed with media and major workers that have their abdomens distended with food. Called repletes, they serve as living

pantries, regurgitating food for other members.

All ant societies are composed entirely of females; males exist only to fertilize the queen and then die. Only the queen (*above*), who may boast a thousand times the body weight of a minor worker, is fertile. All workers

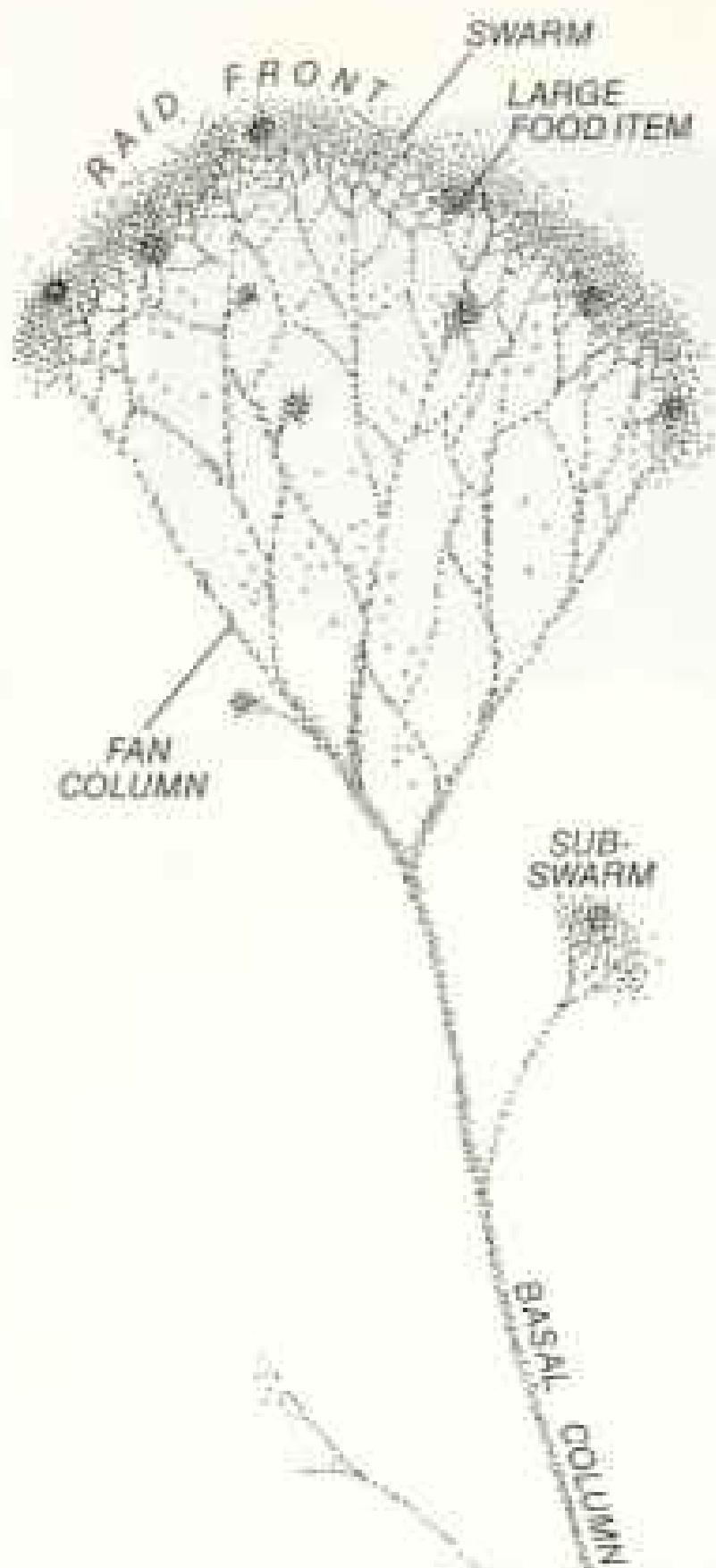
are her daughters. Occasionally she spawns new queens, who fly off to mate and start new colonies. Her wings shed, this hopeful marauder monarch (*below*) attaches her newly laid eggs to her body and protects them by hobbling along with her back section scrunched forward.

The hundreds of thousands of ants in a marauder nest can



PHIDOLECTON DIVERSUS, ABOUT 4 X

make excavating a colony very painful. Though they lack stingers, hundreds of minors biting simultaneously have a considerable effect, and majors can draw blood. Debbie and I learned to tuck our pant legs into our socks (*left*) so that the ants weren't a problem until they swarmed up our clothes to our necks and arms. Every few minutes we ran from the nest to help each other scrape them away.



Raiding pattern

Miniature highway with ephemeral exits, the marauder ants' trunk trail serves as a vital food artery to the colony's nest. Raiding columns branch out — sometimes expanding to form a fan-shaped network with a broad swarm of ants in the vanguard.

EXTENDING from each marauder ant nest, a carefully constructed trunk trail facilitates foraging. Trails often reach an inch across and can even have a soil canopy (*above*). Primary trunk trails may last weeks or even months.

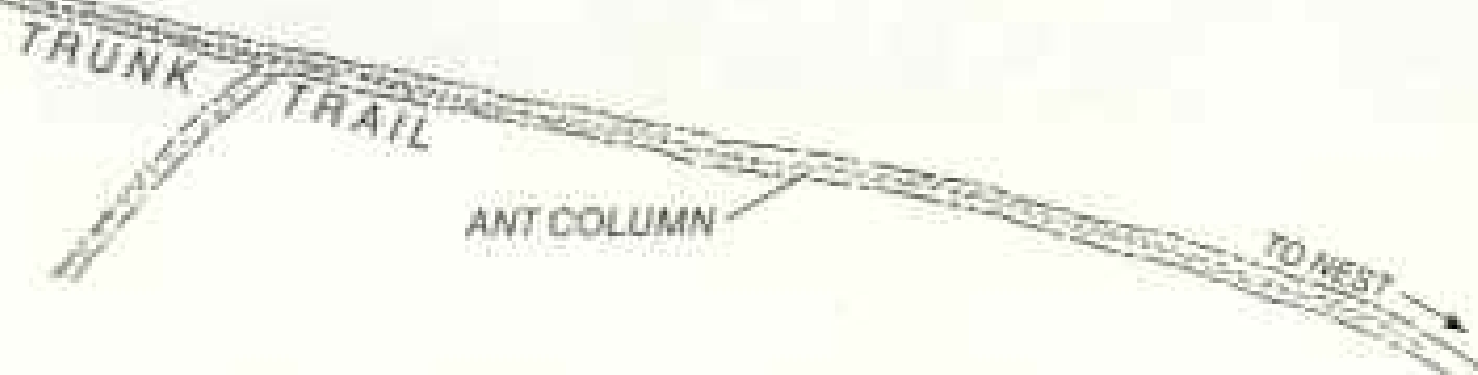
I have seen trunk trails as long as 300 feet, the equivalent of about 30 miles when scaled to the size of a minor worker. Traffic is often very heavy, with several hundred ants passing by each minute; sometimes the number surpasses a thousand. The trail is central to the whole foraging pattern; it is the artery through which all food flows to the nest.

Construction of this highway is a grand-scale

effort, enlisting workers of all sizes. Constant maintenance is required as leaves and twigs falling from above block the passage of food. Media and major workers function like heavy-duty road machinery, dragging away relatively large objects, such as twigs, or knocking them away with upward shoves of their massive heads. Like Indian mahouts riding elephant-back, minors are often seen atop their major sisters, even while they are engaged in road maintenance (*top right*). When an obstruction cannot be moved, it is slowly gnawed away by the bigger workers. Meanwhile the minor workers and small medias carry bits of soil to the sides of the trail, until it has a smooth surface with walls and eventually a roof of soil.



DESIGNED BY JOHN GARDNER
AFTER MARK W. ROFFERT





ABOUT 9.5



ABOUT 6.8 (ABOVE); ABOUT 7.8 (BELOW)



I never saw a marauder ant searching for food on its own. To my surprise I found that the ants forage in groups, like army ants. Columns of workers advance from the trunk trail, then retreat. Some columns develop into massive swarm raids, connected with the trunk trail by a basal column of ants (*diagram, facing page*). Tens of thousands of workers can participate in such a raid, which commonly reaches six to twelve feet across.

Food is collected along the advancing front. Vegetable matter, mostly seeds, constitutes about half of the diet. Prey like this worm (*left, bottom*) makes up most of the other half. Even formidable quarry such as this hapless frog (*left, middle*) may succumb when overwhelmed by sheer numbers.



(bottom) have summoned help to a plant infested with treehoppers, whose green nymphs will be tended and milked of a nutritious honeydew.

Like marauder ants, which are only distantly related, army ants employ a raiding strategy—hunting together in massive groups. But unlike the marauders, which often advance in swarm raids (preceding pages), most army

Foraging strategies

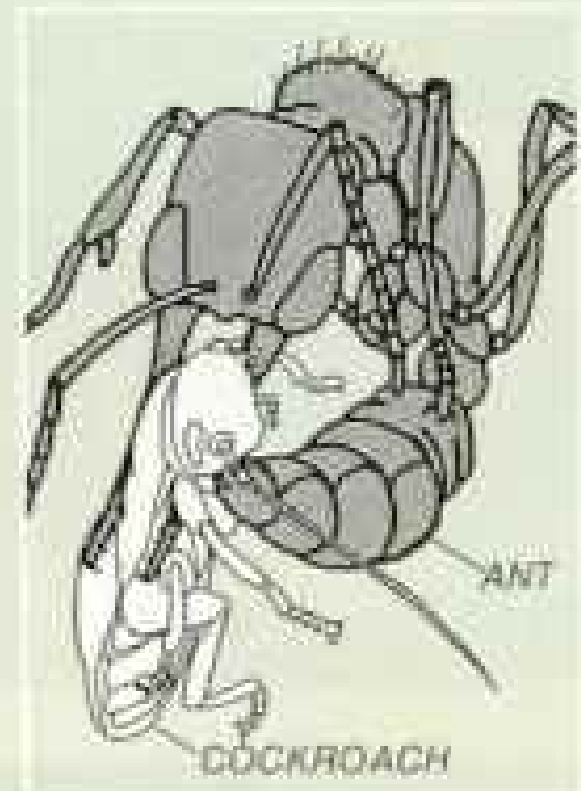
AS DIVERSE as they are numerous, the world's 15,000 or more ant species employ a variety of strategies to search out and appropriate their food. Unlike marauder ants, the workers of many species are solitary hunters.

The Asian jumping ant, known for its ability to make great startling leaps, may travel as far as a hundred feet from its nest—a long journey for an ant. But finding prey makes it worthwhile. This jumping ant in Hong Kong

(far right) has seized an unwary cockroach with its long, curved mandibles and is stabbing it in the neck with a hypodermic-like stinger (diagram).

Species like the jumping ant depend entirely on foods that an individual can handle. Yet many solitary foraging ants also recruit assistance for rich and intractable finds; one method is to lay down chemical trails for nest mates to follow.

Spiny ants in Malaysia



ant species hunt only in narrow columns. This group of workers in Malaysia (below left), with mandibles projecting menacingly, displays the typically aggressive behavior of army ants on the march.



CORYLUS LAEVIGATUS, ABOUT 1/8 IN.; PULTRICHRUS DIBAMATA, ABOUT LIFE-SIZE (RIGHT)





HARPERMATHIS YENICIA, ABOUT 21 Y

SOURCE of constant wonder for Debbie and me, marauder minors working together are able to pin down prey thousands of times their own weight—creatures that viewed through the ants' eyes would appear bigger than dinosaurs would look to us. Victims include spiders, cockroaches, crickets, and scorpions. After being restrained by the minor workers, large prey are then bitten repeatedly by medias and majors, and their limbs are torn off. I sometimes ponder the horrors suffered by victims of marauder ants. Without killing them, the ants render them helpless, to be

ripped asunder within the ants' nest.

While many other ants typically carve up sizable food items into manageable pieces, marauder ants do not waste the time. Dozens of minor workers join forces to carry large seeds (**bottom right**) and other hefty finds like a lizard's egg (**middle right**). They do this so efficiently that each ant often seems to bear far more weight than it could carry on its own.

Earthworms up to four inches long can demand the attention of as many as a hundred workers. Here, to help carry a worm (**below**), workers sop up its excess

moisture with bits of soil.

We were intrigued to note a semblance of traffic rules along the marauder ant trails: Ants returning to the nest tend to travel near the middle, while outbound ants keep to the sides. This is probably because heavy burdens make it difficult for inbound ants to maneuver, forcing outbound ants to the trail's edge.

A common adversary along exposed sections of a trail in India, the thief fly (**right**) sits and waits to snatch a morsel from the ants' collective grip. For defense, fierce minors often ride shotgun on the food.





ABOUT 3.8



ABOUT 5.8



ABOUT 12.8 (LEFT); ABOUT 8.8



MYRMOTERKES BARBOURI, ABOUT 30 X

Armed for the kill



MYRMECRASPILUS, ABOUT 8 mm (above left); ODONTOMACHUS, ABOUT 6 mm

ANTITHESIS of the marauder strategy is the lone hunting practiced by many ant species. Examples include a Singaporean antler-jawed ant (*left*), whose mandibles open an incredible 280 degrees. Between them are two long trigger hairs, which, when touched by some quarry, cause the mandibles to snap forward, knifing the prey. A related species, without trigger hairs (*above*), relies on its antennae to gauge the distance to its quarry, in this case an isopod.

Another kind of trap-jawed ant (*top right*) closes its mandibles violently, flinging intruders far into the air. Primitive *Myrmecraspilus* ants (*bottom right*) stun adversaries with a blow from their mandibles in much the same way that people snap their fingers. *Lophomyrmex* ants (*middle right*) can recruit assistance when hunting food but are also admirable solitary hunters. With their saw-toothed mandibles they shear off the limbs of small prey like this springtail, quickly immobilizing it.



LOPHOMYRMEK, ABOUT 12 mm



MYRMECRASPILUS, ABOUT 12 mm



AROUND 51 & ABOVE LEFT), ABOVE 7 &



DEFENSE is immediate and intense when other ant species encroach on the trails of marauders.

On the edge of a trail in southern India, workers in an aggressive stance (*far left*) hold two far larger ants of the genus *Leptogenys* (*left*) at bay. Intruders are usually driven away without combat. However, when a hapless Malaysian *Diacamma* ant blunders directly into the midst of the marauders' trail,

agile minors rush forward to pin it to the ground (*below left*). With the adversary defenseless, a major worker arrives and kills it with repeated crushing blows (*below*), then drops the corpse by the side of the trail (*bottom*), where minors will bury it. During severe disturbances, the flow of food to the nest halts as ants carrying food quickly retreat.

Encounters between marauder ant colonies often result in hostilities. Fights

occur when the raid of one colony collides with the exposed trail of another. Minor workers of each army grasp their opponents with their mandibles and slowly pull each other apart. Wide battlefields can develop with hundreds of workers locked in combat, until the colony with the largest fighting force drives away its foes. Curiously, medias and majors do not participate in these battles, perhaps because they are too valuable to be risked.



ABOUT 8 X



ABOUT 14 X (LEFT), ABOUT 8 X



ABOUT 8 X



ABOUT 4 X

SCOURING the front line of each raid, marauder ants harvest a variety of plant material. When fruiting grass plants are encountered, media workers climb the stalks and pull out seeds, which the minors carry away. In the nest, media and major workers, serving as a miller caste, crack open seeds so all can eat.

Harvesting sometimes continues for days at a rich find, such as this bamboo shoot (*left*). Large fallen fruits, as from an oil palm (*lower left*), are food bonanzas, and their sap is consumed on the spot.

Often, as I watched the marauder ants' tightly orchestrated activities, the thousands of individuals seemed to merge into a single dynamic pattern. It was as if all the ants had united to form one great living creature. The trunk trail and its branches were arms thrown over the ground, from which raids reached out like fingers, combing the forest floor for nutrients, energy, and information. Then this vision would dissolve, and the individuals would reappear, their labors finely coordinated, the different castes intricately apportioning the day's tasks. Yet that vision, never forgotten, constantly reminds me that a society of ants can be as complex and worthy of admiration as any in the animal kingdom. □

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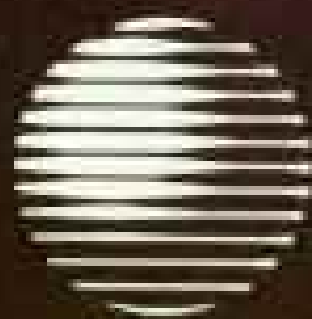
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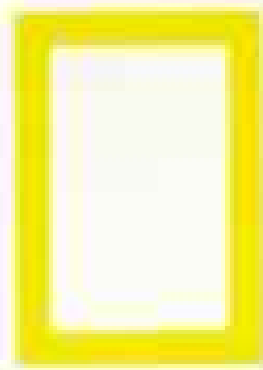
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A short walk and a mile of achievement

GEOGRAPHY becomes important to some only when it promises to bite. Last spring we were asking, "How far is Seattle from Kiev, and which way does the wind blow?" Traditional geographic questions but asked in deadly earnest.

A major problem we have met in our program to restore geography to a deserved place in the curriculum is not only the lack of students to answer such questions but also the lack of teachers to ask them.

This summer the National Geographic Society is taking a major step to help meet that need. A short walk from my office here at

Society headquarters, school is in session—a school for teachers. They are participating in the first National Geographic Summer Geography Institute. All students are secondary-school teachers, selected for excellence and leadership, and we are preparing them to teach other teachers.

The 45 men and women attending the institute were chosen by eight Geographic Alliance coordinators. The alliances—in Colorado, New Jersey, Oregon, Tennessee, Texas, southern and northern California, and Washington, D. C.—were initiated by Christopher "Kit" Salter, professor of geography at UCLA, and modeled after the one he founded in California in 1983.

We motivate teacher participation by providing travel expenses, lodging, and a stipend, as well as the chance to earn credits from George Washington University—but we are asking something in return. Once back home, all graduates of our institute are required to give at least three staff-development workshops this academic year for other teachers in their local school districts. Thus, teaching good teachers to teach geography is how Salter and his fine faculty are spending these warm summer weeks. In the fall, new enthusiasm will be planted in school districts around the country. And we anticipate that in years ahead similar institutes will be conducted by the regional Geographic Alliances.

We have a long road to travel, but I feel we have already made a fine start—we have received great moral support, and material support as well, including a very generous pledge of \$50,000 from Governor Lamar Alexander of Tennessee to support an alliance institute in his state. A gift of \$10 came from Ellsworth, Maine, with a note: "Enclosed is the best I can do to help the Summer Geography Institute. My best wishes for its success!" It meant as much to me as a sum ten times larger, for it is a sign that the grass roots are beginning to grow—and 45 enthusiastic teachers giving 135 workshops in coming months means they will keep growing.

As everyone knows, September is a great month for planting grass.

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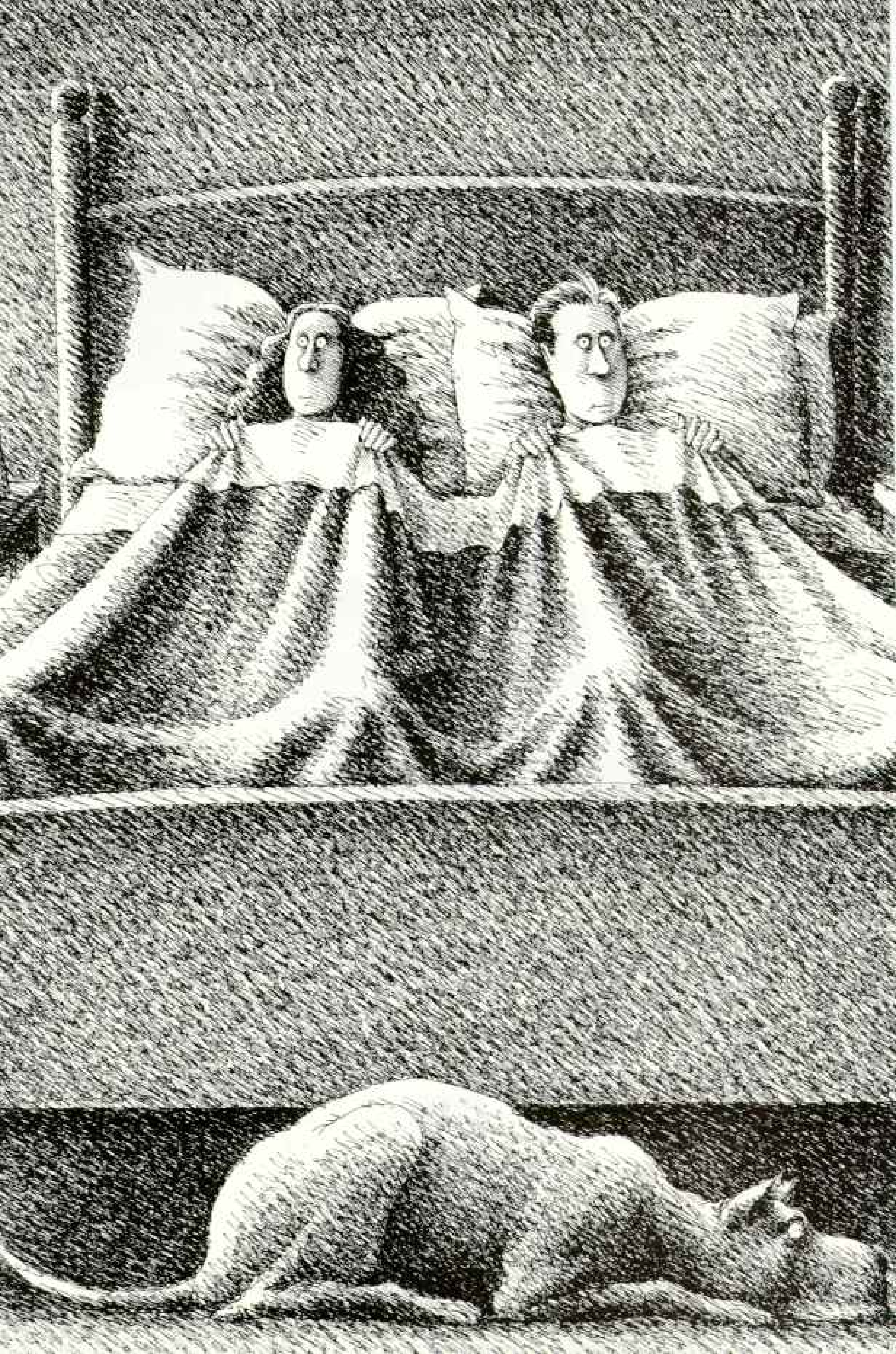
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Japanese Americans

Congratulations on your courage to publish "Japanese Americans: Home at Last" (April 1986), a subject that has generally been avoided by print media because of the emotions it evokes. I suggest that Japanese Americans are not a model minority but model citizens who pay taxes, obey the laws, and contribute to the quality of American life.

Shigeya Kihara
Monterey, California

No mention was made of the thousands who chose to return to Japan or of their fate. The wrong decision, I think. But it was their choice, and I hope they will never be citizens of the U. S.

Max Yancey
Smyrna, Georgia

As a onetime staff member of the War Relocation Authority in a relocation center (Tule Lake) and in the resettlement program (Chicago), I object to several elements in your otherwise excellent article. The relocation centers were *not* "internment camps." That name applies only to camps operated by the Justice Department (as at Bismarck, North Dakota, Lordsburg and Santa Fe, New Mexico, and Crystal City, Texas), where enemy aliens of several nationalities were "interned" after individual hearings.

In their operation and impact on residents, the differences from the concentration camps of the Nazis and Soviets were so great as to render ridiculous the term "concentration camps" for the relocation centers. Also not all Japanese Americans were affected, only those living in California, western Oregon and Washington, and southern Arizona. All told, some 25,000 Japanese Americans never saw the inside of a relocation center.

Harold S. Jacoby
Stockton, California

I feel sorry for the many interned, but as a 20-year-old in 1941 about to be drafted, I would have gladly traded places. I and my brothers and relatives also had to give up our jobs, businesses, and families and go live in barracks, training from 4:30 a. m. to 9 p. m., and then go overseas to get shot at. Japanese Americans have no more legal action against the government than other Americans who had to fight in a war they didn't want to be in.

Earl Belisle
Minneapolis, Minnesota

You should follow up by recommending Agnes Newton Keith's book *Three Came Home*. Or talk to the British wives and children who were put in the Japanese version of a concentration camp because they happened to get trapped in Singapore, Burma, etc. We DID NOT treat our resident Japanese as the Japanese treated civilians who were caught up in the war. I've never heard of any reparations made by the Japanese government. Sorry, but as an ex-Marine, I'm FED UP!

Lee Coburn
Lansing, Michigan

Mary Tsukamoto's words "I had to leave it clean. We didn't know how long we'd be gone" echo the actions of mothers who fled Estonia in 1944 before Soviet occupation forces. All have said that their last action was to clean the house and put a fresh tablecloth on the table. They had no way of knowing that they would never go home again.

Epp Aruja
Don Mills, Ontario

The article by Arthur Zich was accurate and well done. As a former administrator of the Poston Relocation Center, I still marvel at the goodwill of a segment of America that was treated so badly. I emphasize *badly*.

Hugh Harris Anderson
South Pasadena, California

We may have been in concentration camps or in foxholes overseas, but because in our hearts and mind and spirit we were Americans, we were always at home.

Joseph K. Tanaka
St. Louis, Missouri

Río Azul

Gillett Griffin's "In Defense of the Collector" (April 1986) may have given a misleading impression regarding the exhibition "Maya: Treasures of an Ancient Civilization." True, 24 percent of the objects in it are undocumented. The authenticity of some pieces has been questioned, although there is no consensus among scholars that 11 pieces are forgeries. We removed four pieces before the exhibition opened in New York, and we immediately published an addendum to the catalog; the discussion of even these pieces remains unresolved. We have made no acknowledgment that they are forgeries.

Inevitably scholars disagree on the authenticity of many objects whose origins are unknown. It might have been more fair to state that case rather than imply curatorial inexperience or incompetence, by the unsupported opinion that "any scholar with similar experience could have detected these forgeries." We do not consider scholarly controversy to be shameful.

James Moore, Director
The Albuquerque Museum
Albuquerque, New Mexico

"In Defense of the Collector" does not distinguish between collectors. There are those who belong with looters and vandals, as Mr. Griffin might acknowledge should his collection be stolen and later bought by a collector in a remote country.

Francisco Morales
Cozumel, Mexico

I spent eight years as a starving student archaeologist, and I say Griffin quibbles an important point: money. The money spent for a single looted artifact could fund seasons of quality scientific research. Wouldn't the satisfaction of supporting research be as satisfying as owning a single object? Mr. Griffin maligns archaeologists

because "remarkably little is published." Doesn't he realize that publishing also takes money? Archaeologists feed their families on hamburger budgets as they struggle for next season's money.

Ellie Stewart McCulloch
Phoenix, Arizona

On page 465 you provide a list of exhibit venues for "Cenote of Sacrifice: Maya Treasures from the Sacred Well at Chichén Itzá." Unfortunately the exhibition site was listed as the Louisiana Nature and Science Center; the correct location will be the Louisiana Science Centre.

Linda Lewis
New Orleans, Louisiana



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The new museum on the New Orleans riverfront opens with the Maya exhibit on September 12.

Archaeologists are creating an art market with all their sensationalism and hype. Put the money and energy into the humanity of these poor countries, not into digging holes. People are the national treasure of a land, not stone and clay.

Harry Thompson
Brookfield, Illinois

In the U. S. many American Indian groups are seeking the return of artifacts and remains, claiming ownership by descent. In Texas, archaeologists, museum people, and Native Americans are working together to resolve this issue

and meet the needs of all three groups. More of this type of dialogue needs to take place to resolve this many-faceted issue.

Richard A. Kastl
Gainesville, Texas

I find it ironic that your April cover was an artist's rendering and not a photograph of a Maya mask. Ironic because private collectors are not preserving our past for posterity as a whole but hoarding it for themselves. You cannot offer us, the members, a painting of a magnificent mask and expect us not to wonder what the mask looks like in its true luster and craftsmanship.

Kenneth Lloyd Grindall
Cypress, California



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We agree. As the Editor stated (page 419), the owner would not permit us to photograph it.

Panama

As a Zonian, I spent nearly 20 years growing up in and discovering the beauty of the Panamanian countryside and the friendliness of the people. Charles E. Cobb, Jr., and Danny Lehman accomplished the feat in a short visit.

Stephan H. Small
San Diego, California

Your article omitted the fact that a U. S. gunboat kept Colombia from defending its territory during an insurrection (November 3, 1903) that involved a Frenchman and other proponents of the canal as well as natives. The U. S. invoked the treaty of 1846 with Colombia, and the presence of an American warship prevented Colombian troops from quelling the outbreak.

Charles Valentine
Argenta, British Columbia

Flying Foxes

Sincere thanks for Dr. Tuttle's beautiful article on flying foxes (April 1986). I am particularly interested in the conjecture that flying foxes may be primates. Would this imply that all bats, or only fruit bats, are primates?

Peter F. Gray
Pasadena, California

Three species of fruit bats have been found to have a primate-like visual system, according to Australian scientist John D. Pettigrew, but as yet a link between the bats and primates has not been supported by molecular and other studies.

Freshwater Turtles

In the article "Freshwater Turtles" (January 1986) Christopher P. White correctly reported that the sale of small pet turtles was banned in the U. S. because of the extraordinary disease risk they posed to young children. However, turtles raised in the U. S. are currently shipped worldwide and have been associated with salmonellosis in several countries. On occasion these export turtles have been diverted into U. S. territories, where they caused human salmonellosis. The health hazard posed by these turtles continues. They are not appropriate pets for children.

Dr. Robert V. Tauxe
The Centers for Disease Control
Atlanta, Georgia

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Letters should be addressed to Members Forum, National Geographic Magazine, Box 37448, Washington, D. C. 20013, and should include sender's address and telephone number. Not all letters can be used. Those that are will often be edited and excerpted.



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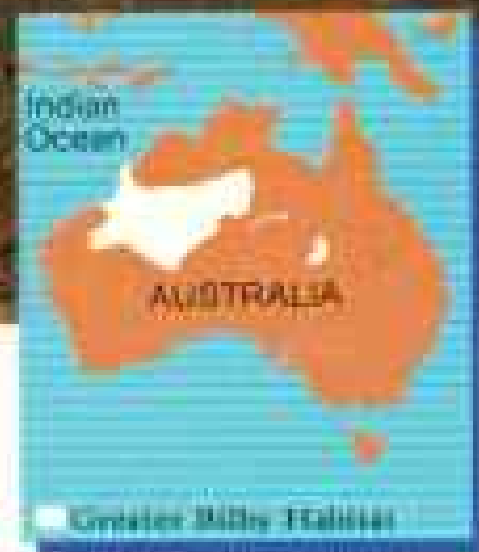
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On Assignment

FOLLOWING THE WAGON RUTS of emigrants who crossed the continent was mostly a pleasure, says **Boyd Gibbons**. But pain helped give him important insights for his article on the Oregon Trail in this issue. Gibbons (**right**), who as a teenager lived on a Montana ranch, walked and rode horseback some 200 miles to get a taste of emigrant life. Within a week the saddle sores, blisters, and bone-deep fatigue brought him new respect for the people he was writing about. "When your lip is split or your feet blistered, it's on your mind *all* the time. Still my problems were nothing compared to what the emigrants went through for six months. I began to wonder . . . my God, could I have done this? I really came to admire their courage."

Like many emigrants, Gibbons changed careers in midstream. After practicing law and serving as deputy under secretary of the Interior Department, he helped develop policy for the President's Council on Environmental Quality in the early 1970s. His life took an abrupt turn when *Wye Island*, his book about land-development battles on Maryland's Eastern Shore, caught the eye of GEOGRAPHIC editors; he joined the magazine staff in 1976.

Photographer **Jim Amos** (**lower**) is another two-career man. The Kalamazoo, Michigan, native was perched atop a 16-year sales career with Eastman Kodak when he risked it all on the camera in his desk drawer. One free-lance GEOGRAPHIC assignment after another led to a staff job in 1969; he promptly won the Magazine Photographer of the Year contest two years running. Amos soon earned a reputation for thoroughness. On the Oregon Trail he spent days tracking down the story behind names carved along the trail (page 164). He logged 25,000 miles—more than ten times the trail's length—in his specially equipped van, often sleeping in the middle of nowhere with nothing but coyotes and Mozart's Clarinet Concerto on the tape deck for company. "I got only one speeding ticket," says Amos. "And that was on the way home."



BY JAMES L. AMOS (TOP); W. PERRY CONWAY

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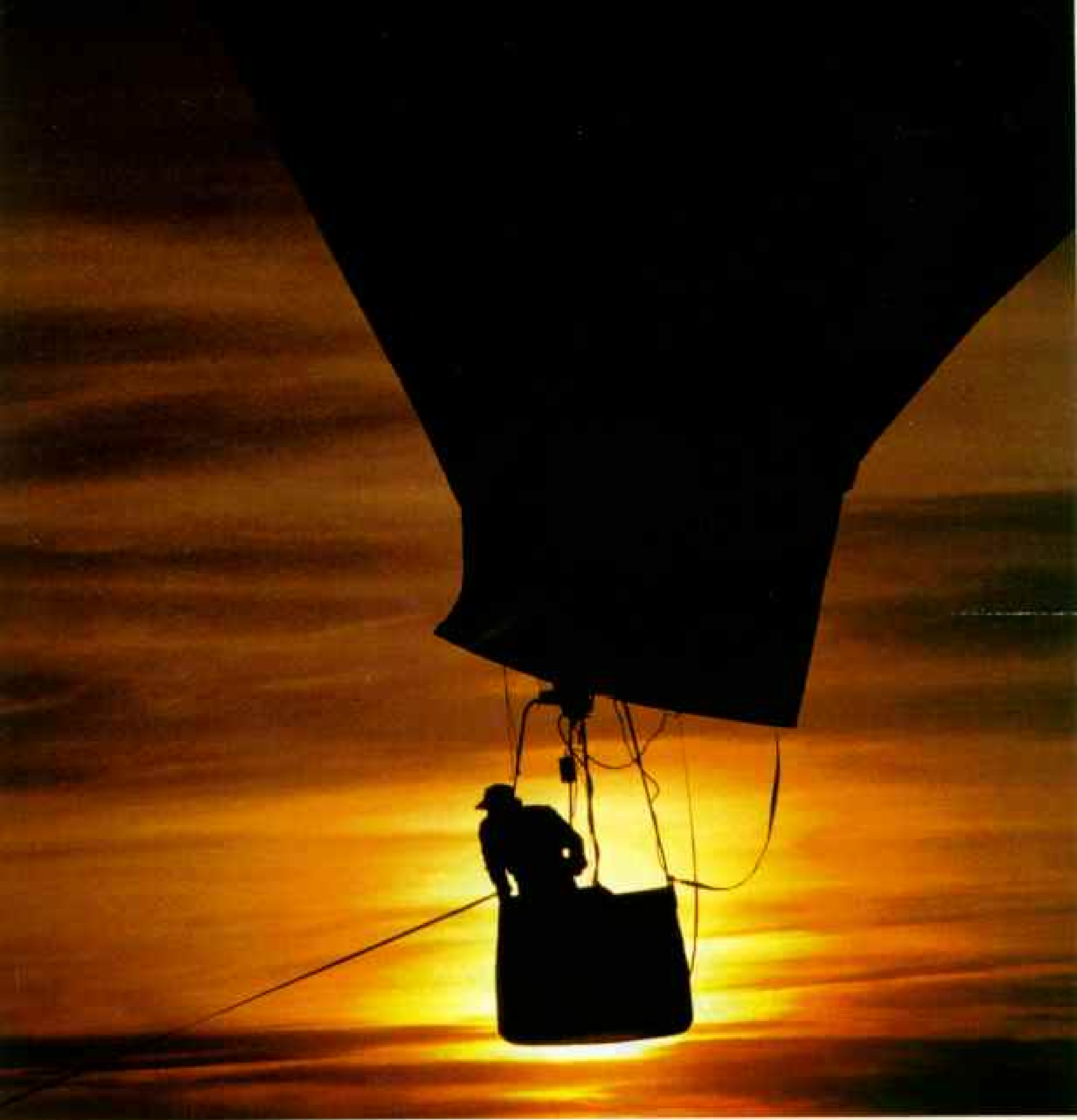
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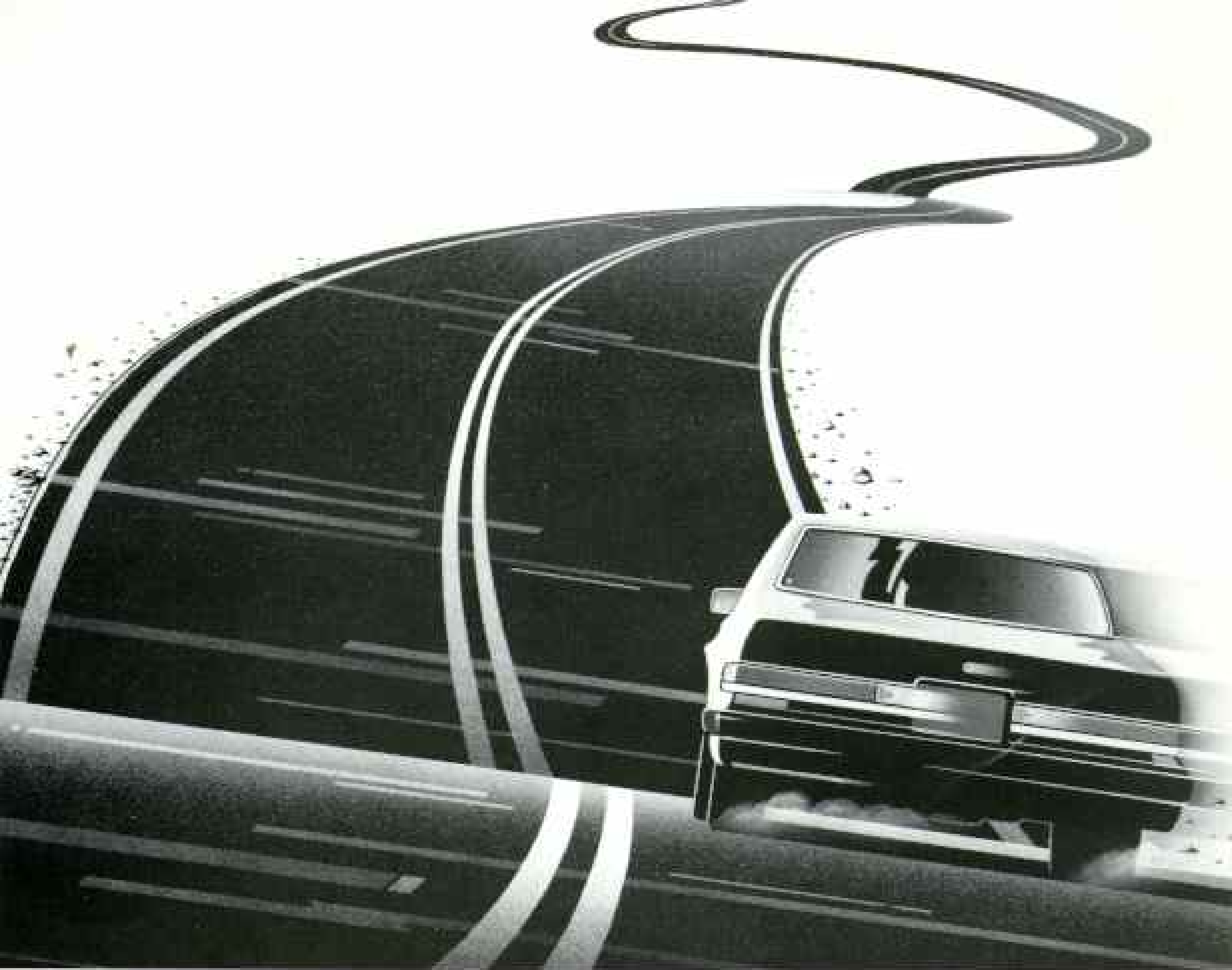
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