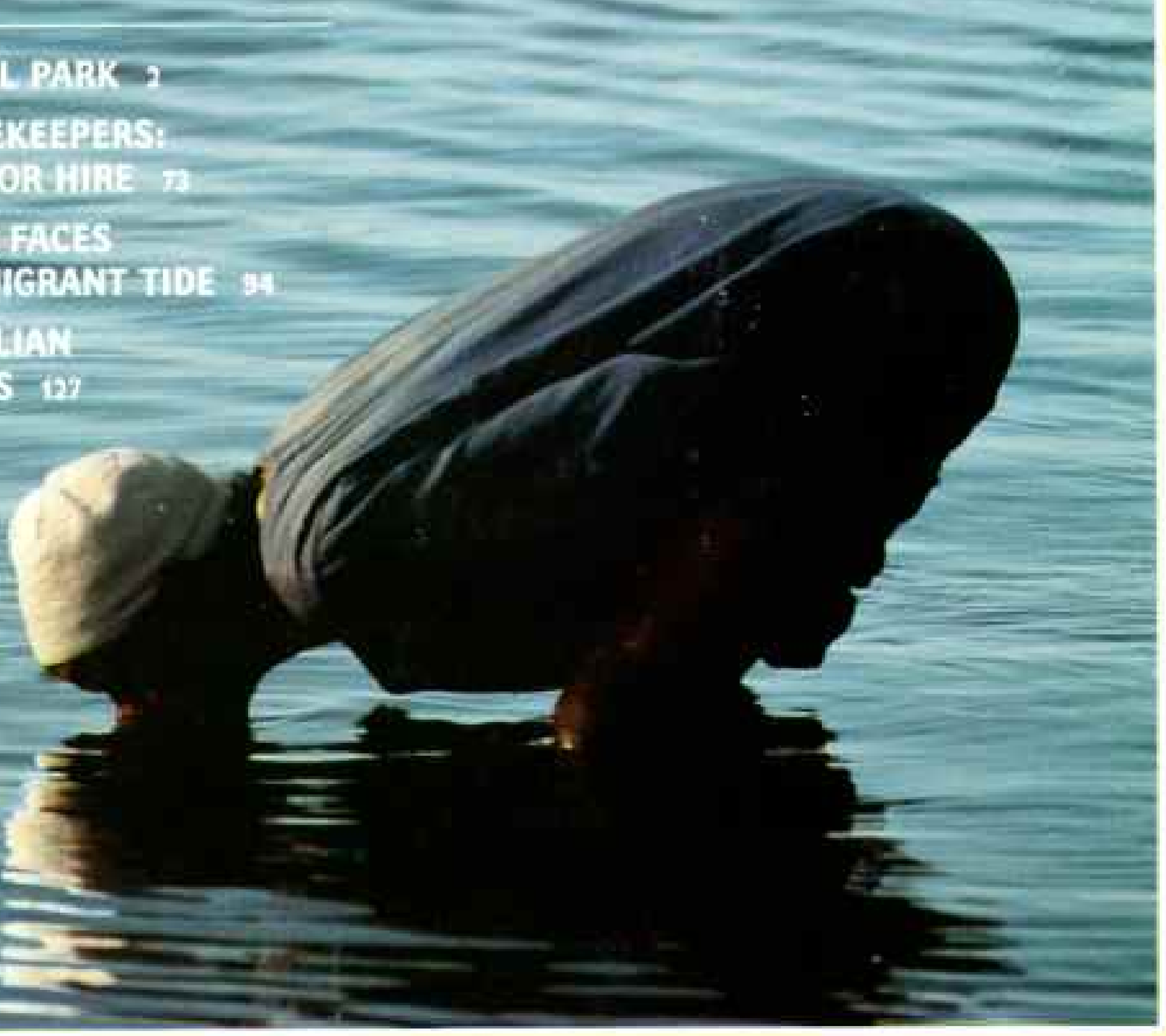
VOL. 183, NO. 5 MAY 1993

NATIONAL GEOGRAPHIC

Middle East Water Critical Resource 38



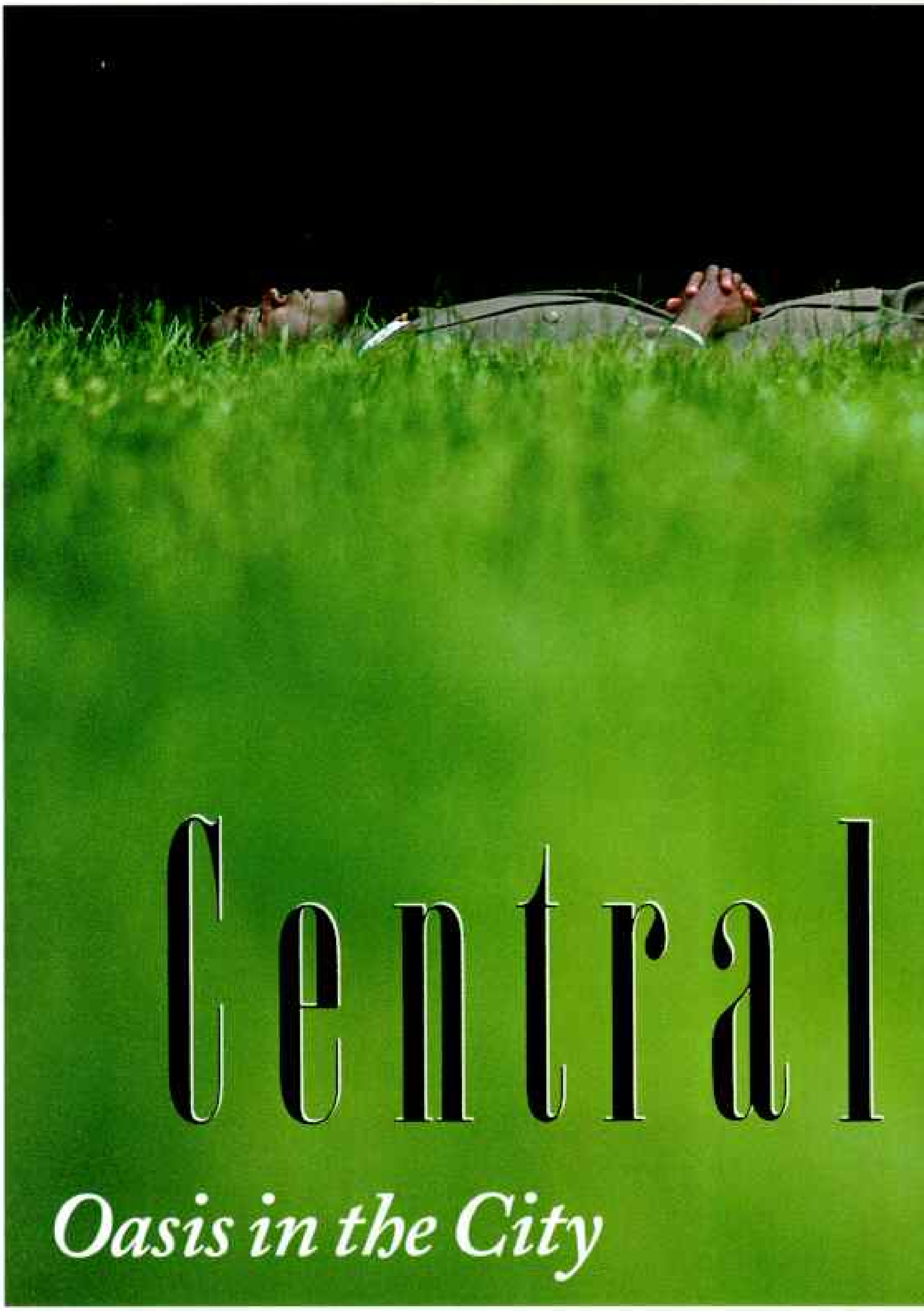
OFFICIAL JOURNAL OF THE NATIONAL GEOGRAPHIC SOCIETY WASHINGTON, D.C.

NATIONAL GEOGRAPHIC

MAY 1993

COVER: As it has since antiquity, the mighty Nile still provides sustenance to Egypt, one sip at a time. Photograph by Ed Kashi.

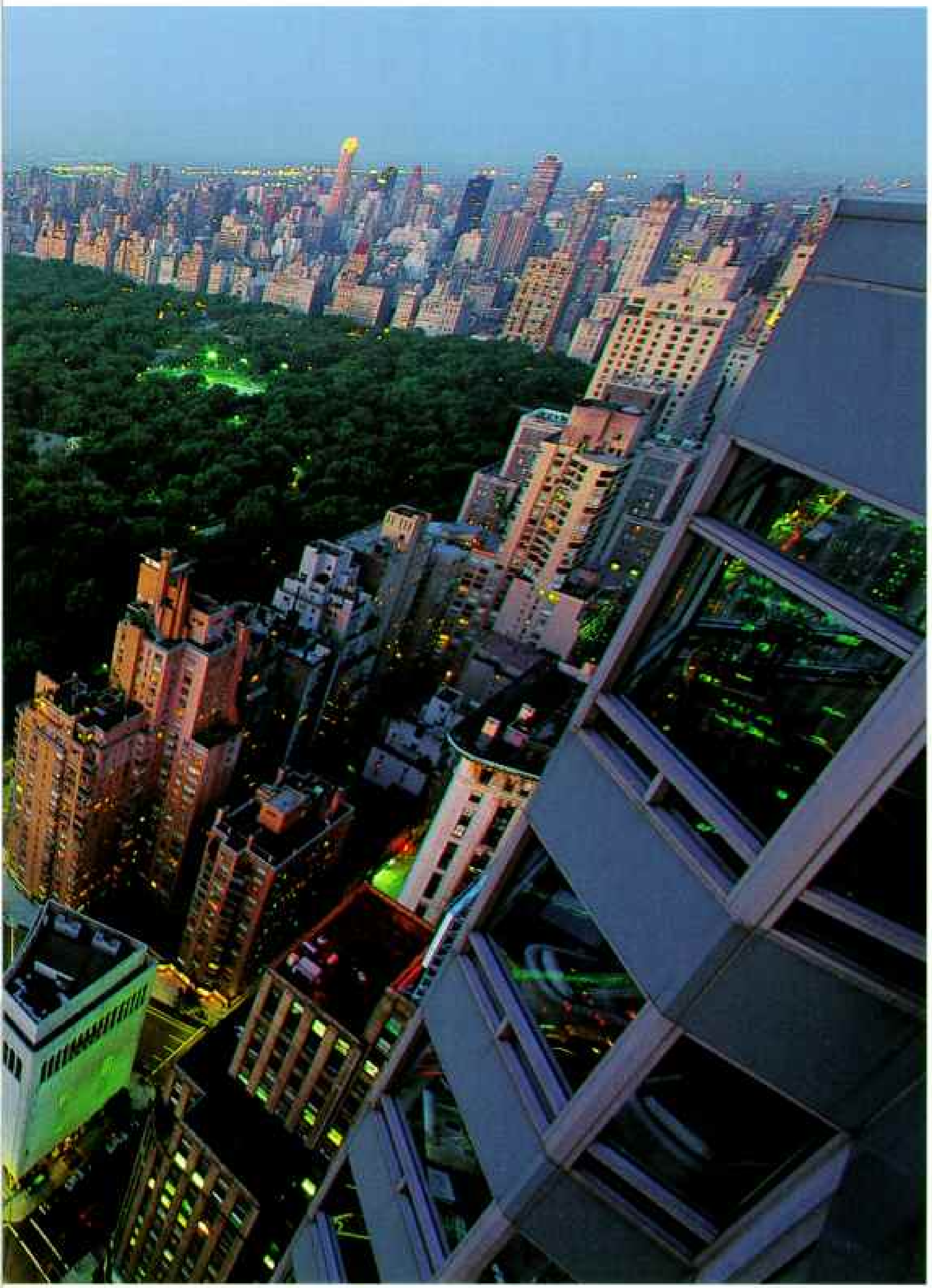
Cover printed on recycled-content paper.



AMID THE CONCRETE AND COMMOTION OF MANHATTAN, CENTRAL PARK—NEW YORK CITY'S

EXPANSIVE GREEN PRESERVE – OFFERS GRASSY COMFORT TO A LUNCH-HOUR SNOOZER.

Armies of buildings halt at Columbus Circle and along the 108 blocks that frame the park.



Merely a glimpse of it from a window can appreciably boost a property's value

Central Park

By JOEL L. SWERDLOW
NATIONAL GEOGRAPHIC SENIOR WRITER

Photographs by JOSÉ AZEL

"WILL YOU WANDER through Central Park with me?" I ask a friend. He is a tough guy with whom I have shared many adventures. "No, thanks," he says, smiling nervously. "I want to live."

Despite its reputation as a crime scene, Central Park attracts 15 million visitors each year. To find what draws them in, I enter the 843-acre park at its southeast corner, where fancy hotels and Fifth Avenue shops make Central Park most glamorous. My plan is to meander north to where it borders on rough, poverty-ridden neighborhoods.

Printmakers Currier and Ives and American impressionist painter Maurice Prendergast idealized Central Park's beauty. I need only a few minutes to see why. Winding trails wrap around a pond. Trees sprout on top of huge rocks. Pedestrian tunnels frame landscapes like works of art. Every curve provides a new masterpiece. Each successive space lures you on.

On a bench near Fifth Avenue I sit with a 74-year-old man who points with his cane, quietly predicting how people will position themselves: "Those two will stand in the middle of the path and talk. That man will sit pretty close to those women." In each case he is right. "The genius of Central Park," says William H. Whyte, a sociologist who, for the past 20 years, has studied how New Yorkers behave in public, "is that it is a big place that is intimate in the workings of its small pieces."

Southern pieces are a paradise for children. The Carousel—powered by a blind horse and blind mule when it opened in 1871—is fast, as befitting the city's life-style. Ice cream drips down faces at the outdoor café next to Conservatory Water, where a philosophical mouse sailed in E. B. White's children's classic *Stuart Little*, published in 1945. Music comes from the skating rink. Rowboats with families fill the Lake. Children climb a bronze statue of Alice in Wonderland. "The park gives you a chance to become young again," one parent, a perfect stranger, tells me.

Four young boys sit on sheets of cardboard and slide off a large rock. The drop is about eight feet. One boy has an arm in a cast. "Did you break it going off the rock?" I ask. "No," he says in a flat tone. "This guy hit me with a chair, so I hit him, boom, on the head with a hammer. He won't hit me again."

Despite this reminder that the park sits within a rough city, I see no violence. Central Park is much different from what I expected. People are having fun. It is, as Danforth says in the 1982 play *I'm Not Rappaport*, an "oasis in the middle of the jungle." Perhaps because it provides such a dramatic break with urban routines, Central Park reaches deep into the lives of people and prompts many New Yorkers to feel that they own it.

"I come here on a bus," a woman says. "As soon as it starts to cross the park, it feels like going into a second home. I feel a mine-ness I feel nowhere else."

ON SCHOOL DAYS dozens of teachers lead classes to the park. For many children this is their only opportunity to see a world governed by nature's rhythms. Just north of the zoo I join first graders listening to "Wildman" Steve Brill. His outfit includes a pith helmet and a T-shirt with a drawing of himself discovering a huge mushroom. The drawing is accurate: beard, rounded forehead, untamed hair, and eyes that look permanently excited.

Wildman, 43, supports himself by taking people on edible tours of city parks. His interest in plants began when Greek women in his home borough of Queens told him that they picked grape leaves in a neighborhood park. He became a professional food gatherer—or

FOOTPRINTS AT 4:30 A.M. HEAD DOWNTOWN IN FRESHLY FALLEN SNOW. DESPITE WARNINGS OF DANGER, PATHWAYS AND ROADS ARE SURPRISINGLY ACTIVE AT NIGHT WITH JOGGERS, POWER WALKERS, AND OTHERS AMONG THE 15 MILLION VISITORS WHO YEARLY ENJOY THE 843-ACRE THEME PARK TO NATURE.

forager—ten years ago. Around the same time, he adopted his new name.

Wildman is a natural teacher. Through noises and contortions he transforms himself into whatever living entity he describes. His arms and neck arch and he is a worm looking for apples; the next moment his body bellows outward and he is a walnut tree intent on protecting its turf from other trees. Within minutes he makes me desperate to learn more about the plants I take for granted.

Although he is self-taught, Wildman sounds encyclopedic as he interweaves folklore, history, science, and nature: "Indians used black walnut to dye clothing. Tea from the hawthorn tree can help with heart disease. White snakeroot is poisonous. If cows eat it, they excrete the deadly poison through their milk and pass it to humans. It killed Abraham Lincoln's mother. I'll bet they never teach you these things in school."

The children do not accept everything without challenge. When Wildman tastes an Asian species of raspberry called the wineberry, one

LOST IN THE BLISS OF FLUID MOTION, FELIX SANTIAGO PRANCES AND DANCES ON IN-LINE SKATES HE HAS PLASTERED WITH STARS AND PLANETS. A FAMILIAR SIGHT ON A LONG STRAIGHTAWAY CALLED DEAD ROAD, SANTIAGO GIVES LESSONS (STARTING WITH HOW TO STOP) AND LEADS SKATING TOURS IN THE PARK.

first grader tells him, "You shouldn't do that. It's not yours."

"Eating and spitting out seeds helps nature. Concrete and mowers hurt nature," Wildman replies. Heads nod in agreement.

Park regulations prohibit picking, and in 1986 two undercover park rangers signed up for one of Wildman's classes and took him away in handcuffs after he picked and ate a dandelion. Wildman called the media, which made headlines out of his promise "not to eat all of Central Park." Embarrassed officials dropped the charges.

"More than 18,000 people have taken my classes, and they leave the park in better shape," Wildman says. "They become advocates for maintenance of parks." He emphasizes, however, that "no one should pick or eat without learning first. You could harm something rare or poison yourself."

After the children return to school, Wildman invites me to his apartment for a meal cooked from Central Park. "Appetizer to dessert," he promises.

His front door is painted to look like a tree. Dried mushrooms fill half of the front hall closet. Next to it is a freezer filled with nuts, berries, and roots. We munch on acorns, boiled to remove acids, and listen to jazz.

The appetizer is pickled daylily shoots and burdock root. They taste rich and tangy. The main course is a chicken mushroom that tastes like real chicken. The Japanese knotweed tastes like rhubarb.

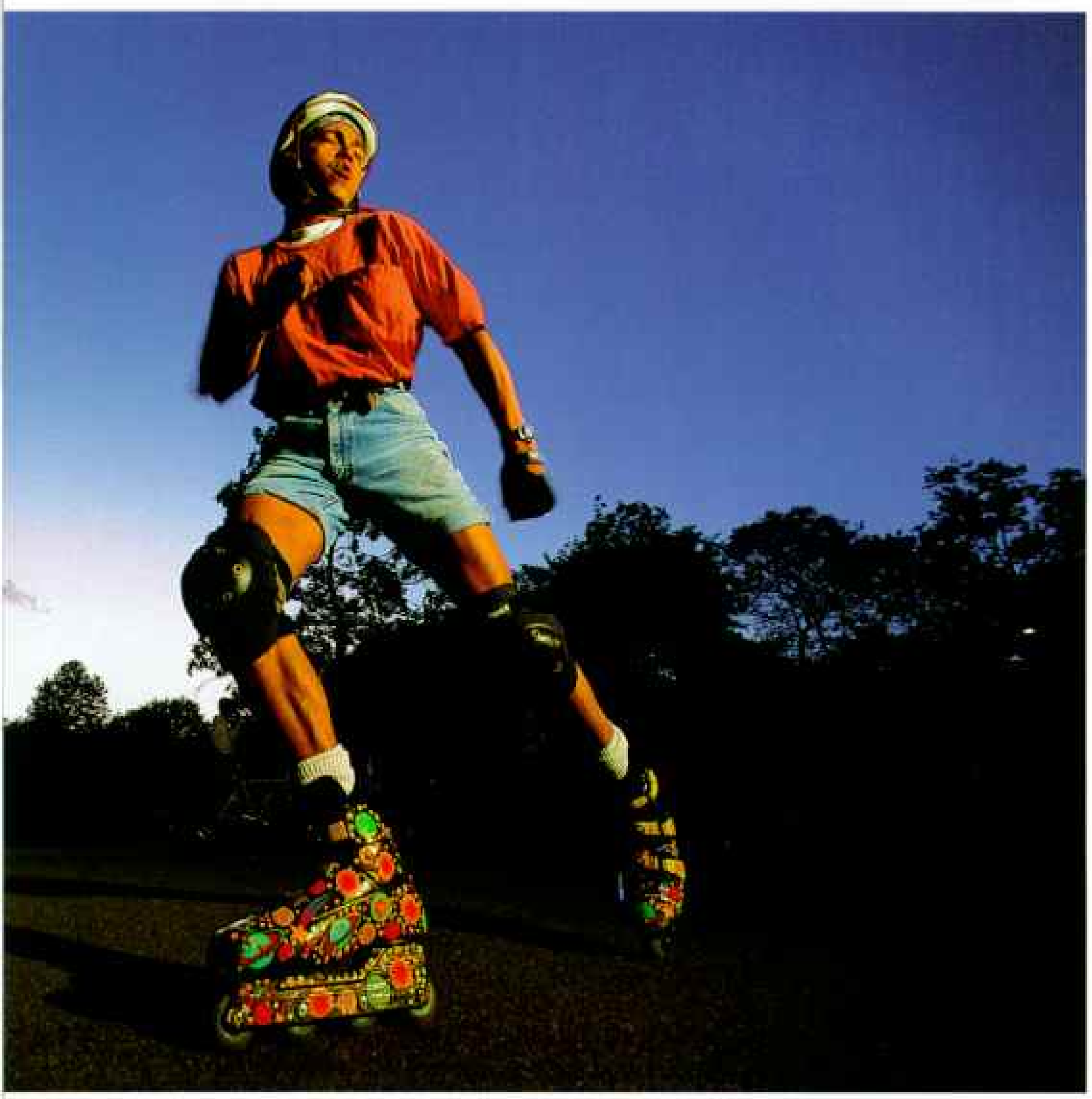
"Have you ever made yourself sick?"

"Never. Sometimes I study a plant for years before trying it." His voice has an authoritative aura. "Foraging is safer than eating junk food and will never hurt you if you do your homework and prepare everything correctly."

He points to the green vegetable I am eating. "If you prepare pokeweed incorrectly you get sick or die," he says. "You must boil it at least twice, changing the water to make sure poisons drain out. You must also pick the right part of the plant, at the right time of the year."

I push the pokeweed aside.

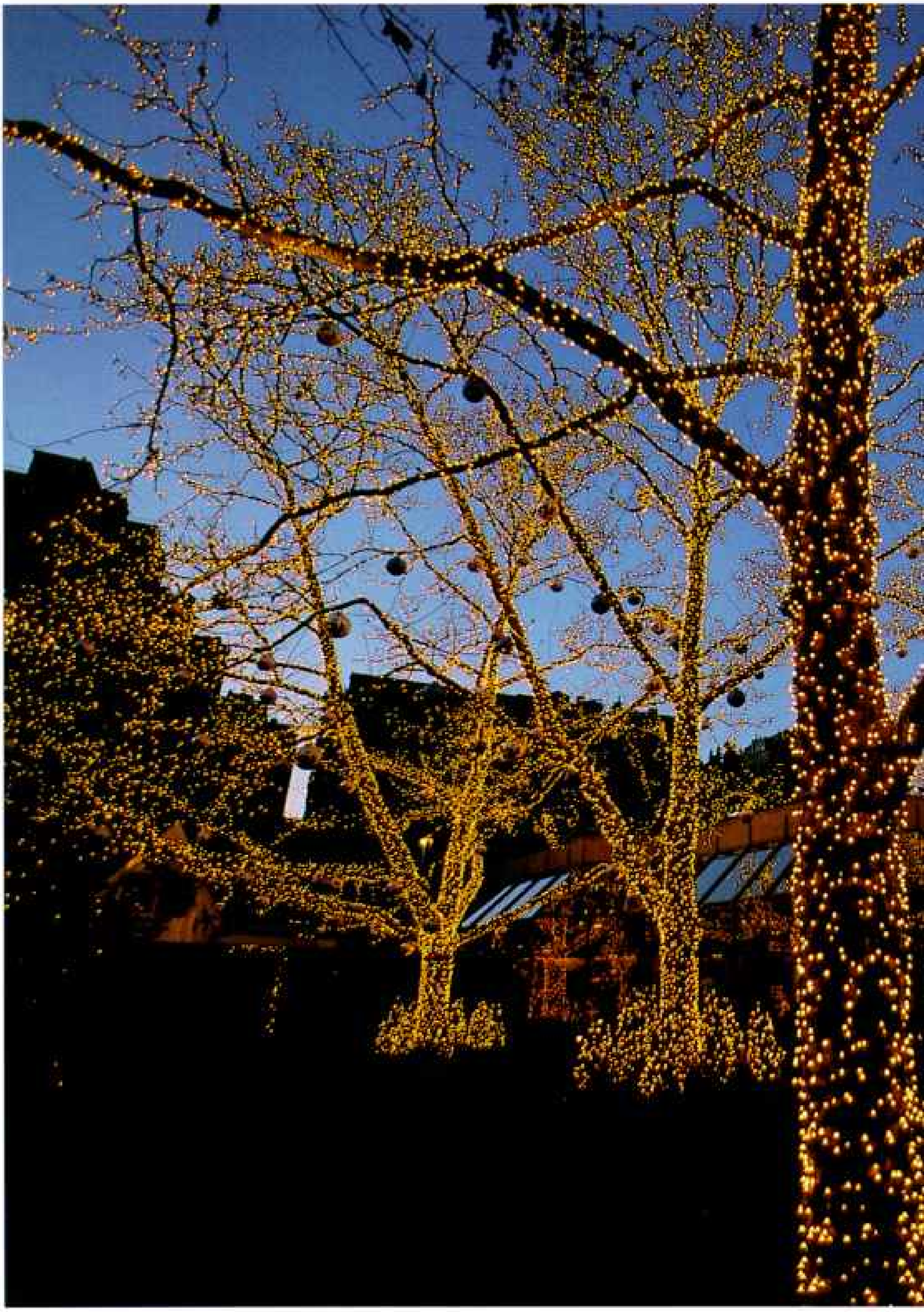
"I want room for dessert," I say. Wildman laughs at my lack of faith and serves me pudding made from the autumn olive, an Asian member of the oleaster family planted in Central Park as an ornamental bush.



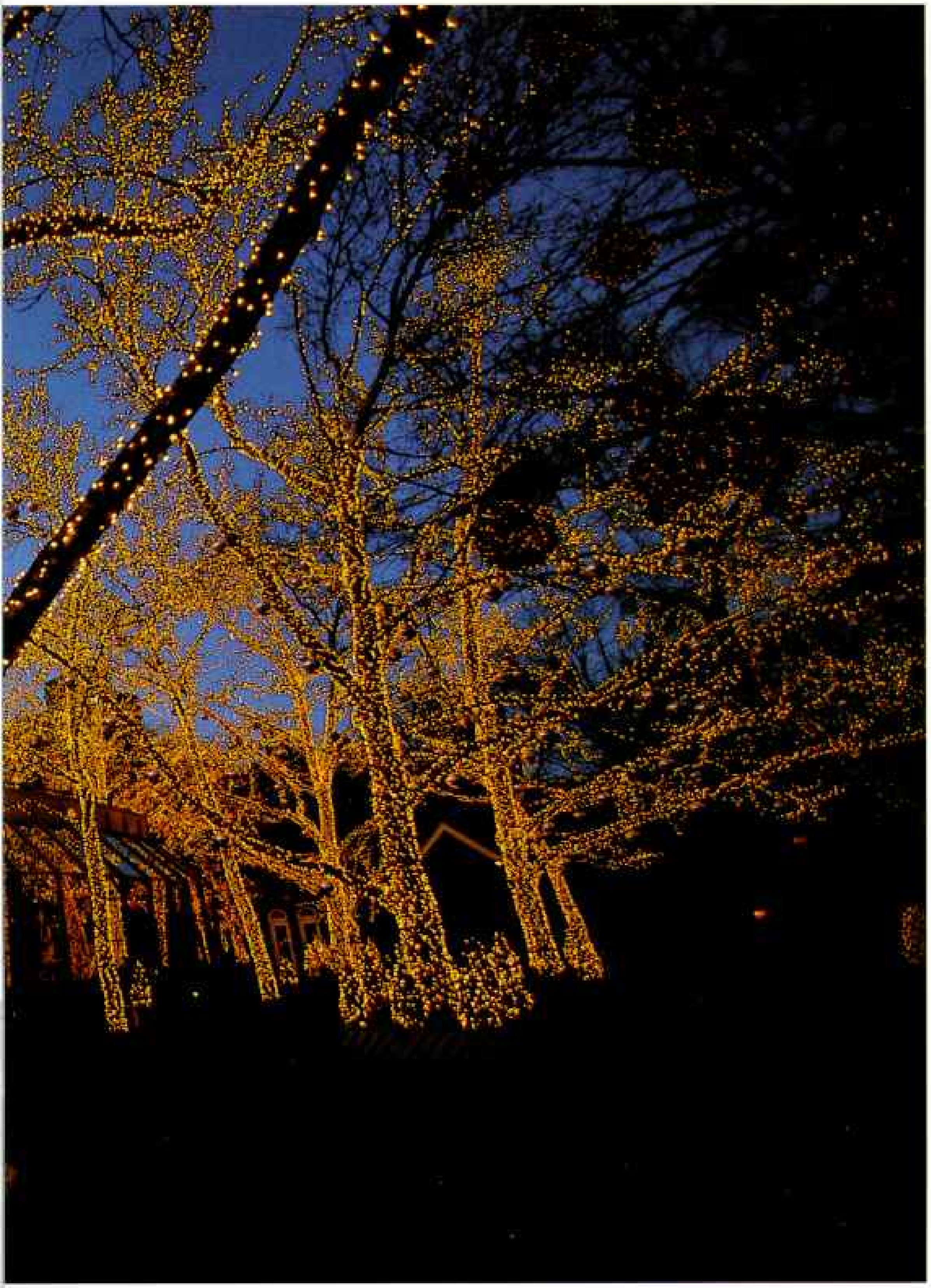
NATIVE AMERICANS could choose among black walnuts, cherries, hickory nuts, wild onions, acorns, and dozens of other foods in what is now Central Park. No villages are known to have existed on the site, although a north-south trail did cross it. By the 1660s this trail had become the road connecting Boston with the southern tip of Manhattan. During the Revolutionary War, British troops chased George Washington's army and almost caught him in the northeast corner of the park.

In 1844, when New York's 400,000 people made it the nation's largest city, newspaper editor William Cullen Bryant called for "a new park." The only "rural" areas at that time in America's cities were cemeteries. In 1853 the city decided on the unlikely location—then filled with quarries, swamps, and slaughterhouses—largely because waterfront property had too much commercial value.

Central Park's principal designers, winners of an 1857 competition that attracted entrants from all over the world, were American writer Frederick Law Olmsted and British-born architect Calvert Vaux. Except for the rocks—Manhattan schist, formed more than 400 million years ago on the ocean floor—virtually



Limbs and lights entwine in an affair of nature and artifice at Tavern on the Green.



A RESTAURANT WHOSE OLDEST SECTION ONCE HOUSED A FLOCK THAT GRAZED ON THE SHEEP MEADOW

A WINTER'S MORNING FINDS A HOMELESS MAN STILL ASLEEP IN A CARDBOARD BOX, WHILE A PARK EMPLOYEE BEGINS THE DAILY CHORE OF DISCARDING SUCH SHELTERS. BY SUMMER HUNDREDS OF PEOPLE WILL SLEEP IN THE PARK NIGHTLY. A SAMARITAN WHO INSISTS ON ANONYMITY OFFERS FOOD AND CIGARETTES.

everything in Central Park is of human design. Even the lakes have artificial bottoms. The park proved so popular—2.5 million people visited in 1860, its second year—that Philadelphia, Baltimore, Boston, Hartford, Detroit, and other cities quickly copied it.

Olmsted, despite his lack of formal training, became known as "the father of landscape architecture" and helped design Niagara Falls park, the Stanford University campus, and the U. S. Capitol grounds, among others.

THE DEFINING FORCE throughout Central Park's history has been the conflict between nature and facilities for activities. Social historians Roy Rosenzweig and Elizabeth Blackmar note in their recent book, *The Park and the People*, that Central Park's first "equipped playground" appeared at the southern end in 1926, nearly seven decades after the park opened. It provoked continued opposition. When Fiorello La Guardia was campaigning for mayor in 1933, for example, he proclaimed that "there is no more place for a playground in a park than there would be a park in a playground."

Sometimes nature reclaims land. Recent renovation on the Great Hill in the north revealed that grass and bushes had grown over long strips of sand. This confused park planners until they remembered that Harlem had been largely Italian from the 1890s into the 1920s. The maintenance workers had stumbled upon old boccie courts.

Facilities proposed but never built include a racetrack (1890s), an airport (1919), a 50,000-seat theater (1933), and public housing (1964). Many New Yorkers resist such proposals—and any changes in the park—because they want the park to remain the place they knew in their youth. Thus, when the Transit Authority had to dig a subway tunnel under Central Park in the 1970s and '80s, community pressure forced them to number each rock like a jigsaw puzzle and restore everything to its original position.

Passions will heat up again in a few years when improvements to the city water-supply system make the Reservoir unnecessary. Park officials could fill it in, adding 106 acres of land—potentially the most significant change in the park since its inception.

Central Park's past is most alive in the horse-drawn carriages that clip-clop throughout the lower park. "About twice a week I have people who get engaged while riding," says Tom O'Gara, a 26-year-old driver. He came from Dublin in 1985 and speaks with a strong Irish accent. "Sometimes the guys will

hide champagne in the carriage. The girls act surprised even if they've guessed it's there."

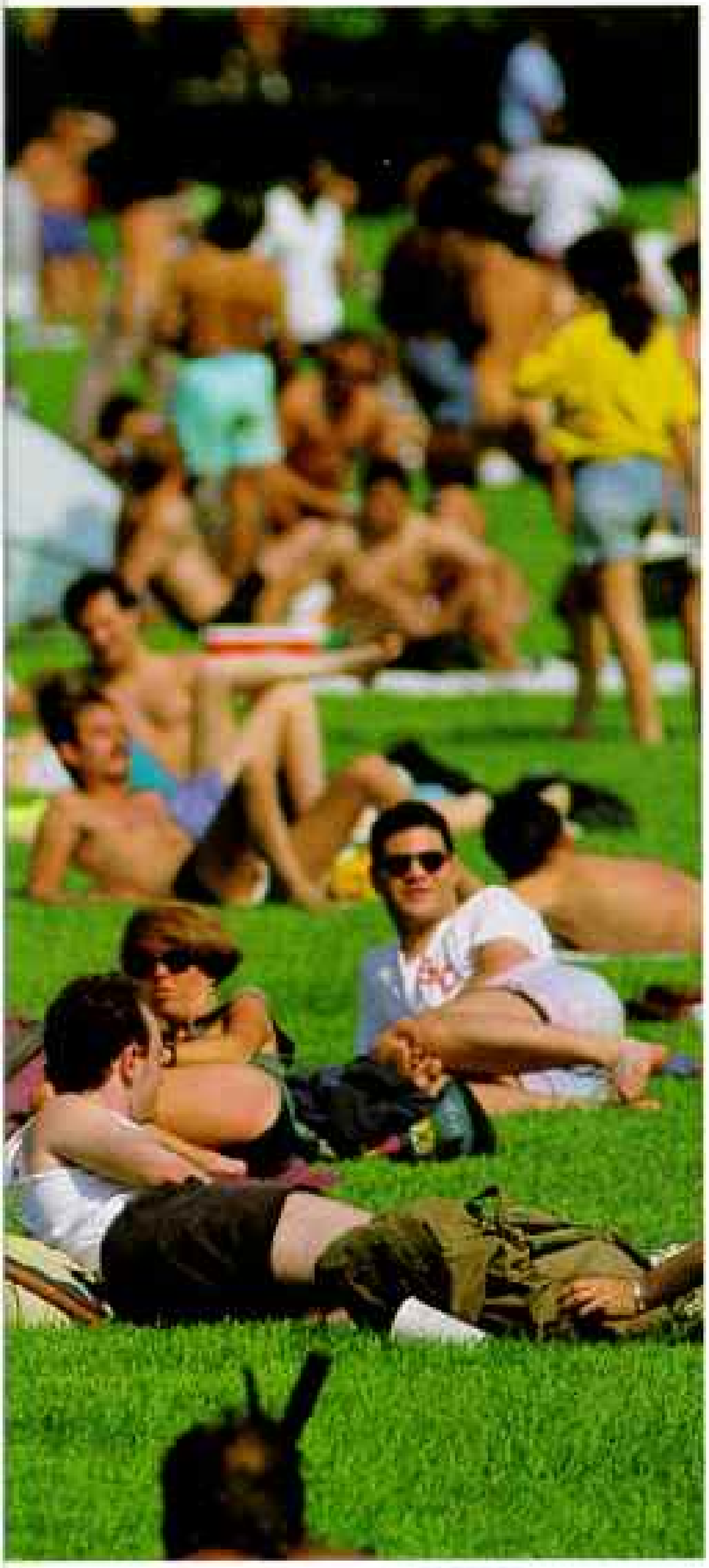
I watch several couples get in carriages and then await their return. One young woman looks like she has been crying. She rushes to a telephone, dials, and says, "Mom, you won't believe what just happened."

A carriage ride costs $34 for half an hour and $54 for an hour. Much of the drivers' income is from tips. "People who get engaged are generally bad tippers," O'Gara says with a shrug. "The guys are probably saving it for dinner and a limousine. I don't blame them."

His roommate, "Big Irish Joe" Jeiter, says that Valentine Day is his busiest, no matter what the weather. "The guy usually gets on his knees inside the carriage, and then they're hugging," Jeiter says.

In 14 years he has seen only one rejection: "This young guy was very nervous. He booked the carriage in advance and asked me to wear a tuxedo. I'm singing Irish songs and they're joining in. When we got well into the park, they got out of the carriage. They were quiet, and then they started arguing. He stormed off, and she got back in by herself. She had told him no."

The colors and textures of Central Park



stimulate romance even without a carriage. In Truman Capote's *Breakfast at Tiffany's*, a suitor sees Holly Golightly's hair flash in the park's "red-yellow leaf light" and feels "a glad-to-be-alive exhilaration." Climbing over some rocks, I stumble upon a young man and woman lying intertwined. They neither kiss nor move. They just look at each other. I walk right next to them, as do several children. The couple continue their motionless embrace.

This seems strange, but it makes sense. They may want to be alone but need other people, if nothing else, for safety. To be alone *alone* could place them at risk.

A GREEN BEACH MILES FROM THE OCEAN, THE SHEEP MEADOW ENTERTAINS THE BARE-LIMBED AND LANGUID. DAILY PARK ATTENDANCE CAN REACH MORE THAN 100,000 ON A WARM WEEKEND, GOOD BUSINESS FOR A SALVAGER WHO CAN EASILY COLLECT 2,000 ALUMINUM CANS A DAY—AND REDEEM THEM FOR A HUNDRED DOLLARS.

BECAUSE no one seems to use the entire park, I can also see the wisdom in William H. Whyte's observation that Central Park is not one large park, it is a series of small spaces.

New Yorkers stake their claim to these spaces and learn what lines not to cross. On top of a small hill, a wedding begins. The groom wears a tuxedo. The bride glides in a flowing white dress. Kids sweaty from playing ball watch but do not come too close. They see the unmarked borders.

The park also asks people to respect borders they may not like. Matt Foreman, executive director of the New York City Gay and Lesbian Anti-Violence Project, escorts me along the winding trails of the Ramble, a heavily wooded 37-acre tract just north of the Lake. Seclusion has made it a gathering place for homosexuals for at least 50 years.

Foreman is from West Virginia and graduated from New York University Law School in 1980. "Use of the Ramble comes from the time when there were no gay churches or bars, and it was one of the only meeting places," he explains. "A small percentage of the city's gay community comes here now, but it remains an important symbol of sexual liberation." His voice conveys both emotion and lawyerly logic.

Men, alone and in couples, drift through the trees. "Places like this are part of gay male culture in America," Foreman says. "Most communities have their Ramble."

While the isolation of the Ramble made me uneasy, Central Park is safe by New York City standards. The park had two reported murders and 204 reported robberies in 1991. The precinct encompassing Rockefeller Center

as well as other popular tourist attractions reported about ten times as many robberies and 17 murders. Worldwide headlines followed a particularly vicious gang rape in Central Park on the night of April 19, 1989. New York City had 3,254 other reported rapes in 1989, none of which received nearly as much attention.

In the low, slate-roofed Central Park station house, I hang out with off-duty officers. They play Ping-Pong and watch TV. "Not much goes on here," says one. "Bad things happen in other precincts, and reporters don't notice. Something happens here, and it's all over the media." The media have made even something as benign as Central Park's squirrels seem dangerous. A British newspaper reported in the summer of 1991 that they "chew on half-empty vials of crack" and attack parkgoers—something that has never happened.

Likewise, movies and television often depict Central Park as a crime scene. "Maybe we're simply using a myth we helped create," says Robert Palm, a producer of the program *Law & Order*, which has featured several felonies in the park. "But crime in Central Park works well because it's a place everyone knows about."

HER PERPETUAL DELIGHT FIXED IN BRONZE, A WATER SPRITE REVELS IN THE WETNESS OF UNTERMEYER FOUNTAIN. STATUARY WAS ALLOWED ONLY GRUDGINGLY BY THE PARK'S DESIGNERS, FREDERICK LAW OLMSTED AND CALVERT VAUX, WHOSE PLAN EMPHASIZED TREES AND GRASS WITH FEW MAN-MADE ADDITIONS.

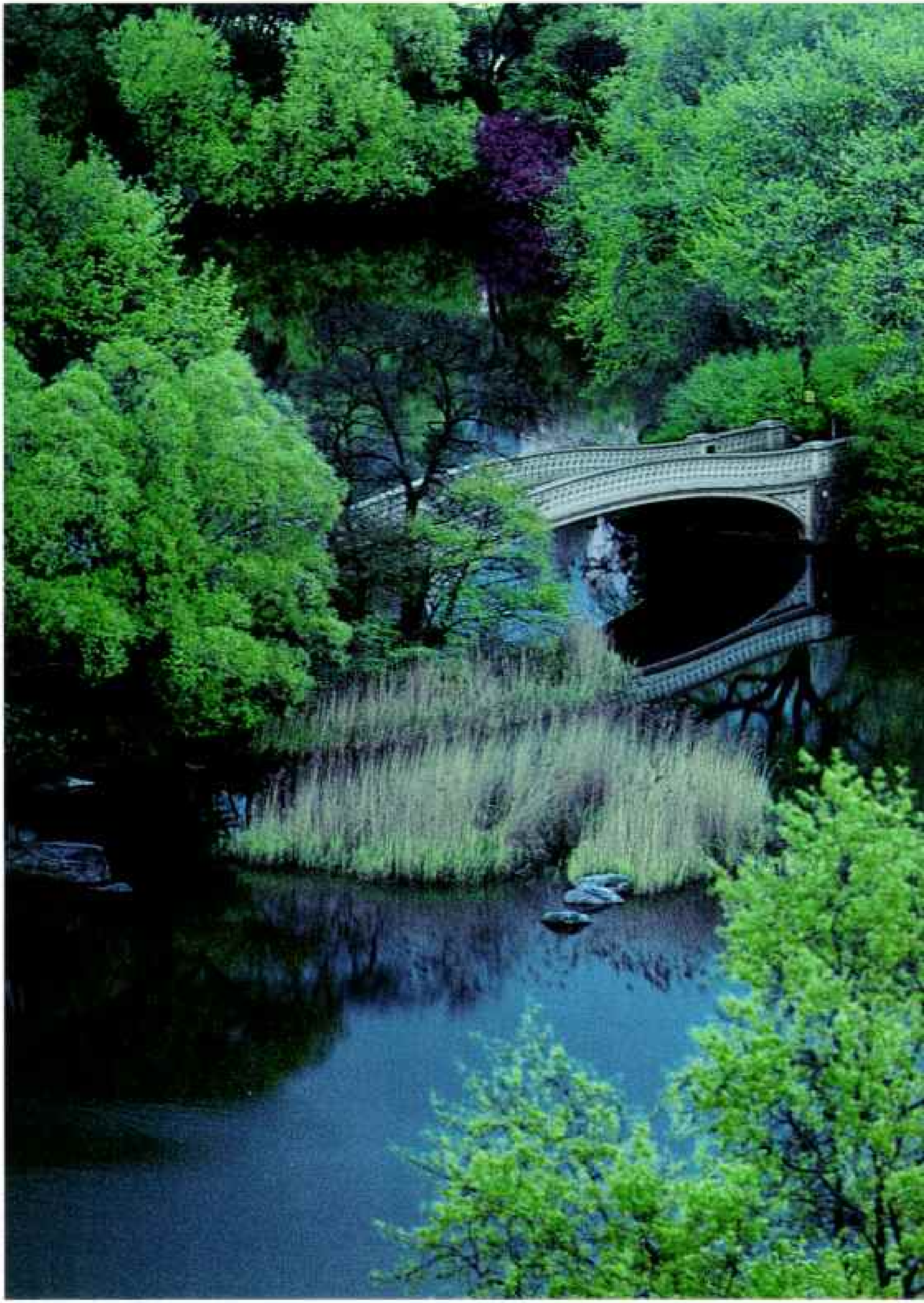
One late-night television comedian got a good laugh by saying, "It was so quiet out in Central Park this evening, you could have heard a knife drop." People often find such media images hard to shake. At the park's Visitor Center, out-of-towners sign a guest book. "Everything is so much nicer than I expected," one man comments. Another writes with apparent amazement, "I didn't get mugged yet."

I do not fully appreciate this fear of mugging until I visit New York City police headquarters. Everyone who enters must pass through a metal detector, and every on-duty officer who ventures out must wear a bulletproof vest. Lt. R. J. Molloy, head of the Special Frauds Squad, has the look of someone who has seen the bad in life and believes he can beat it. He eats lunch at his desk.

"Fear of mugging makes possible one of the city's successful scams," he says. "It goes like this: A single woman is staying at a hotel on the park. She meets a man in the hotel restaurant. They have dinner, maybe dance right there in the hotel. He says he's in town for a business deal early Monday morning. They arrange to meet for Sunday brunch. He arrives late and disheveled, saying he had cut across the park to get from his hotel and got mugged. 'They took my wallet, credit cards, everything,' he moans. He needs two thousand dollars for the deal and will repay her when banks open. She gets him the money from the hotel cashier and he disappears."

Molloy stands as I leave. For the first time, he looks sad. "They take advantage of people's loneliness and desire to help," he says. "We almost never catch them. The victims leave town, and that's it. I can guarantee it will happen again."

THE BROAD PATH from the park entrance to the zoo is the best place for what the French call *flâner*, to stroll and see other people. I wander among street performers. Miss Oula La assists Professor Bendeasy, a balloon sculptor. Danceman swirls a life-size female mannequin. Josh Weiner juggles an eight-pound bowling ball, a machete with a sharpened two-foot-long blade, and an apple. Weiner brushes back flowing black hair and talks to the audience as he keeps all three objects in the air.



DUSKY SHADES OF BLUE AND GREEN PAINT AN EVENING IDYLL OF THE

LAKE AND BOW BRIDGE, A CAST-IRON SPAN OPENED IN 1860 AND RESTORED IN 1974.

"I've never cut myself," Weiner—who is 21 years old and grew up two blocks from Central Park—tells me when he takes a break. "It's so easy; I never practice it. My face and body make it look hard and draw you in."

"Which of these things is most dangerous?" he asks as he resumes juggling.

"The knife!" children in the crowd surrounding him shout.

"Wrong!" Weiner shouts back. "It's the apple." He then delivers a brief lesson on the dangers of pesticides.

As I round Turtle Pond and begin to cross the Great Lawn, I come upon what looks like a thousand people standing in line. They are waiting for free Shakespeare—which has been performed in Central Park since 1957. The Delacorte Theater offers a flavor found nowhere else. That evening, as Othello says "If thou dost love me, Show me thy thought," he is answered by quacking ducks.

Such Shakespeare is free mostly to those who stood in line much of the day. This line offers a case study in entrepreneurship. A woman in a business suit pulls a new suitcase, as though arriving from the airport. She opens the suitcase, which is full of soft drinks, and sells them to people for a dollar a can. Thirty feet behind her, three homeless men politely ask for the empty cans. They will collect a nickel deposit for each.

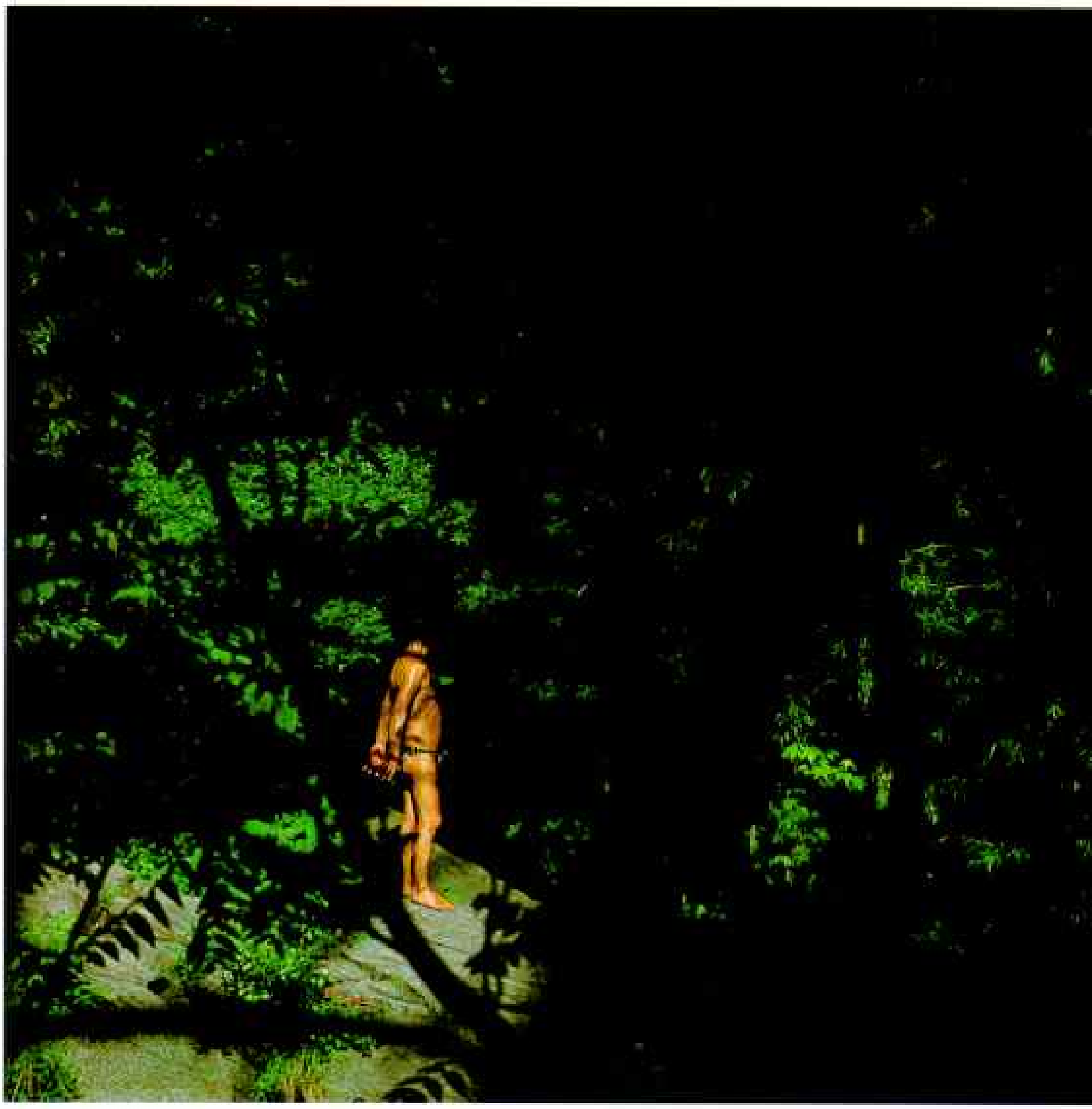
Most efforts to make money from the park involve higher stakes. The next morning I sit on an overstuffed sofa as a man wearing a white jacket serves coffee from a silver pot. Then I tour a 5.6-million-dollar penthouse, one of Manhattan's most expensive new condominiums. It is in an old residential hotel, recently renovated, and looks down on the park.

Developer Jack Heller is a 34-year-old Long Island native with a ponytail and beard. Funding for this project comes from Investcorp, a Bahrain-based consortium that invests Persian Gulf oil money and purchased Saks Fifth Avenue for 1.5 billion dollars in 1990.

Despite hard times, such high-end condominium prices are rising. "The world always has the very rich who want their needs met," Heller explains.

Heller's full-page newspaper advertisements feature a panoramic view of the Great Lawn and the Reservoir from one of the terraces. "The park adds 20 to 30 percent to the selling price; a park 'peek' adds somewhat less," he says. "Views from this building are particularly good because they center on the Reservoir. People like looking at water even better than trees, so the Reservoir adds the most in park value."

COILED FOR THE SWING, A BATTER EYES THE BALL DURING A PICKUP GAME ON ONE OF THE PARK'S 26 BALL FIELDS. WHEN CROWDS THIN AFTER DARK, MEMBERS OF THE CENTURY ROAD CLUB ZIP ALONG DURING GRUELING TRAINING SESSIONS. SOLO OR IN TANDEM, CYCLISTS ROUTINELY IGNORE THE 15-MILE-AN-HOUR SPEED LIMIT.



Hotels, apartments, and offices with a park view can charge more than double the usual rate. The Plaza, with 140 of its 800 rooms facing the park, charges at least a hundred dollars more for a room with a full view.

I RETURN to the Great Lawn and find something new. A dozen trucks are parked, and work crews have unloaded mounds of steel and wood. In less than a week they construct a stage with six-story speaker towers for a performance by musician Paul Simon.

People begin to arrive at dawn on the day of the concert. They set up tents, spread blankets, and disperse picnic items to claim space. Some unfurl handwritten banners with names or initials to signal late arriving members of their group—whom they greet with shrieks and hugs.

Frisbee games end around noon when the field becomes too crowded, but flirting—usually between college-age groups—continues. Mothers nurse babies and people cheer a woman who wears a live python over her shoulders as casually as a scarf.

By midafternoon the crowd has become so large that nearly everyone has started to stand.

Having fun gives way to protecting turf. People who try to "wander" forward face, "Did you get up at 5 a.m. to get this spot? Get outa here!"

At 7:15 p.m. the police estimate that 750,000 people fill 18 acres. (Central Park's largest gathering was in 1944 when 1.4 million people came for the "I Am an American Day" celebration.) Production director Brian "Higgy" Higginson and I stand stage left as Simon walks on. Drums roll. More drums kick in. Several million hands and feet keep rhythm. Time and reality stop. My body is swaying as I ask Higgy, "Do you ever get

A SUNBATHER STANDS IN A SECLUDED SECTION OF THE RAMBLE, A STRETCH OF WOODS USED AS A MEETING PLACE BY GAYS FOR MORE THAN HALF A CENTURY. HONEYCOMBED BY MEANDERING PATHS, THE 37-ACRE RAMBLE WAS THE FIRST PART OF THE PARK TO BE LANDSCAPED AND REMAINS ONE OF ITS MOST ARTFULLY NATURAL SET PIECES.

---

to this point and have a major problem?"

"Very rarely. But if it rains, the sound system or lights could go."

During the second song Higgy decides to check the production from out in the audience. We walk through the crowd, using a corridor protected by police barricades. On both sides people clap their hands above their heads and dance. A young woman wearing a baseball cap sits on her boyfriend's shoulders. Their eyes are closed as they sing.

Near the top of the 35-foot tower located about 150 feet in front of the stage, instrument panels flash. Sound engineers dance as they move dials. They keep dancing while Higgy shouts into their ears. Sound seems to flow into one side of my body and out the other.

As far as I can see, the park moves in rhythmic waves. Many trees are fruited with the daring who climbed for a better view. The sun sets and city lights slowly encircle us. When Simon begins "Still Crazy After All These Years," strangers link arms and sway.

"Have a sweet and peaceful night," Simon says to the crowd before the last song. Searchlights create a passageway out of the park. "Please leave the park now," loudspeakers keep repeating.

Some concertgoers avoid the rush by finishing a picnic or playing Frisbee. One man with long white hair and other destitute-looking people drift among them, sifting through trash in search of food and aluminum cans.

Homeless people living in Central Park—about 500 during warm months—compete for food with rats, among the most common wildlife here. Both are attracted to the hundreds of tons of garbage that parkgoers toss away each year.

AN OVERWROUGHT MOTHER PLEADS FOR THE RELEASE OF HER 13-YEAR-OLD SON, ARRESTED ON SUSPICION OF STEALING A WOMAN'S BAG. CONTRARY TO ITS REPUTATION, THE PARK IS THE CITY'S SAFEST POLICE PRECINCT, WHERE CRIME FELL 30 PERCENT IN 1992.

The rats can grow to 17 inches, nose to tail, and defy eradication. In 1988 authorities hung nesting boxes from trees to attract barn owls—one family of the birds eats as many as 18 rats a night—but not enough owls came.

TO GET A SENSE of how it feels to be homeless, I telephone 32-year-old Paul Larson, who makes backpacking equipment in Seattle but slept in Central Park during the summer of 1986. He is happy to talk. "I found myself with six dollars in my pocket, and I didn't know anyone," he says. "It was Tuesday night and raining, and I went into the park. In one week your self-esteem is gone. Stress and fear compound whatever got you there. One night I was in a deep sleep and suddenly jumped up. Someone was about to smash a baseball bat on me. He just lowered it and walked away." Larson never slept in the park again.

Margarita Lopez, who works for Project Reachout, a program of Goddard Riverside Community Center, drives me through the park in a van. Her prime mission is to help the park's homeless who are mentally ill. She says she loves to work with people who "have nothing," and after nearly 15 years shows no sign of burnout. "How do you relax?" I ask.

"I'm active in a group that builds low-income housing," she says. When I insist that she must do something to get away, she admits that twice a year she treats herself to the opera.

Margarita weaves the van between trees with the finesse of an eye surgeon. When she sees a potential "client," she gets out of the van, approaches to about 20 feet, and offers a sandwich. Such distancing is partly a precaution. People have threatened her with knives. Mostly, however, she acts out of respect.

"If you're sitting on a bench, that's your home," she says. "Would you like it if I walked into your home and said, 'Here's a sandwich'? I may approach the same person on the same bench for two years before he lets me in."

Government agencies sometimes share her view of "home." During the Depression the U. S. Post Office delivered mail to squatters' shacks in Central Park, and a federal court ruled in 1984 that a park bench can be an address for voter registration.

"Do people live in the park for a long time?" I ask her.

"Geography does something to them," Margarita says. "Some move around the country and come here every few years. Some drift between Central Park and the city. Others are always in the park." She shows me hidden areas where homeless people sleep. One person has left fresh flowers in a glass jar.

The homeless cry out for a John Steinbeck to capture their humanity. One man introduces himself as "Thing." He smells of garbage and urine. I breathe through my mouth. Margarita reaches to shake his hand. "I'm dirty," he says. "Don't." She smiles and insists. A young man with a suitcase sits on a rock and approaches us when Margarita offers a sandwich. He says his name is Joseph and he is "fine, just lonely." He has a baby face and sad eyes. Margarita hesitates before driving away. "He's not in danger," she says to me. "Not at this point."

I sit alone to sort through my emotions. On a nearby bench are a homeless man staring at nothing and a well-dressed woman eating lunch. They ignore each other.

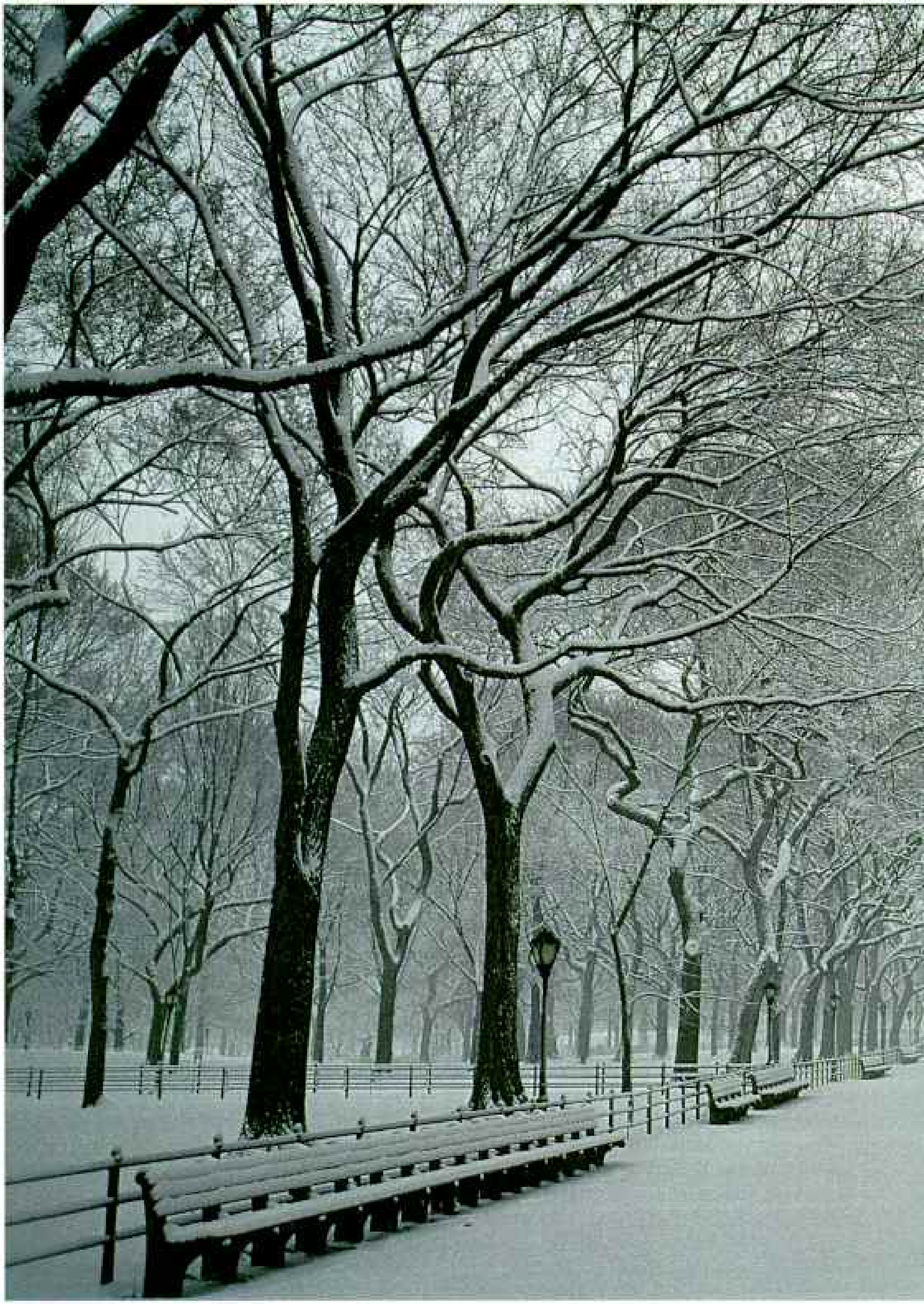
WALKING THROUGH THE PARK, I find it remarkable that New Yorkers used to leave their apartments to sleep here on summer nights. That was mostly in the 1920s and '30s, before they had air-conditioning. Was America safer then, or did people simply provide one another with security as they sought relief from the heat?

I retrace my steps at night and am once again surprised at how many people I find. Unless the weather is too cold, joggers and strollers use the park—principally below the Reservoir—until around midnight. Some women jog late at night. When I ask if they are scared, the women talk about the need to "take back the night."

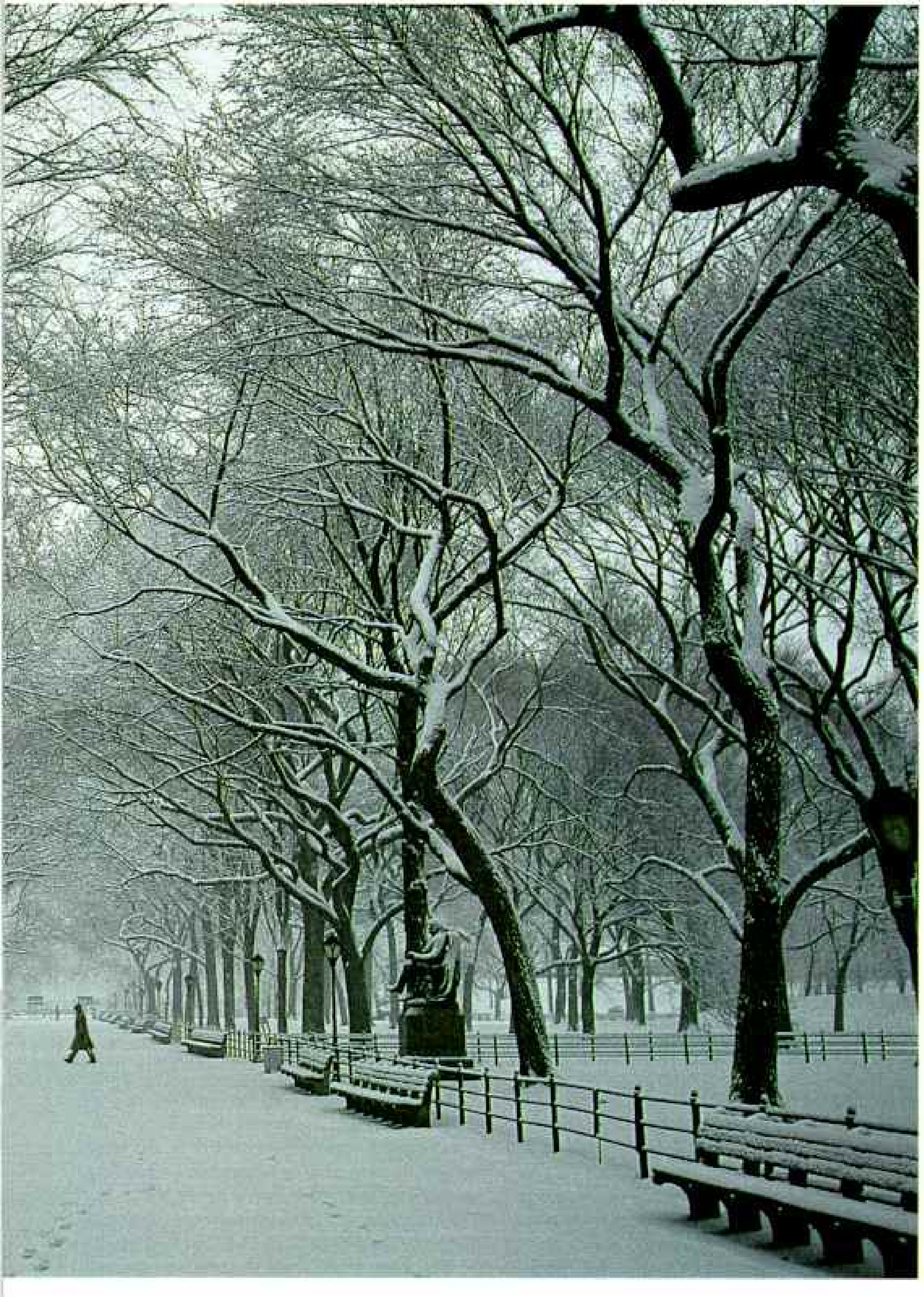
That people have a right to use the park at night is a relatively recent notion. Central Park's planners, Olmsted and Vaux, warned that after dark safety could not be assured.

"Suspects often run into the park at night," one police officer from a neighboring precinct tells me. "They usually throw away their weapons, which we need to get convictions."

One night I ride with officer Ray Mancini and his 85-pound partner, a German shepherd named Jake, whose specialties include finding objects discarded by suspects. Mancini stops his patrol car. He gives me a switchblade and waits with Jake while I walk into a field. I



A BOWER OF AMERICAN ELMS CREATES A STUDY FOR POET FITZ-GREENE HALLECK, WHOSE BRONZE



LIKENESS LOOKS OUT ON LITERARY WALK, NAMED FOR ITS STATUARY OF MEN OF LETTERS

throw the knife far into the darkness and return to the car. Mancini emits a high-pitched, "Seeek. Seeeek."

Jake sweeps through the field in semicircles. Within minutes he has brought the knife to Mancini.

FOR SOME PEOPLE the nighttime park offers opportunity to keep dreams alive. Bob Redman, 27, was born to climb. At age five he shinnied to the top of lampposts. At 13 he began building tree houses in Central Park. One had five rooms spread over five levels.

Redman has Hollywood good looks: blue eyes, brown hair, a muscular body, and a shy manner. He and I wander among the trees that were once his home-away-from-home.

"I'd sleep in the park, go home for breakfast, and then to school. My mother was worried until I brought her into the park one afternoon and showed her my trees. She saw that no one could climb up after me."

His older brother Bill often came to play conga drums up in the trees, which generated stories that mysterious tribes of tree dwellers inhabited the park.

Redman would camouflage his houses with green paint. When leaves fell off the trees, park officials would tear down Redman's creations. They spent eight years looking for him. Then in 1985 maintenance workers noticed a tree house near an equipment storage lot and called the police. Redman and a friend were in the tree house sleeping.

When officials saw how Redman scampered up trees, they hired him as a tree pruner but made him promise to build no more tree houses. He now owns his own tree maintenance business.

"I was nuts about this tree," he says, patting the pin oak that soars about 60 feet above us. "I had two houses in it."

Central Park is a perpetually unfinished portrait, changed by everyone who enters. With his tree houses Redman kept alive a part of childhood—the tree climber's exhilarating aloneness—that most of us abandon while we are still quite young. It saddens me to hear that he is reluctant to climb without safety equipment. "I don't like to take risks," Redman says. "I have a business to worry about."

Central Park has 26,000 trees, the largest concentration in the 132-acre woodland that dominates the upper park. Neil Calvanese, a former hemodialysis technician who learned to climb at age 31, has risen to chief horticulturist. He takes me on a tour.

"This type of area is common in the park," he says, as we get out of his truck. "It's severely disturbed." A few small trees grow. Above them tower larger trees. Otherwise, the ground is barren.

Calvanese cradles a seedling. His fingers gently examine tiny leaves. "This poor little oak is struggling," he says. "It needs help." He points to the large trees, innocuous-looking *Acer pseudoplatanus*, or sycamore maples. "They're nasty," Calvanese says. "They were brought in from Europe in the 1700s and 1800s and have been used primarily as street trees. They're destroying the woodlands because they produce dense shade. Nothing grows under them, which causes erosion. This is the future for the area unless we get rid of them and replace them with native trees like red maple, sugar maple, black locust, sweet birch, and river birch."

The area looks very wild. "Will it be self-sustaining?" I ask.

"That would be nice, but this is a managed park. That means not giving it over to whatever happens to grow. It'll always need attention from professionals."

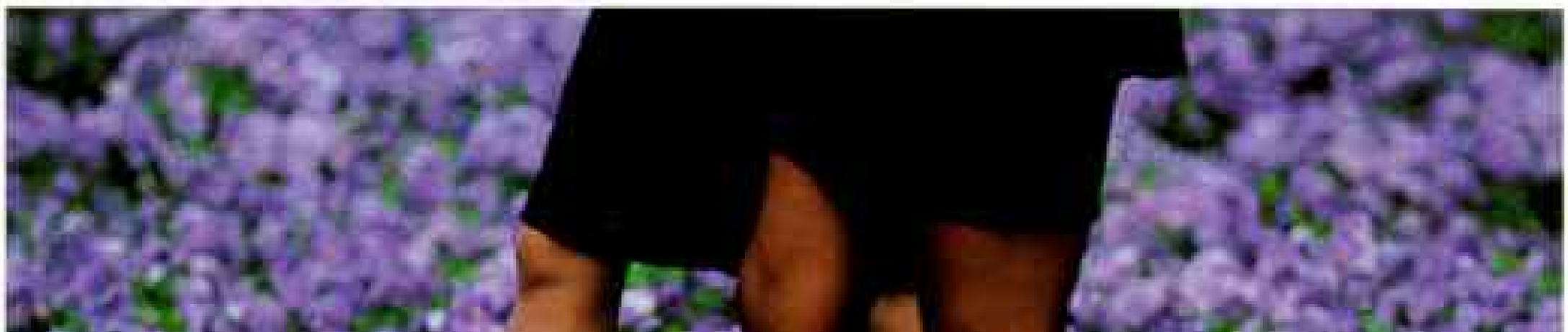
To remove unwanted trees with a diameter of three inches or less, you use a weed wrench—a steel pole, about shoulder high, with a vise at its base. You grasp the trunk of the tree with the vise and twist up. I try this on one of the sycamore maples. The roots pop out. It feels satisfying but wrong. I consider myself an ally of trees.

"Are you sure it's all right?" I ask Calvanese. He tells me to keep yanking.

ALMOST ALL MONEY for tree maintenance comes from the Central Park Conservancy, a nonprofit organization that has raised nearly a hundred million dollars since its founding in 1980. The Conservancy has doubled the number of park employees, provides education programs, and deserves much of the credit for graffiti removal, new lighting, resodding, restoration, and other improvements.

Working with community groups, the Conservancy has focused much effort and money on Central Park's northernmost regions, many of which—in accordance with the park's original design—are secluded woods.

In a park made for walking, birders in sensible shoes scan with binoculars near the Lake, where trees and abundant water increase chances for sightings. Beside a bed of pansies more stylishly shod feet head for a wedding in Conservatory Garden.



Although Conservancy officials tell me that the whole park is safe, I worry about walking through these woods by myself. Whether to walk alone on an isolated city street or alley would also require good judgment.

I decide to go ahead, not because it will prove anything, but because it involves a principle. If people are scared, they stay away from certain areas, which become dangerous because they are deserted. The problem is self-perpetuating.

On an overcast weekday afternoon I set out. To avoid looking lost, I memorize the map.

My walk starts well. A stone arch completed in 1885 leads to rock formations that rise with primal power. I cross into aloneness, however, faster than I expected. No one is in sight in any direction.

The only sounds are waterfalls and my own footsteps. The air smells clean and cool. The city has disappeared. Not even skyscrapers are visible above the hills. Trees overhang the trail. A few have fallen across a stream. I could be in rural Pennsylvania or Michigan.

Minutes later, I see a man coming toward me. He is tall and wide at the shoulders. I put on a "New York-tough" expression that says, "Leave me alone."

DUSTED BY LATE WINTER SNOW, A HORSE AND CARRIAGE RETURN FROM A NIGHTTIME TOUR. THE SCENE SEEMS A DREAM FROM THE 19TH CENTURY, A TIME WHEN NEW YORK CITY CHOSE TO COUNTER THE BLOCK-BY-BLOCK MARCH OF DEVELOPMENT WITH AN UNPARALLELED URBAN OASIS CALLED SIMPLY CENTRAL PARK

The man is better dressed than I am. I take comfort in thinking he may be scared of me. He is black, I am white. I try to detach myself and analyze the scene. Does his color make him frightening? Such fear can be subtle and not-so-subtle racism. About half New York City's residents are nonwhite. To see a black man in the woods should not surprise me.

Racism had been very much on the minds of many New Yorkers I met earlier in this journey. Several told me variations of a story that anthropologists would call an urban myth. There is no evidence that it ever happened, but it captures something that people want to believe: A white man is jogging in Central Park. A black teenager runs toward him. They bump. The man notices his wallet is missing. He tackles the teenager, yelling, "Wallet! Wallet!" The teenager hands over a wallet. The man returns home and sees his wallet. He had not taken it when he went jogging.

Suddenly, such introspection becomes an unaffordable luxury. The man, still approaching on the path, is shaking his head and shouting. Everything starts to happen in slow motion. We get closer. I realize his shouts are swear words. The path is narrow. I am careful not to look at him. Our shoulders nearly brush when we pass each other.

As I keep walking, my mind generates images of this man, face contorted, about to grab me. To turn around and check on him could convey that I am scared. But "city smarts" dictate that I should know what is happening near me. I wait and then slowly turn. The man's back is disappearing around a turn in the trail.

With sudden exhilaration I feel liberated. I can, like any New Yorker, claim the entire park as my own simply by remaining alert to my surroundings. I wander through woods, up the escarpment, and enjoy a treetop view of Central Park.

Later that afternoon I describe the scene to Irene Hecht. She is legally blind, yet has often run in Central Park, thanks to friends and volunteers who accompany disabled runners.

"The park *is* very pretty," she says, in response to the account of my walk.

"How do you know it's pretty?" I ask. "You've never seen it."

She pauses. A smile slowly emerges as she says, "It makes me feel good to be there."

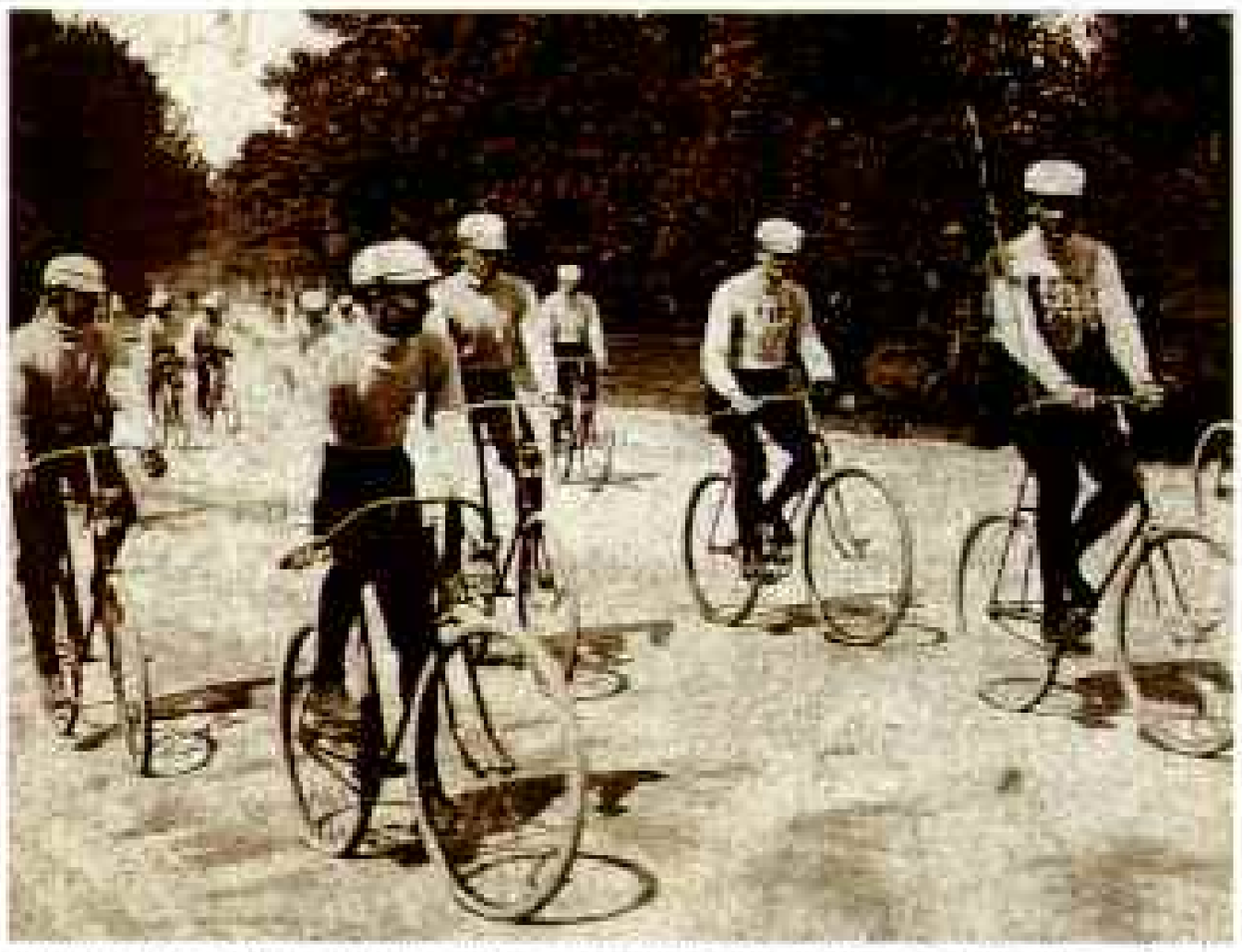
DRESSED TO BE SEEN, A WEEKEND CROWD IN THE LATE 1800S COLLECTS AT THE MALL, THE PARK'S FORMAL PROMENADE.

The peopling of the park

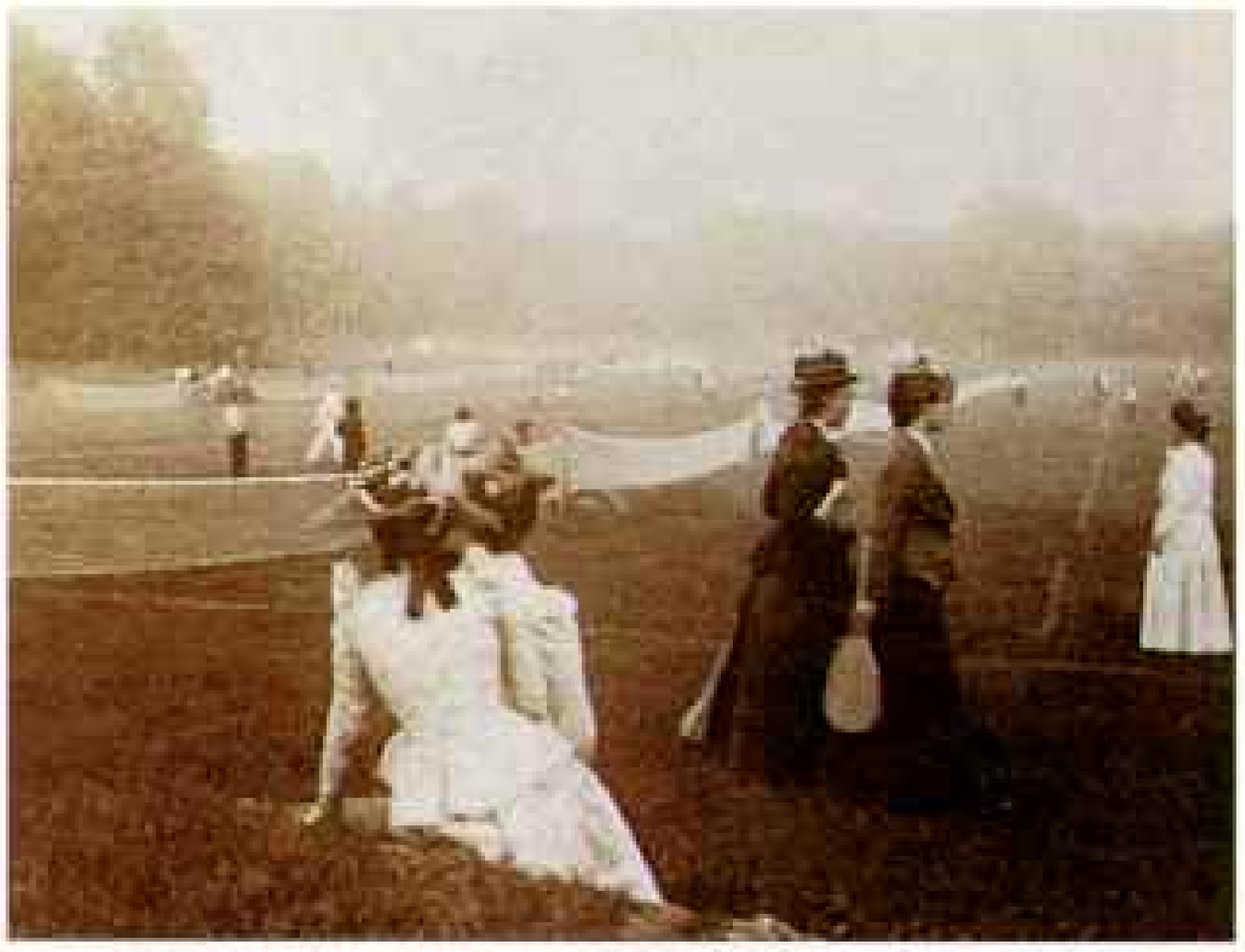
When its grounds opened in 1858, Central Park was anything but central to the life of New York. Ninety percent of the city lived more than 20 blocks south of the park, and for the first decade most visitors arrived by horse and carriage.

Envisioned as a resource "in the open air . . . for the benefit of all," Central Park at first resembled a private estate, a stage for high-society carriage parades. Strict rules—no gambling, no speeches, no music on Sunday—kept many New Yorkers away.

By the late 1800s, however, as the city grew northward and new attractions—two museums and a carousel—were added, the park began to reflect the variety and energy of the surrounding streets. Sunday taboos were lifted; "Keep off the grass" signs disappeared. People of all classes came to play or stroll in a park that, as Henry James noted in 1905, has "something for everyone." Yearly visitation, by one account, had surged to 15 million, the equal of today's attendance.



SHOWING OFF THEIR RACING MEDALS, MEMBERS OF A BICYCLE CLUB WHEEL DOWN THE "DRIVE" IN 1895.

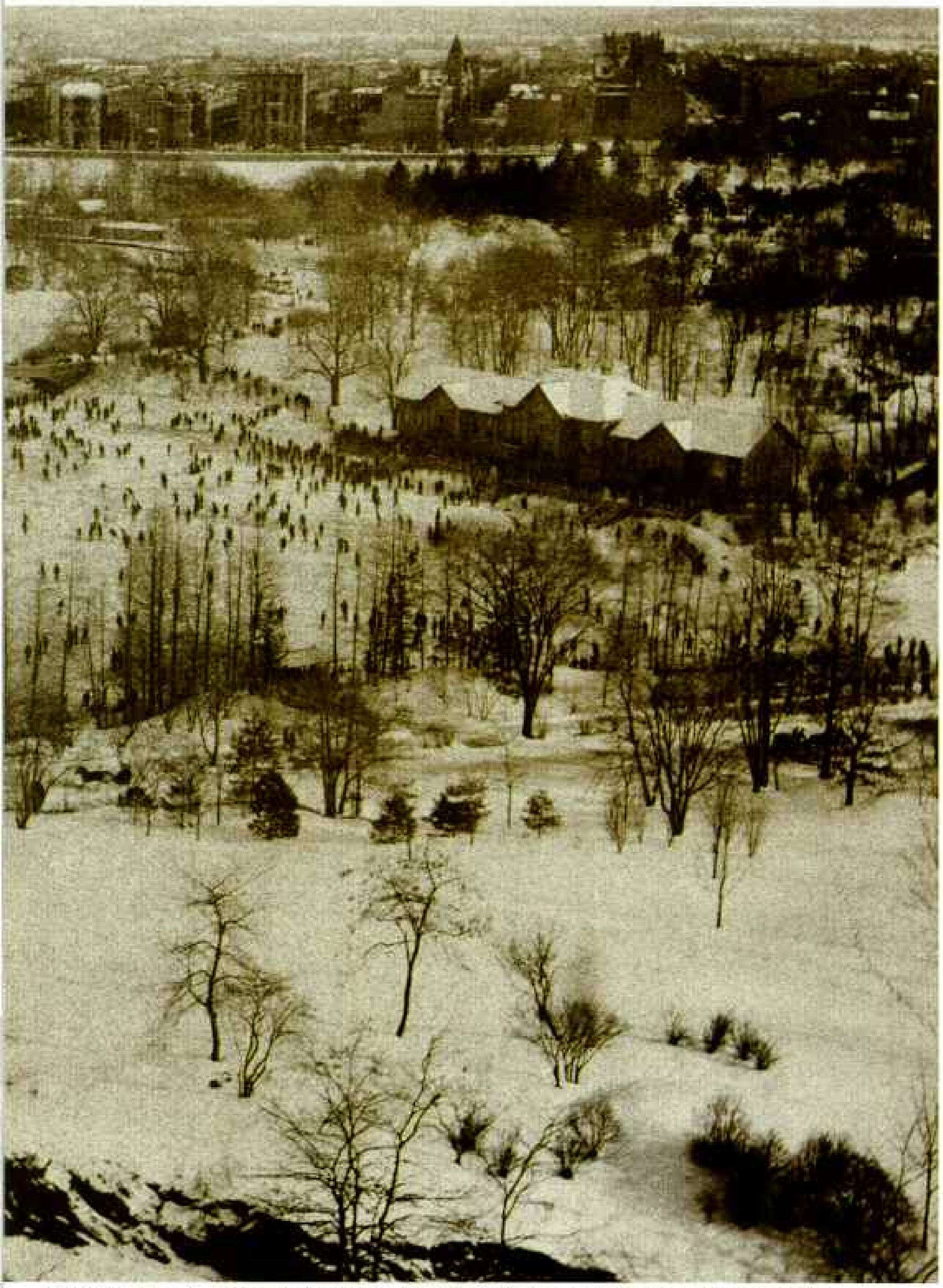


BOULDERS BECAME SEATS AND MEADOWS TURNED INTO TENNIS COURTS IN THE 1880S, WHEN MANY SPORTS IN THE PARK WERE AT LAST ALLOWED.

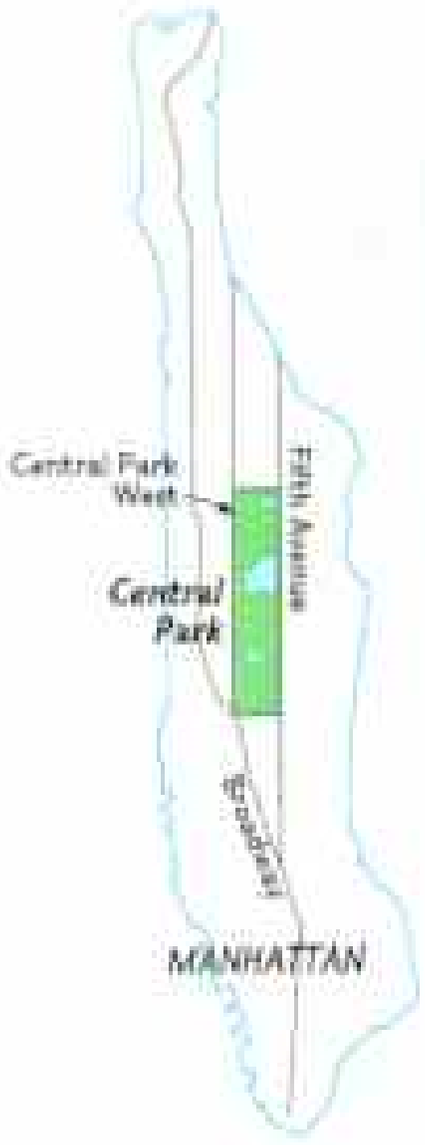
DESIGNED AS A PARADE GROUND, THE SHEEP MEADOW TOOK ITS NAME FROM A FLOCK THAT GRAZED HERE FROM THE CIVIL WAR UNTIL 1934.

FRANCIS LOEB LIBRARY, HARVARD UNIVERSITY (TOP LEFT); HERBERT MITCHELL COLLECTION

THE LUXURY OF OPEN SPACE LURES SKATERS IN THE 1860S TO THE PARK'S LARGEST LAKE, A 22-ACRE EXPANSE FASHIONED OUT OF SWAMPLAND. GAP-TOOTHED BLOCKS ALONG FIFTH AVENUE RISE TO THE EAST, WHILE A SLEIGH WHISTLES DOWN A BRIDLE



PATH ON THE NEAR SHORE. THE FIRST ATTRACTION TO OPEN, THE LAKE DREW 50,000 PEOPLE ON CHRISTMAS DAY OF 1859, MANY OF THEM YOUNG MEN AND WOMEN EXCITED TO FIND A FRESH-AIR PLACE TO MEET.



Green core of the Big Apple

What began as a hodgepodge of bogland, hills and ravines, shantytowns, pigpens, and bone-boiling plants has been shaped and reshaped over the past 135 years into the country's most famous and elaborate landscaped park. Much has changed from Olmsted and Vaux's original "Greensward" design, which conceived the park as a nature museum allowing no distractions from the scenery—a place where people would come for uplift and rejuvenation.

As the park aged, its changes mirrored the turnings of the wider world. Museums, statues, and playing fields were added to entertain and enlighten the city's mounting population at the turn of the century. In the 1930s, when automobiles began to dominate the city, roads and paths were paved and widened.

After World War II, donations from the park's wealthy neighbors added new facilities such as the Wollman Rink and the Delacorte Theater. In the 1970s the park fell into graffiti-stained disrepair as the city went broke.

Since 1979 a multimillion-dollar restoration program, guided by the original design, has revived the park's grandeur. The Sheep Meadow has been reseeded, the Bethesda Terrace restored, the Conservatory Garden replanted, sight lines in the Ramble cleared. The vision of the park's creators has endured: Central Park stands as a "many sided, fluent, thoroughly American high art work." □

PAINTING BY NATIONAL GEOGRAPHIC ARTIST WILLIAM H. BOND

1. Charles A. Dana Discovery Center
2. Harlem Mere
3. Lasker Rink and Pool
4. Untermeyer Fountain and Conservatory Garden
5. Great Hill
6. Loch
7. North Meadow Recreation Center
8. Tennis Courts
9. Guggenheim Museum
10. Central Park Precinct
11. Metropolitan Museum of Art
12. Obelisk
13. Turtle Pond
14. Delacorte Theater
15. Shakespeare Garden
16. Swedish Cottage Marionette Theater
17. American Museum of Natural History
18. Belvedere Castle
19. Fire Department
20. Ramble
21. Loeb Boathouse
22. Alice in Wonderland Statue
23. Kerbs Model Boathouse
24. Conservatory Water
25. Bethesda Terrace
26. Cherry Hill Fountain
27. Strawberry Fields
28. Naumburg Bandshell and Wisteria Pergola
29. Dead Road
30. Lawn Bowling and Croquet Greens
31. Volleyball Courts
32. Literary Walk and Mall
33. Tavern on the Green
34. Carousel
35. Chess and Checkers House
36. Dairy, Central Park Visitor Center
37. Central Park Zoo
38. Arsenal
39. Wollman Rink
40. Heckscher Playground and Puppet House
41. Bridle Path

The Middle East's WATER
Critical Resource

From the plains of Anatolia to the eastern Sahara, rivers are lifeblood to this arid region, where growing nations compete for a shrinking water supply. Workers inspect giant pipes that will channel waters of the Euphrates to generators in the Atatürk Dam, keystone of a plan to transform southeastern Turkey. North of Egypt's Aswan High Dam, a tour boat eases past a boy and his horse in the shallows of the Nile.

By
PRIIT J. VESILIND
NATIONAL GEOGRAPHIC
SENIOR WRITER

Photographs by
ED KASHI

FRESH WATER, life itself, has never come easy in the Middle East. Ever since the Old Testament God punished man with 40 days and 40 nights of rain, water supplies here have been dwindling. The rainfall only comes in winter, *Inshallah*—God willing—and drains quickly through the semiarid land, leaving the soil to bake and to thirst for next November.

■ **JORDAN: Farmers pumping brackish Jordan River water say that drought-resistant olive trees barely grow where citrus once thrived. The river, usually a stream salty from diversion of feeder streams and leaching of minerals from irrigated fields, runs swollen after a wet winter.**

■ **IRAQ: War has undermined agriculture east of Baghdad, where a dry canal borders a patchy wheat field.**

The region's accelerating population, expanding agriculture, industrialization, and higher living standards demand more fresh water. Drought and pollution limit its availability. War and mismanagement squander it. Says Joyce Starr of the Global Water Summit Initiative, based in Washington, D. C., "Nations like Israel and Jordan are swiftly sliding into that zone where they are using all the water resources available to them. They have only 15 to 20 years left before their agriculture, and ultimately their food security, is threatened."

I came here to examine this crisis in the making, to investigate fears that "water wars" are imminent, that water has replaced oil as the region's most contentious commodity. For more than two months I traveled through three river valleys and seven nations—from southern Turkey down the Euphrates River to Syria, Iraq, and on to Kuwait; to Israel and Jordan, neighbors across the valley of the *(Continued on page 48)*

■ SYRIA: Bedouin who used to roam in search of water now drill for it east of Aleppo in the northern steppe. Repeated drilling lowers the water table by as much as six feet a year, emptying water holes where animals and humans once drank.

As Bedouin take up

farming and sheep-herding, a vicious cycle is triggered. To nourish wheat, cotton, and sheep, they drill wells. But as water levels drop, supplies may become too salty for crops and animals or too costly to pump—forcing the Bedouin to sink more new wells.

■ TURKEY: A giant plug, Atatürk Dam contains the Euphrates River, filling a reservoir expected to hold more than ten times the volume of the Sea of Galilee. Atatürk anchors Turkey's Southeastern Anatolia Project, a plan that centers on 22 dams and 19 power

plants in the Tigris-Euphrates basin. Heavily dependent on the Euphrates, Syria and Iraq watch anxiously for reduced flow. Both complained of shortages of water and power in 1990, when Turkey held back the river to begin filling the Atatürk reservoir.

(Continued from page 43) Jordan; to the timeless Egyptian Nile (maps, pages 52-3).

Even amid the scarcity there are haves and have-nots. Compared with the United States, which in 1990 had a freshwater potential of 10,000 cubic meters (2.6 million gallons) a year for each citizen, Iraq had 5,500, Turkey had 4,000, and even Syria had more than 2,800. Egypt's potential was only 1,100. Israel had 460, Jordan a meager 260. But these are not firm figures, because upstream use of river water can dramatically alter the potential downstream.

Scarcity is only one element of the crisis. Inefficiency is another, as is the reluctance of some water-poor nations to change priorities from agriculture to less water-intensive enterprises. Some experts suggest that if nations would share both water technology and resources, they could satisfy the region's population, currently 159 million. But in this patchwork of ethnic and religious rivalries, water seldom stands alone as an issue. It is entangled in the politics that keep people from trusting and seeking help from one another. Here, where water, like truth, is precious, each nation tends to find its own water and supply its own truth.

As Israeli hydrology professor Uri Shamir told me: "If there is political will for peace, water will not be a hindrance. If you want reasons to fight, water will give you ample opportunities."

■ IRAQ: Frosted by salt, a field that once grew barley lies barren near the confluence of the Tigris and Euphrates Rivers. Southern Iraq's soils are badly damaged by saline waters, as the Euphrates carries runoff from fields upstream into the area. Over-irrigation and poor drainage compound the problem: As the stagnant water evaporates, it leaves behind a crust of salt. Consumed by wars since the early 1980s, the government has had little time or money to spare for soil improvement programs.

MY JOURNEY STARTS in springtime, high in the Anti-Taurus Mountains of southern Turkey, where I shiver among the dripping snow beds. In the distance I can trace the silvery strand of the Euphrates, gathering force for its step-down south into Syria, then into Iraq, where it joins the Tigris to empty into the Persian Gulf.

It was in the land between these rivers—Mesopotamia—that agriculture arose in the Middle East. Turkish tradition says Abraham himself first tilled the soil on the Harran Plain, just beyond the horizon.

The generous snows of the Turkish mountains have brought little wealth to the semiarid plains of the southeast. Without irrigation they have yielded only one crop a year. But now Turkey has finally begun to harness its waters.

In the haze I can see the Euphrates swelling with backup from the great Atatürk Dam, dedicated last year. Soon its waters will rush through the world's two largest irrigation tunnels—25 feet in diameter—to revitalize the Harran Plain 40 miles away. The Atatürk will also generate nine billion kilowatt-hours of electricity a year.

Eventually 22 dams will impound the waters of the Euphrates and the Tigris, which also rises in eastern Turkey, all part of an ambitious and diverse development scheme called the Southeastern Anatolia Project. Arab neighbors joke uneasily about a new Ottoman Empire.

From the mountaintop I inch down twisted dirt roads, dwarfed between boulders, crossing earth slides and streams milky with limestone, where Kurdish farmers spread manure on tobacco fields. A patriarch with a bristly white mustache comes to wave his arms and complain, thinking I am a government agent.

ED KASHI's photographs illustrated "Struggle of the Kurds" in the August 1992 GEOGRAPHIC. Before that he spent two years covering Northern Ireland for the documentary work, *No Surrender: The Protestants*. He lives in San Francisco.

"We don't have enough land, and people are hungry," he says. As for the dam: "It just benefits the Harran Plain, and land there has been bought by the rich."

On the Harran, now lush with spring grass, the mood is optimistic. At a government experimental farm at Koruklu, agronomists test patches of peaches, pecans, nectarines, pomegranates, and grapes as candidate crops for the coming waters. Local farmers, many of them Arabs, attend irrigation classes with anticipation.

The massive Atatürk sits 40 miles north of the regional capital of Urfa. It is essentially an immense pile of rocks guarded by men with machine guns. With officials I drive along its mile-long top. What looked like pebbles from a distance grow into car-size boulders of basalt, each placed according to size, like a mosaic, by a machine with a monstrous but artistic claw. The blue-green Euphrates thunders below the dam with a kind of virile, elastic power that seems closer to electricity than water.

I ask dam official Necmettin Sasaoglu if he and his colleagues feared sabotage during the gulf war, when Turkey assisted coalition forces against Iraq. "It's impossible to destroy this dam," he answers. "Besides, the floods would ruin Iraqi lands and cities downstream. It would have been self-destruction."

When nations share the same river, the upstream nation is under no legally binding obligation to provide water downstream. But the downstream nation can claim historical rights of use and press for fair treatment. In 1989 President Turgut Özal alarmed Syria and Iraq by announcing that Turkey would hold back the flow of the Euphrates for a month to start filling the Atatürk, despite an earlier guarantee to provide an average flow of 500 cubic meters a second at the Syrian border. To offset the loss, Turkey increased

the flow for two months before the cutback, but even this did not prevent an outburst of criticism. Full development of the Anatolia project could reduce the Euphrates' flow by as much as 60 percent. This could severely jeopardize Syrian and Iraqi agriculture. A technical committee of the three Euphrates riparians—Turkey, Syria, and Iraq—has met intermittently to share hydrological information but has made no real headway.

If seen as a commodity, water can be packaged, bought, and sold, and may soon move between nations like so much wheat. But political mistrust hampers many promising schemes. In 1987 Turkey proposed a "peace pipeline" of water from two Turkish rivers—the Ceyhan and the Seyhan—that flow south into the Mediterranean. The dual pipelines would deliver potable water to millions in Syria, Jordan, Saudi Arabia, and other Arab gulf states. Few nations were receptive, and the concept sits in limbo.

"In this region," Turkish Foreign Ministry official Burhan Ant told me in Ankara, "interdependence is understood as the opposite of independence. Every country here seeks a kind of self-sufficiency in every field, because they don't trust the others."

HARRAN'S GOOD FORTUNE is seen darkly in Syria, a nation that needs the Euphrates to keep pace with its population growth of 3.8 percent a year. Less water in the river has meant low power output at Syria's own large-scale Euphrates Dam at Tabqa. In Syrian

■ IRAQ: Ankle-deep in pools of sewage, residents of a Basra neighborhood suffer war's ravages long after the bombs have stopped. "We can't endure this any more," a woman shouted as she passed the author on the fetid streets of this once prosperous port city, 300 miles downstream from Baghdad. Years of pounding during the Iran-Iraq and gulf wars crippled the city's sewer and water-supply systems, flooding neighborhoods with pools of liquid waste. Though some sections of the system work periodically, they often break down: United Nations sanctions against Iraq have led to a shortage of spare parts.

cities power is routinely shut off several hours each day. Kerosene lamps glow orange through apartment windows.

"Only two of the dam's eight turbines are working," says Ministry of Irrigation official Hamdan Odeh in Damascus. "There has never been enough water for them all."

Predictably, Syria's big dam has kindled fear of scarcity downstream in Iraq. The Iraqis dispatched troops to rattle sabers at the Syrian border in 1975, when the reservoir was filling.

But Syria sees the great project as vital to its future security. The nation's rain-fed western farmland is already heavily used. The government looks now to its arid eastern steppes, where the Euphrates Dam irrigates 500,000 acres. Authorities estimate that a million more will have to be pushed into cultivation, and that cannot be done without more river water.

"There is no other choice," says Syria's director of international waters, Majed Daoud. "We will have 25 million people by 2010, and these people will need food."

In Aleppo I spend several days at the International Center for Agricultural Research in the Dry Areas (ICARDA), where researchers are devising strategies for coping with a drier future. "Water harvesting" is one way. Research agronomist Theib Oweis explains: "If one acre gets 150 millimeters (six inches) of rain a year, that is not enough. But, if you can get the water from one half of this acre to the other, you have land with 300 millimeters. Then you can grow a crop.

"For example, you plow the land in alternating strips. Water will run off the area you don't plow, so it will flow to the other strip. I don't see how any dry country can afford not to use such techniques."

When water is short, disease can spread, partly because untreated sewage water is used to irrigate vegetables. In 1989 Aleppo suffered a cholera outbreak blamed on contaminated parsley.

"I always soak my vegetables in chlorine," an Aleppo housewife tells me. "When I go to the market, the maid says, 'Don't get the onions with the black dirt on them; get the ones with the red dirt.' They were grown farther from the river."

Later I approach a merchant in the outdoor market by Aleppo's medieval city walls, one whose radishes bear the telltale black earth. "I eat these," he tells me, "and I don't wash anything. The only people who get sick are already slightly affected in the head. Dust and mud don't make you sick. It all comes from God."

Islam forbids alcohol, and water is the table drink, along with tea and coffee. Those Syrians

who can afford it buy plastic bottles of Boukein mineral water, whose label assures all drinkers, in English: "The best to prepare baby's food and to conserve his teeth healthy."

From Damascus, I drive with government escorts to the Golan Heights. The western slopes, where streams flow down to nourish the Sea of Galilee, were captured by Israel during the war of 1967. The humiliation still stings.

At the border there is a no-man's-land. The Israeli flag flutters on the other side. "See that flag?" says border official Mohammed Ali. "Those blue stripes represent the Nile and the Euphrates. The Israelis think this is where their land should extend, all the way from Egypt to Turkey. And they are working to get this area."

Actually, their blue-striped flag is patterned after the Jewish prayer shawl, but the misinformation suits the Syrian government, which has made a martyr city out of Al Qunaytirah. The regional Golan capital was destroyed. Nothing has been rebuilt. Busloads of Syrian and Iranian tourists trundle through the wreckage to see the "work of the Zionists." And the city itself is quietly returning to nature. I hear only sparrow song and the gurgle of pure water.

THE ONLY ROAD TO IRAQ for an American begins in Amman, the capital of Jordan, then shoots northeast through 500 miles of desert, through the cannon-shaped end of Jordan. I ride in a hired Chevrolet through a grit-filled haze called *khamsin*—"50 days"—for the duration of the winds that blow from the deserts. Curiously, a circle of blue sky shines overhead, like a skullcap on an immense bald head of ocher dust.

The landscape turns fertile when we reach the valley of the two rivers—ancient Mesopotamia. The Euphrates flows flat and strong, and in a few miles Baghdad arises on the Tigris, modern and bombastic. It shows few outward signs of the punishment it absorbed during the gulf war.

Bridges are repaired, tap water runs, and toilets flush. Portraits of President Saddam Hussein—depicted as a war hero, a son of Islam, a friend of the poor, a workingman with a wrench—hang heavy over the streets.

But Baghdad, like the rest of Iraq, merely survives. Its standard of life has collapsed since the gulf war and under the United Nations embargo. Duct tape and cannibalized parts hold city plumbing together, says Adnan Jabro, director general of water supply and sewage treatment.

"Can you imagine," *(Continued on page 56)*

Divided on the surface by political borders, most Middle East countries are joined by common aquifers—underground layers of porous rock that contain water. Shallow aquifers can be refilled by rain, but deep aquifers cannot quickly be replenished. Above ground, pipelines carry water within countries; no transnational pipeline is now in operation.

High Stakes for Thirsty Nations

"The next war in the Middle East will be fought over water, not politics," UN Secretary-General Boutros Boutros-Ghali warned in 1985, while he was Egypt's minister of state for foreign affairs.

Localized water conflicts have raised tensions in the region for decades. In 1967 Israelis shelled a dam site shared by Jordan and Syria on the Yarmuk River. In 1975 Syria and Iraq nearly went to war after Syria and Turkey filled reservoirs behind two new dams, causing a sharp drop in the Euphrates River. More recently Palestinians and Israelis have wrangled over access to a failing groundwater supply in the West Bank.

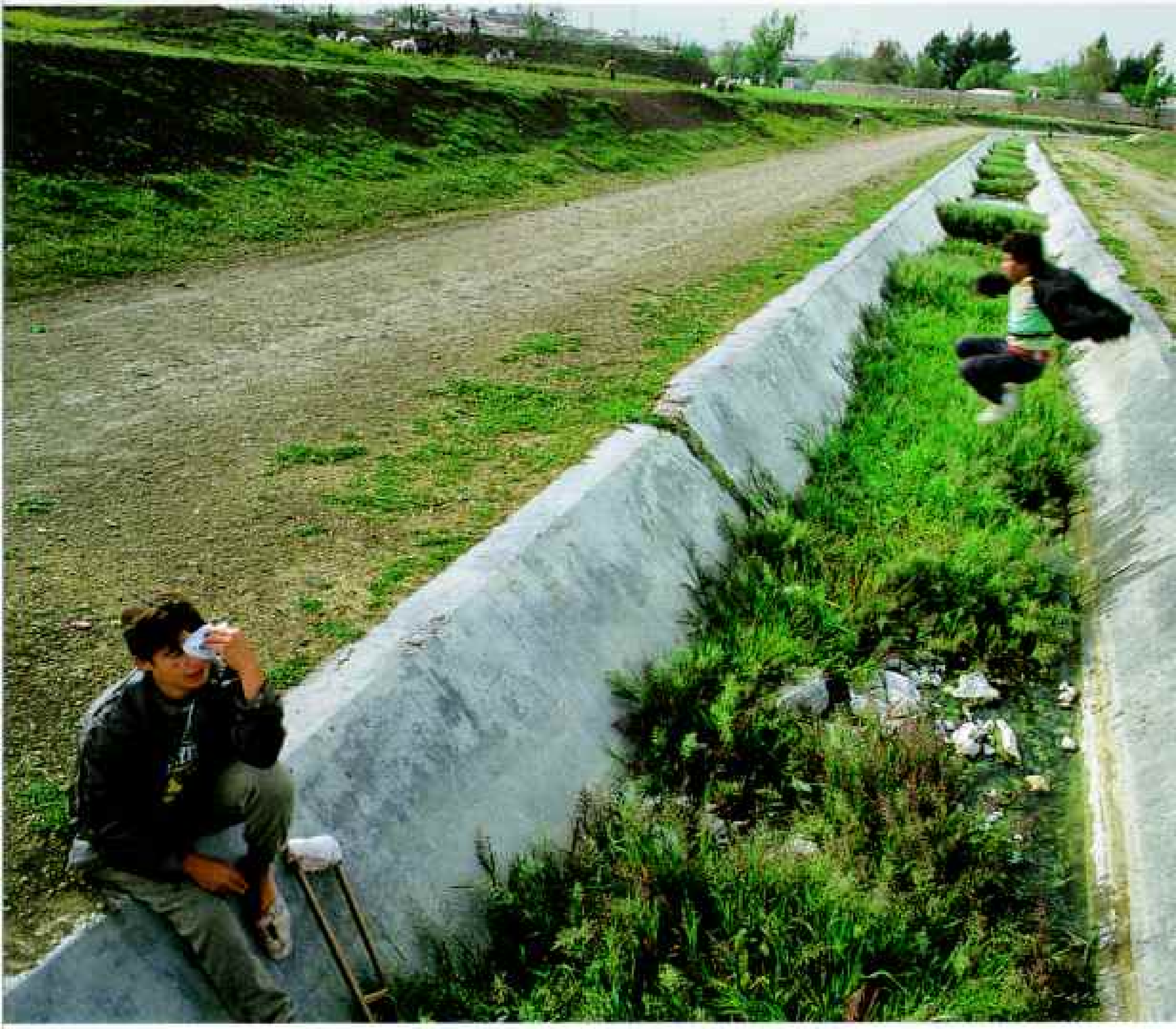
Almost wholly dependent on the flow of the Nile, Egyptians now worry that countries upstream will demand a greater share of the river's waters.

■ **SYRIA: "O believers, when you stand up to pray, wash your faces, and your hands up to the elbows, and wipe your heads, and your feet up to the ankles." Faithful Muslims gathered for midday prayer at a Damascus mosque obey the words of the Koran nearly 14**

centuries after Arab conquerors brought Islam to this city on the Barada River. A

failing network of leaky pipes contributes to the frequent water shortages that plague

Damascus's galloping population, which has more than doubled since 1970.



he says, "43 straight days of bombing, with no electricity, and you—*you*—are responsible for supplying water to 4.5 million people? It was a nightmare. People were using polluted water from ditches. And without electricity to operate the pumps, Baghdad was flooded with sewage."

Jabro feels that Iraq has done everything the United Nations wants. "Government officials can drink bottled water," he says, "but what can the other people do? If the United Nations really intends to kill people, they should come out and say it."

Iraq has a surplus of river water; its shortcomings are in management, investment, and control of pollution. During four decades of oil wealth, Iraq gave its rivers and agriculture low priority. For ten years of war, water projects were further set back. And water arrives already degraded by salts, agricultural runoff, and chemical pollutants from upstream users, for Iraq sits at the tail end of the drainage.

At the same time, drought has intensified, and as Turkey begins massive irrigation this spring, Iraqis fear even lower levels. Seasonal floods that once leached and washed the soil have been rare. With over-irrigation and poor drainage, salinization has affected huge areas; in southern Iraq, where brackish marshes surround the Shatt al Arab waterway formed by the confluence of the Tigris and Euphrates, thousands of acres have been glazed with an icing of salt.

In the infirmary that is Iraq, the city of Basra is on the critical list. Basra suffered more than three years of shelling from Iran and was savaged again by coalition bombing and by street fighting between Shiite rebel forces and Iraqi troops.

■ **SYRIA: Where the Quwayq River once flowed, a weed-choked ditch enters Aleppo, filling with sewage and industrial waste as it crosses the city. Aleppo's river dried to a trickle decades ago after farmers upstream diverted its waters. Today the city's nearly two million residents receive drinking water from the Euphrates, though hard-pressed local farmers tap into the stream of sewage to irrigate produce. The result: occasional outbreaks of cholera, typhoid, and dysentery.**

I fly to Basra from Baghdad. Saad, my official guide and handler from the press office in Baghdad, advises me of practical things en route: "To shampoo in Basra, buy two bottles of mineral water. If you don't, your hair will stick straight out with the salts."

In the stricken city barefoot toddlers wade casually through ponds of sewage. Our taxi driver, Abu Hekmat, says, "When we drink from the tap—it's directly to the hospital!" Waterborne diseases—typhoid, cholera, amebic dysentery—have bred.

About 20 cases of gastroenteritis arrive at the children's hospital in Basra every morning. In the wards, acrid with the smell of antiseptic and diarrhea, mothers whisk flies from pale babies hooked to plastic tubes and IV bottles. Stray cats stride boldly in the heat of the corridors.

"The main drugs, even diagnostic kits, are simply not here," says hospital manager H. A. Borak. Smoldering quietly, he demands: "Why is America doing this?"

KUWAIT, THE OIL-RICH NATION that Iraq still covets, has little fresh water, but it has the money to make it. To utilize seawater, Kuwait constructed six large-scale oil-powered desalination plants.

The plants use a complex distillation process, in which water "flashes" into a salt-free vapor. This requires huge amounts of energy and produces a cubic meter of fresh water that costs more than two dollars, compared with 20 cents in Chicago. But the water is heavily subsidized. Consumers pay less than a tenth of the cost.

Says Abdulla Mohammed Al-Minayes of Kuwait's Ministry of Electricity and Water, "Availability and reliability are very important to us. Economics does not mean anything."

Kuwait City in the spring of 1992 is a shell. Rubble litters the quiet streets. Bitterness and recrimination between those who stayed and struggled through the Iraqi invasion and those who left for the comforts of London or Paris polarize Kuwaitis. Half the population of two million, primarily the foreign laborers, is gone. The four surviving desalination plants produce a surplus—204 million gallons of drinking water a day for a demand of only 174 million gallons.

Saudi Arabia, farther down the Arabian Peninsula, leads the world in desalination. Its 22 large plants produce 30 percent of all desalinated water in the world. It is also a leader in the pumping of fossil water—water accumulated in an earlier geologic age—lying deep in aquifers spread under northern Africa and the Middle East. Mining nonrenewable water is like extracting oil—someday it will run out. Various estimates of the life span for Saudi fossil-water reserves at the present rate of pumping range from 25 to 100 years. Saudis themselves say longer.

Using such water, Saudi Arabia has exceeded its goal of self-sufficiency in wheat. Surprisingly, it has become the world's seventh biggest exporter, selling the wheat at one-quarter of cost. The government absorbs the loss.

"The Saudis are shortsighted," says Elias Salameh, professor of hydrology at the University of Jordan. "Someday they will need that water. And taking out fossil resources has its impact on the geologic structure of the area. The ground level may drop. Water is pressurized, and if you

take it out, no one knows what will happen."

For drinking water, the Saudis will increasingly rely on desalination. They fear only sabotage and pollution, as dramatized by the 600-square-mile oil slick that blackened the Persian Gulf during the war against Iraq, threatening to clog desalination intake pipes.

SADDAM HUSSEIN remains a hero to the Palestinians. Many of those who labored in Kuwait welcomed the Iraqi warlord, then fled before Desert Storm. More than 300,000 flooded cities and refugee camps in the Hashemite Kingdom of Jordan, already burdened with two prior waves of Palestinians in 1948 and 1967. They severely tax the nation's meager water resources.

In Baqaa refugee camp outside Amman, I visit Mohammed Abu Ghoname, his wife, and their 18 children. The family shares one brass faucet to wash babies, scrub laundry, and fill pots. One son, six-year-old Shadi, steps up and demands: "Do you like Saddam?"

I reach for a positive answer: "He has a fine mustache." The father translates. The child stares up at me, then lunges with a tiny fist and socks me hard in the stomach.

Times are tough in Jordan. Its aquifers are overpumped, and before the inundating winter of 1991-92, years of drought had worn agriculture to stubble. In Amman water rationing has been a fact of life; the water authority pumps only two or three times a week to the metal tanks that sit on every rooftop.

Jordan controls no major rivers. The Jordan River forms part of its border with Israel, but the Jordan's headwaters rise mainly in the mountains of Lebanon, northern Israel, and the highlands of Syria, and the river is heavily tapped upstream. Jordan must depend on the river's

■ **ISRAEL: "Mines. Beware!" reads a Hebrew sign on the Golan Heights. The former Syrian territory, annexed in 1981, is key to controlling 35 percent of Israel's water supply. In the valley below lies Israel's main reservoir, the Sea of Galilee, where members of Kibbutz Haon raise fish in rectangular ponds.**

■ **WEST BANK: "If there is no rain, what can we do? Nothing," says Jihad Ahmed Jamaat. He coils irrigation hose after a failed banana harvest near the village of Al Auja in the Israeli-occupied West Bank, a 2,270-square-mile area seized from Jordan in 1967. Al Auja's Palestinians say deep wells dug for Jewish settlers made their ancient spring run dry.**

main tributary, the Yarmuk, which forms part of the kingdom's northern border with Syria. But the Yarmuk is also crucial to Syria and Israel. Only the small Zarqa River runs within Jordan.

Recognizing early on the volatility of the water issue in this area, U. S. President Dwight D. Eisenhower sent an envoy to devise a sharing plan for the Jordan in the 1950s. Technical experts from all four riparians—Syria, Lebanon, Israel, and Jordan—accepted the Johnston Plan in principle. But there was no agreement on exact quotas, and governments would not ratify it. The plan was abandoned, but Jordan and Israel agreed to quotas in return for U. S. aid in financing a major water project in each nation.

In the 1960s Israel finished its project—the National Water Carrier—tapping the Sea of Galilee to channel water as far south as the Negev desert and virtually drying up the southern Jordan River. Jordan and other Arab states were outraged, calling the transfer of water from the Jordan basin a breach of international law. Israel maintains that it has the right to do what it wants with its own water.

During the 1967 war Israel captured the Golan Heights and the West Bank, effectively gaining control of almost the entire Jordan River basin. Jordanian farmers in the valley, under shelling and fearing a full-scale Israeli invasion, temporarily abandoned the east bank, and agriculture shriveled there.

In the 1970s Jordan completed the extension of its major project, the East Ghor (King Abdullah) Canal, which runs from the Yarmuk River south, parallel to the Jordan. Farmers returned, induced by promises of continued land reform.

Agriculture now soaks up 73 percent of Jordan's water, but some hydrologists insist that water-poor nations must curb their farmers instead of investing in them. Says the University of Jordan's Elias Salameh, "We should take whatever we need for domestic purposes first, and then use the rest for irrigation, not the reverse. We have a crisis because we are not able to put enough investment into industrialization, so we rely on agriculture, which needs less investment and more water."

"If Israel didn't exist," Salameh allows, "we still would have scarcity in the future. The cake is the same size; we can't enlarge it."

In 1967 the Israelis shelled a joint Jordanian-Syrian dam site on the Yarmuk. Jordan and Syria's current effort to build the Unity Dam on the Yarmuk, to provide hydropower to Syria and more water for Jordan, has been stymied as well. Institutions such as the World Bank will not help finance the project as long as Israel objects to a diminished water flow. Now Syria has built some 20 small diversion dams on the sources of the Yarmuk, leaving even less for Jordan.

Jordanian water experts have been meeting with their Israeli counterparts for years, but the

■ JORDAN: By the tank or by the can, Jordanians limit water consumption while their country endures the gravest shortages in the Middle East. In the capital, Amman, private truckers sell water for rooftop tanks, supplementing government rations. Near the Yarmuk River by the Syrian border, a mother sponges her son with rainwater from the family cistern.

Since the early 1960s regional politics have stifled a plan to build a dam on the Yarmuk—and bring running water to surrounding villages.

loss of their water to an enemy eats at the pride of Jordanians. Jordan's King Hussein has said that water is such a volatile issue that it "could drive nations of the region to war." Abdullah Toukan, the king's science adviser, adds, "In this arid region water is life. Money may bring desalination plants, but the real solution remains the restoration of Jordan's rightful share of water."

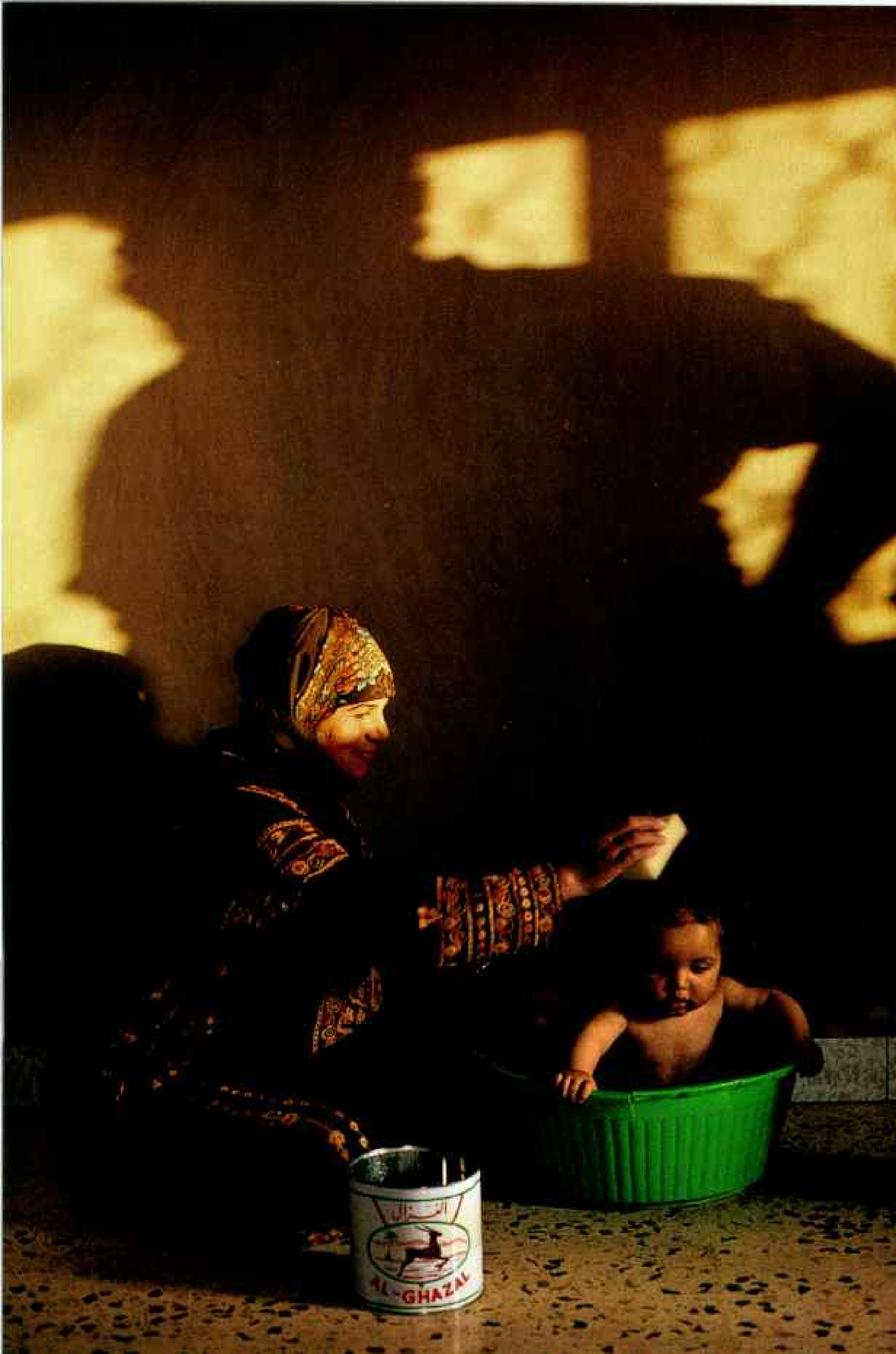
The East Ghor Canal snakes down the Jordan Valley, radiating life as it flows, into a heat sink where oranges and bananas are grown year-round. Here the barley stands ripe and golden, and white polyethylene hothouses, nurturing melons, carnations, and tomatoes, shimmer under a consuming sun.

Near the Dead Sea, I drive past Mount Nebo, massive in the magenta haze to the east, the mountain where Moses stood and looked over the Jordan to the Promised Land, knowing he could never cross.

ISRAEL DEFINED ITSELF early as a nation seeking to reclaim the land from neglect. Arriving from Europe with memories of green fields and forest glades, the early Zionists toiled to reestablish a Jewish culture based on agriculture. They drained swamps and quickened the desert soil with irrigation.

"Go back a hundred years and you'll see that agriculture determined the borders of what is Israel," says Jacob Bear, professor of hydrology at the Technion, Israel's technological university in Haifa. "So we are still in a state of creation—establishing our borders—if not to say in a state of war."

Israel draws 65 percent of its renewable fresh water from two major aquifers—a limestone aquifer under the mountains and a shallower, partly saline one beneath the coastal plain, including the Gaza Strip. The rest comes from the Jordan River and its great storage basin, the Sea of Galilee. The Litani River in southern Lebanon


AL-GHAZAL

has been a temptation, especially since Israel established its security zone there eight years ago, but so far Israel has resisted tapping it.

Israel's major contribution to farming in arid lands has been the development of drip irrigation, bringing precisely the right amount of water to each plant through holes in plastic hoses, with minimal waste. Computerized automation has allowed such refinements as high-frequency pulse irrigation. Farmers have more than doubled their output in the past 20 years, with the same amount of water.

Such achievements prompt recent Israeli water commissioner Dan Zaslavsky to call the Middle Eastern water crisis a myth: "There are local and temporary shortages because it's not the highest priority of the countries involved; that's all, nothing else."

Zaslavsky's brave words belie a growing anxiety. Until the heavy rains of 1991-92 partially refilled aquifers, the government had cut agricultural use of water by as much as 30 percent. Now farmers have succeeded in pressing for a larger allotment. Says water expert Hillel Shuval of the Hebrew University of Jerusalem, "We are living in fear that there will be a return to the old, dangerous policies of overpumping aquifers to satisfy agriculture."

As the population soars with new immigrants, the search for alternatives has taken on urgency. Israel has pioneered in the use of recycled urban wastewater for agriculture; a project in Tel Aviv already generates enough to cultivate 20,000 acres of farmland, water that is pure enough for accidental drinking. The use of brackish water drawn from fossil aquifers is being developed in the Negev. Desalination for agriculture is still too costly, at least until other options run out, or until new technology brings down the price.

Some experts point out that desalination could be a mutual investment between nations. To meet the needs of Israel, Jordan, and the West Bank, for example, would require less than ten billion dollars. By comparison, the gulf war to free Kuwait cost Arab countries 430 billion.

THE ALON ROAD near Jerusalem leads through the wilderness of Judaea, where migrating storks pick their way through waves of wildflowers, and landslides of goats teeter on the ridges. With Israeli historian Mooli Brog I go to see the revived and roaring El Fawar mountain spring that in ancient times supplied winter palaces west of Jericho.

"The sound of the water," says Mooli, shaking his head. "I can't get over the sound. Since 1968 this has been nothing."

Until last year decades of drought and overuse had dried up many springs and wells in the West Bank, where agriculture is suffering. Palestinians, chafing under Israeli occupation, are convinced that Israel is to blame—that it takes more than its fair share of water and denies permits for new Arab wells.

Israelis point out that unlimited drinking water is available to everyone in the occupied territories, but neither Jew nor Arab can dig new wells for agriculture when the water table is so low.

The salient fact about the mountain aquifer is that its waters flow naturally, underground, toward its edges. They emerge as springs and wells in the foothills, in Israel proper. The mountains, much of the West Bank, cannot sustain intensive agriculture, in part because the aquifer is too deep for viable irrigation wells.

But water remains a point of rancor. In the Arab village of Marda, 25 miles east of Tel Aviv, I meet with Palestinian elder Shaher Khufash, who announces gravely, "Israel has stolen our water, and we are thirsty."

How? "They have dug a well on confiscated village land. And they are denying us this water."

Marda could tap into the Israeli state water system, as 250 other West Bank villages have, but it has declined. Its main water source now is a Roman-era well that shrinks deep in summer, leaving 50 steps for the women to climb.

"This well is dangerous," says Khufash. "Four citizens have drowned in it."

Then why not hook up with the Israelis? Khufash rolls his worry beads carefully: "Doing so means accepting them and their confiscations. Also, they say we have to pay for the water then. The people refuse. They say, 'Why should we pay? The water comes from God.' "

In the Jewish settlement of Ariel, built along a mountain ridge that overlooks Marda, the young mayor, Ron Nachman, drives me around town in his new white Ford Scorpio. I tell him what I have heard from Khufash.

"It's pure Arab propaganda," he counters. "We tried to dig this well for the Arabs but got only mud. Hah! No one uses it. We get our water by pipe from the Sea of Galilee. But why don't Arabs build up themselves? Huh? Why not? I'll tell you why not. It's easier to sit and cry."

The mayor guns the car into the parking lot of the Ariel Hotel, with its swimming pool

■ **JORDAN: An underground transfusion waters beds of cucumbers at a private greenhouse in Baqaa, near Amman.**

"We are saving about 50 percent of our water," says owner Abdelraouf el-Khatib. In 1978 he was among the first in Jordan to switch to a drip-irrigation system, watering plants through tubes in the ground; plastic sheets discourage insects and prevent water-guzzling weeds. Using the same method, he grows green peppers, tomatoes, and beans.

and palms. "Just like Las Vegas," he beams.

Even Arab hydrologists point out that swimming pools are mere thimblefuls in the overall water volume. But pools and green lawns are red flags to the Palestinians, whose cultural resentment runs deep. Israel fears that if a new Palestinian state comes into existence on the West Bank, it might pursue a policy of deep, heavy pumping—not just to use the water but to deprive Israel. Politicians use the argument to resist Israeli withdrawal. Says one water expert, "Anybody, in my opinion, who would give away their water resources is simply mad, sick in the head."

On the road from Jericho to Tiberias on the Sea of Galilee, yellow mustard weeds wave in the ditches, and thistles spike the roadside. I can see Jordan across the river, with its mud-brick villages and spring grass sneaking up the hillsides.

At a Tiberias seaside restaurant I dine on St. Peter's fish from the Galilee, a primitive model of a fish, all scales and spines. The ample winter rains have swamped bushes along the shore. The cup of Galilee is full.

"The water problem is not a problem," says a local hydrologist, who declined to be named. "It's psychological and emotional. A hundred million cubic meters overflowed from the Sea of Galilee this year. If we had peace between Israel and Jordan, we might have developed 30,000 acres of land. Instead, the water goes into the Dead Sea."

Next day I visit the Jordan Valley Water Association, a private agency organized by area kibbutzim. Computers run the irrigation system through cables and radio. "The computer gets information from the fields, decides what pump to run and what valves to close or open," says engineer Gidi Sela. "Want to change levels? Just push a few buttons, and the valves of a holding tank five miles away open to admit water."

On one kibbutz, manager Zvi Rub tells me that 7,000 cubic meters of water per quarter acre were used for bananas each year when they were flood-irrigated. "When we started to drip-irrigate, we were down to 2,000 cubic meters," he says.

■ **JORDAN: Old-style sluices flood a banana field 800 feet below sea level in the Jordan River Valley. Since the early 1960s the East Ghor Canal has channeled Yarmuk River waters to the country's main farming area. Now the Jordan Valley Authority is replacing**

ditches with a network of pressurized pipes and offering low-cost loans to farmers who make the switch to drip irrigation.

Meanwhile lack of water prompted the government in 1991 to limit irrigated lands to less than half the valley's capacity.

■ **WEST BANK: A swimming pool and an ancient well symbolize the separate worlds of two communities less than a mile apart. Ariel is home to 12,000 Israeli settlers; Marda numbers 1,500 Palestinians. Although the Israeli pool is not filled from local wells—but with water piped in from the Sea of Galilee—to the Palestinians it stands as a bitter reminder of their treatment under Israeli rule. The Israelis, they say, have confiscated the land and stolen their water.**

"But aren't bananas still uneconomical?" I ask, remembering a vagrant statistic that a banana costs more to grow in Israel than to import from, say, Honduras. "If you only want to consider economics, you can close down agriculture," Rub said, voicing the Israeli reverence for the soil, "and you can close down the country."

I FLY FROM TEL AVIV TO CAIRO, arriving at night into a chaos of smoke, dust, and whirling traffic. My taxi, with one tire flat and no lights, rattles the wrong way up the down ramp of a major freeway and at last deposits me at the hotel door.

Egyptians have always huddled around the green tendril of the Nile, clinging to it as if to a rope, afraid to let go. Only along the coast and in the Western Desert have they strayed, gathering around oases. But for most Egyptians the desert is as alien as the sea; they are the people of the river. They do not think of themselves as desert Arabs.

Yet to feed a projected 25 million more people by 2010, Egyptian authorities say they must yank a sizable population from its river roots and replant it in the desert. They also need to make better use of the Nile's gift—recycling its waters for multiple use—and to pump water from aquifers.

In the office of the Egyptian Water Research Center, chairman Mahmoud Abu-Zeid says that the nation now depends almost totally on the Nile: "Every inch of this very narrow strip on both sides of the Nile is cultivated twice, sometimes three times a year."

The Nile drains eight other nations: Ethiopia, Sudan, Tanzania, Uganda, Kenya, Zaire, Burundi, and Rwanda, more than 10 percent of Africa. It flows into the Nubian Desert of Sudan and gathers behind Egypt's Aswan High Dam, which has given Egypt's farmers security from destructive floods and drought since its completion in 1971.

Egypt has seldom been challenged for Nile water, but other nations in the catchment will soon need more water for agricultural and power projects. Egypt has organized discussions between riparians—a forum called the Undugu Group—and has made a compact with Sudan for a stable Egyptian quota of 55.5 billion cubic meters a year at the High Dam. But Ethiopia, source of 85 percent of the headwaters, is not a party to

the Undugu talks. It has threatened to build its own hydropower dam, rattling nerves in Cairo.

The brutal civil war in Sudan has sidetracked one key water scheme—the Jonglei Canal that was to drain Sudan's southern swamps and provide Egypt and Sudan each with two billion more cubic meters of water a year.

Says Abu-Zeid, "Egypt is not a water-rich country any more. Beyond 2000 our water budget is very dark and very serious."

The next day I fly to the town of Aswan, in southern Egypt, where the daily furnace stokes up by 7:30, and the color bakes out of sunsets. From the Aswan High Dam, Lake Nasser spreads south as if floating on the heat. A hundred twenty million tons of silt settle yearly behind the dam, silt that once replenished the banks and built the Nile Delta. To compensate, farmers have had to increase their use of fertilizer, which contributes to water pollution. But the High Dam has kept its short-term promise. In the years of drought before the previous winter's ample rains, Lake Nasser kept Egyptian agriculture stable and the economy from collapse.

Aswan is the southern terminal for 200 river tour boats. I take a three-day trip down the Nile, visiting monuments, breathing the fresh staleness of life unchanged for millennia. Islands thick with grain and fruit trees quiver with reedy growth, and fellahin till the soil among date palms. The river pulses north, generous to those who trust it. Soil breathes, life appears, man struggles. Time flickers past.

The new Egypt that wants to grow into the desert must tear itself away from this nostalgia. History complicates its mission. The British, who occupied Egypt from 1882 to 1922, discouraged most Egyptians from the desert.

At the Water Research Center in the delta town of El Qanatir, I speak to Bahay Issawi, former director of the Egyptian Geologic Survey. "The British tried to separate valley dwellers and Bedouin, to keep barriers between us," he says. "The desert is full of genies and dangerous things, they said. We Egyptians inherited the idea, without knowing why. In 1965 I still needed a permit to go into Bedouin territory. That policy held Egypt back for a long time from Sinai."

Now, in a "new lands" program, Egypt offers young people livestock, money, and virtually free water to farm the desert. Thousands have accepted. The aquifers that could sustain agriculture in the Western Desert and in Sinai have been identified and drilling programs begun.

In addition, the 103-mile El Salam, or Peace, Canal will soon channel Nile water under the Suez Canal and along the Mediterranean coast to the North Sinai Project near El Arish. This could add 400,000 acres to cultivation.

The land is cheap, but too many of the pioneers in the new lands have been wealthy investors, not the young farmers the government wants to encourage. And those who grow staples in the Egyptian desert find that five acres of irrigated desert will grow only as much as half an acre of river bottomland.

■ KUWAIT: "It was like a heartbeat when they were all going, and now it has stopped," a former technician told the author at the wrecked Shuwaikh power and desalination station in Kuwait City. Iraqi soldiers destroyed the station, Kuwait's oldest, in February

1991 as they retreated during the gulf war.

With no rivers and limited groundwater, Kuwait and other gulf states increasingly count on seawater converted at oil-powered stations. Shuwaikh's fate underscored the stations' vulnerability to enemy attacks.

■ EGYPT: Far from the Nile, Bedouin in the Sinai desert stock up on river water along El Arish pipeline. The hundred-mile line is part of a plan to lure Egyptians from the teeming banks of the river, where a girl fetches water. Just 22 years after the Aswan High Dam ushered in an era of water abundance, Egyptians are asking: Will there be water for the next generation?

The Nile Delta blossoms like a peony on the stem of the Nile, watered by a network of canals that flood the alluvial earth. I drive along the "farm road" north from Cairo in the early morning, passing horse-drawn wagonloads heading to city markets, shaggy with onions, lettuce, and emerald green berseem clover.

Farmers in the delta have been accused of wasting water by flood irrigation—letting water run onto the fields until they are soaked. But recent studies seem to vindicate them. To properly leach the soil and to keep intact the powerful underground pressure against seawater intrusion, much fresh water must be sunk into the delta.

The key to conservation here, scientists say, is to intercept drainage water for reuse just before it goes into the sea. Twelve billion cubic meters of drainage water, six times the water budget of Israel, once flowed into the Mediterranean each year. Egypt already recycles almost two billion cubic meters of that water. By lining irrigation canals with plastic and by capturing water underground with drain systems, Egyptians hope to salvage five billion more.

Today the water sometimes falls short. On the roadside I talk to farmer Hassan Ibrahim Ghazy, a gaunt, dark man whose face seems squeezed below his turban. He is harvesting garlic in the culverts. "Sometimes I can't get water," he complains. "I'm at the tail end of the canal. Also, the water I get is polluted. There are many villages and many donkeys and ducks between me and the beginning."

He shifts uncomfortably. "But now I must go do my work. Our son died. He was the strong one. He died of schistosomiasis"—caused by parasites in stagnant water.

On the way back to Cairo diesel pumps along the roadway sputter and crack like artillery, and I must look hard to find a *saqia*, the traditional irrigation wheel turned by an ox. In the old way the animal is blindfolded with a thick pad of cloth. "Otherwise, he will get dizzy and fall down," explains a woman nearby. The beast moans in its yoke, plodding nowhere, but as it turns the wheel, water trickles into the culvert to spread among the clover. And then the trickle passes to the sea, from which all life has come.

"THE FUTURE of the human race is the sea," former Israeli water commissioner Meir Ben-Meir told me, preaching desalination. "The water problem will be solved if we are willing enough, patient enough, clever enough."

In my journey through the Middle East I found much cleverness, little patience, but a growing will. Ancient angers burn; flash points over water rights still smolder. And yet, most nations will concede that water is a mutual, interconnected need. They know that the quest for water, life itself, could foster peace as easily as warfare.

Now minds must be changed, biases curbed, and brotherhood kindled in this infertile crescent. Water must be understood as a resource, not just taken as a gift from God. □

JEFF ANDERSON SMOKES HIS BEES TO QUIET THEM DURING THE HONEY HARVEST IN MINNESOTA.

AMERICA'S BEEKEEPERS

Hives for Hire

Crisscrossing the country with truckloads of hives, they put their bees to work making honey and pollinating crops. Just who are these mobile, masked men?

By ALAN MAIRSON
NATIONAL GEOGRAPHIC EDITORIAL STAFF
Photographs by MARIA STENZEL

Bees cluster on two pallets of hives—12 in all—that are stacked and strapped for moving. A farmer in Maine rented them from a migratory beekeeper, who had hauled in the hives to pollinate the blueberry crop. With that mission accomplished, the beekeeper collects $32 a hive, loads his bees on a truck, and hits the road again.

EVERY SPRING Joe Tweedy and Jeff Anderson stack their hives on flatbed trucks and move 160 million bees from California to Minnesota. There, amid flowering fields, the bees change the nectar of clover and basswood trees into honey.

Every fall, before the Minnesota winter blows in, Joe and Jeff, Joe's 36-year-old son-in-law, haul their hives back to California, where farmers will rent the bees to pollinate almond and cherry trees.

And every year Jeff remembers two trips he'd rather forget.

First came the Mother's Day mishap of 1985. It was unseasonably hot that May morning as Jeff and Joe strapped more than a thousand hives onto their two 18-wheelers and covered them with a nylon net to prevent the bees from escaping.

Leaving their winter home in the central California town of Oakdale, they rumbled north on Highway 99. South of Sacramento a brown station wagon suddenly cut in front of Jeff, who swerved left, flipping his trailer and smashing open more than 500 hives. "It was either take out a car or dump bees," he says.

A huge cloud of bees stormed out and hovered over the road. The California Highway Patrol came in to direct the traffic that backed up for miles. Local TV crews swooped in while Joe and Jeff picked up the broken boxes. When the bees finally settled down on the side of an overpass, men armed with flamethrowers incinerated the swarms.

Five months later, another disaster. "Beekeeping," Jeff says wryly, "is always

Tiny titan of U. S. agriculture, a foraging honeybee flies as far as four miles from its hive to find food—in this case, chicory pollen—yet usually visits only one type of flower during a single sortie. This floral fidelity helps make bees ideal crop pollinators. As the bee gathers food for the hive, the pollen grains that cling to its hairy body will rub off at each flower to produce a seed, fruit, or vegetable.

an adventure somewhere." After restocking his hives and harvesting the summer's honey crop, he was driving his bees back to California when the exhaust system under his truck sprang a leak. The resulting fire destroyed everything, including the truck.

"The devil, when he's got a good thing going, wants to run it for all it's worth," says Jeff. "I almost think I should have gone in for some couch therapy."

Few kids fantasize about growing up to be caretaker and chauffeur for millions of stinging insects. Of the 2,000 commercial beekeepers in the United States only about half migrate. This pays off in two ways. Moving north in the summer and south in the winter lets bees work a longer blooming season, making more honey—and money—for their keepers. Second, beekeepers can carry their hives to farmers who need bees to pollinate crops.

Jeff Anderson and Joe Tweedy became migratory beekeepers by the same twist of fate: Each fell in love with a beekeeper's daughter. Like most of the players in this essential but unheralded branch of American agriculture, they don't really mind being anonymous; if beekeepers get any publicity at all, it tends toward the sensational.

When I joined Jeff and Joe at a meeting of the Delta Bee Club, the president asked me to explain to the members why I was writing this story.

"It's simple," I told them. "Most people don't know you guys exist."

A voice yelled back, "Keep it that way!" and everybody laughed.

"Let's face it, people are afraid of honeybees—especially a truckload of them," said John Miller, who ferries 7,000 hives between California and North Dakota. "But I love the bees. I understand what makes them tick. Give them a little respect, use a little common sense, and they'll make you some money—they'll do their best."

MIGRATORY BEEKEEPING is nothing new. The ancient Egyptians moved clay hives, probably on rafts down the Nile to follow the bloom and nectar flow as it moved toward Cairo. In the 1800s U. S. beekeepers experimented with the same idea, moving bees on barges along the Mississippi and on waterways in Florida, but their lighter, wooden hives kept falling into the water. Other keepers tried the railroad and horse-drawn wagons, but that didn't

---

Photographer MARIA STENZEL, who lived in Ghana and the Netherlands before moving to New York State, visited ten scattered states on this assignment, her second for NATIONAL GEOGRAPHIC. She photographed "The Lure of the Catskills" in the November 1992 issue.

Taking Wing

To eke out a full-time living from their honeybees, about half the nation's 2,000 commercial beekeepers pull up stakes each spring, migrating north to find more flowers for their bees. Besides turning floral nectar into honey, these hardworking insects also pollinate crops for farmers—for a fee. As autumn approaches, the beekeepers pack up their hives and go south, scrambling for pollination contracts in hot spots like California's fertile Central Valley.

prove practical. Not until the 1920s, when cars and trucks became affordable and roads improved, did migratory beekeeping begin to catch on.

"When I started, it didn't take much money, just hard work," said Joe Tweedy's father-in-law, John Wells, who got his first three hives from a friend in 1937. He soon caught the beekeeping bug and turned his hobby into a business. He bought more hives and an old Chevy truck and started following alfalfa and orange blossoms in southern and central California. John was running 1,200 hives by 1955, when his daughter Florine married Joe, who started helping with the bees.

"I wasn't sure for quite a while if I wanted to stay with it, because I didn't like getting stung," says Joe, an auto mechanic by training. But the migratory life eventually won him over. "With bees, you're here for a while, a hundred miles away for a while. You're always seeing new country."

In 1962 they started migrating for the summer to Minnesota—rich in clover, largely free of pesticides, and far away from most other beekeepers. The family's business, California-Minnesota Honey Farms, was born.

John sold it to Joe in 1982 and retired, but John and his wife, Leona, still make the migration to Minnesota. So do most of the 16 members of their extended family, who live in five mobile homes and one small house that sit in a semicircle around a big oak tree in Oakdale, California. One of

Joe's hired hands and his family live here too. It's a family, business, playground, and neighborhood rolled into one.

Juggling migratory beekeeping and a family is no easy trick. Several of Joe's employees quit because their wives hated spending half the year away from home.

Joe's eldest daughter, Christine, now 36, remembers the strain of starting each school year in Minnesota and finishing in California.

"It was hard changing friends and teachers," Christine told me. "I just hated it." So she and her husband, Jeff Anderson, decided to school their children at home.

Living in California's fertile Central Valley, the family was poised to capitalize on one of the biggest changes in migratory beekeeping: the dramatic rise in the demand for bees to pollinate crops.

Directly or indirectly, about a quarter of the food we eat depends on the honeybee's talent. While foraging on flowers, bees transfer male sexual matter, pollen, to the flower's female part, the stigma.

Apples, almonds, watermelons, plums, cantaloupes, pears, avocados, blueberries, cranberries, cherries, cucumbers, and kiwis all rely on bees for pollination. So do various seed crops, including carrots, cauliflower, celery, onions, and sunflowers. Meat and dairy products are also touched by bees, which pollinate the alfalfa that produces feed for livestock.

But the growth of huge commercial farms and heavy use of herbicides and

pesticides have made it impossible for wild bees to do all the work. Enter the migratory beekeeper.

The pollination season begins with a bang in California in February. Hundreds of beekeepers come to the Central Valley from as far away as Texas and Minnesota, lured by the biggest bee pollination bonanza in the U. S., almonds.

"Almonds have changed the face of beekeeping more than anything," said Joe Traynor, a former beekeeper who now brokers pollination contracts and makes sure the bees get delivered in time for the three-week-long bloom. "When I'm getting ten calls an hour and growers are hollering for their bees, it's stressful."

In 1960 virtually no out-of-state beekeepers came here, Traynor told me. "Pollination fees were $2.00 a hive, and it wasn't worth the trip." But as the state's almond groves grew from roughly 100,000 acres to today's 400,000 acres, so did demand for bees. Growers need two hives an acre. At today's rental rate of $32 a hive, the almond pollination bill could exceed 25 million dollars.

It's a bonanza for the bees too. Inside the hives they are filling wax combs with the only foods they naturally live on, nuggets of pollen (beebread it's called) and honey.

To make honey, foraging bees regurgitate nectar into the mouths of "house" bees, which add enzymes and store the mixture in the tiny hexagonal cells of the comb. Then they fan it with their wings to reduce the moisture content and cap each cell with a thin layer of wax they secrete from abdominal glands. Most people consider almond honey too bitter to eat, so the bees get to keep it for themselves.

Ten frames of comb hang vertically from the top edge of each hive. As the colony grows, the beekeeper can extend the hive by stacking an empty hive box on top.

At the center of a healthy hive the queen lays eggs, as many as 2,000 a day, which quickly change into larvae. These are fed frequently by worker bees, the infertile females that constitute more than 98 percent of the hive's population. Workers clean and defend the hive and fill the outer edges of the comb with pollen and honey. The few male bees, called drones, exist

Saying good-bye is a seasonal ritual for Joe Tweedy (above, at right) and most of his family, who have been chasing mild California winters and Minnesota summers for more than 30 years. Today the traveling crew—16 people strong—includes (facing page, left to right) Joe, his grandsons Jeremy and Aaron Anderson, employee Chris Slater, and son-in-law Jeff Anderson. "If you took a poll and asked most kids what their fathers do, they'd have no idea," says Jeff. "My boys know, because they work with me." On the road to Minnesota, Jeff's son Aaron sprays the hives to keep the bees cool.

solely to mate with a virgin queen in a mid-air courtship.

"Then the drone dies and falls out of the sky like a dive-bomber," explains beekeeper Lucille Hoffman. "The ones who don't mate stay alive until fall, and then they're evicted. The workers pitch them out the door and won't let them back in. You kind of feel sorry for them, but that's life."

Lucille and her mother, Louise Gentry, both of Oakdale, are among the few women in migratory beekeeping. "Guys say I'm the cause of a lot of arguments with their wives," says Louise, "because most of the wives don't go out and help."

The pair are also among a small group of professionals who specialize in raising queen bees, a complicated process most beekeepers don't bother with. For six dollars a queen, packed in a little cage, can be mailed to you.

BY EARLY MARCH the almond bloom has come and gone, and the buds on the cherry trees are ready to burst. It is time to move bees.

The Cal-Minn bees have been pollinating an almond orchard a few miles north of Oakdale. A fragrant frost of white petals covers the orchard floor when Joe Tweedy, Jeff Anderson, and hired hands Chris Slater and Dave Stomberg pull up with three trucks. It is 5:30 p.m., late enough so most bees are back in their hives for the night. Beekeepers don't move their hives in the middle of the day because too many bees would end up homeless.

We park the 18-wheeler at the edge of the orchard and hop into two smaller trucks, each pulling a forklift on a trailer. Jeff and Dave disappear in one direction; Joe, Chris, and I head in another, driving

. . . . . .

Moving out before winter moves in, Dave Hackenberg trucks his bees from Pennsylvania to Florida's citrus groves, where the bees will feed and multiply. Six months later he'll head north again to pollinate crops and make honey, earning a modest living. "How do I convince my boy in college to do this when he gets job offers for $35,000 a year?" he says.

Shaking bees from thriving hives to weaker ones, Jim Robertson of Dos Palos, California (below, at right, and facing page), needs a sturdy back as well as fluency in bee biology. Neither trait protects against beestings—or human barbs. "A guy came up to me once and said, 'I got a boy. He's not too bright, and he don't get along with people—but you ought to hire him. He'd make a real good beekeeper,'" says Jim with a laugh.

slowly between the almond trees until we stop near eight beehives. The hives are grouped in sets of four and sit back-to-back on separate wooden pallets.

Joe wears blue jeans and a long-sleeved flannel shirt. Chris is cloaked in white nylon coveralls. Neither uses gloves nor a beekeeper's veil for this work because they are not opening the hives and the bees should remain relatively quiet.

Just in case, Chris pacifies the bees with smoke. He stuffs a wad of burlap into a smoker—a metal canister with a spout on top and bellows on the side—ignites it, and squeezes the bellows a few times. Smoke streams out the spout. Running ahead of Joe's forklift, Chris blows a few puffs into each hive's narrow entrance. Seconds later, Joe picks up the pallets with the forklift and puts them on the truck.

We return to the big truck to transfer our load and find that Jeff and Dave have beaten us back. Jeff maneuvers his forklift flawlessly, with mesmerizing speed and grace. Even in the dark he never spilled or shook up a hive, the sort of performance you'd expect from the winner of the 1991 California State Beekeepers Association forklift competition.

The next morning, before the bees begin to fly, we haul the previous night's batch to a cherry orchard and do the same maneuvers in reverse. It will take the men seven nights to pick up their 4,000 hives.

That morning, though, I was distracted. I'd been stung four times the night before, and my neck and left hand were red, swollen, and itchy. But why was I complaining? The bees had nailed Joe maybe 30 times.

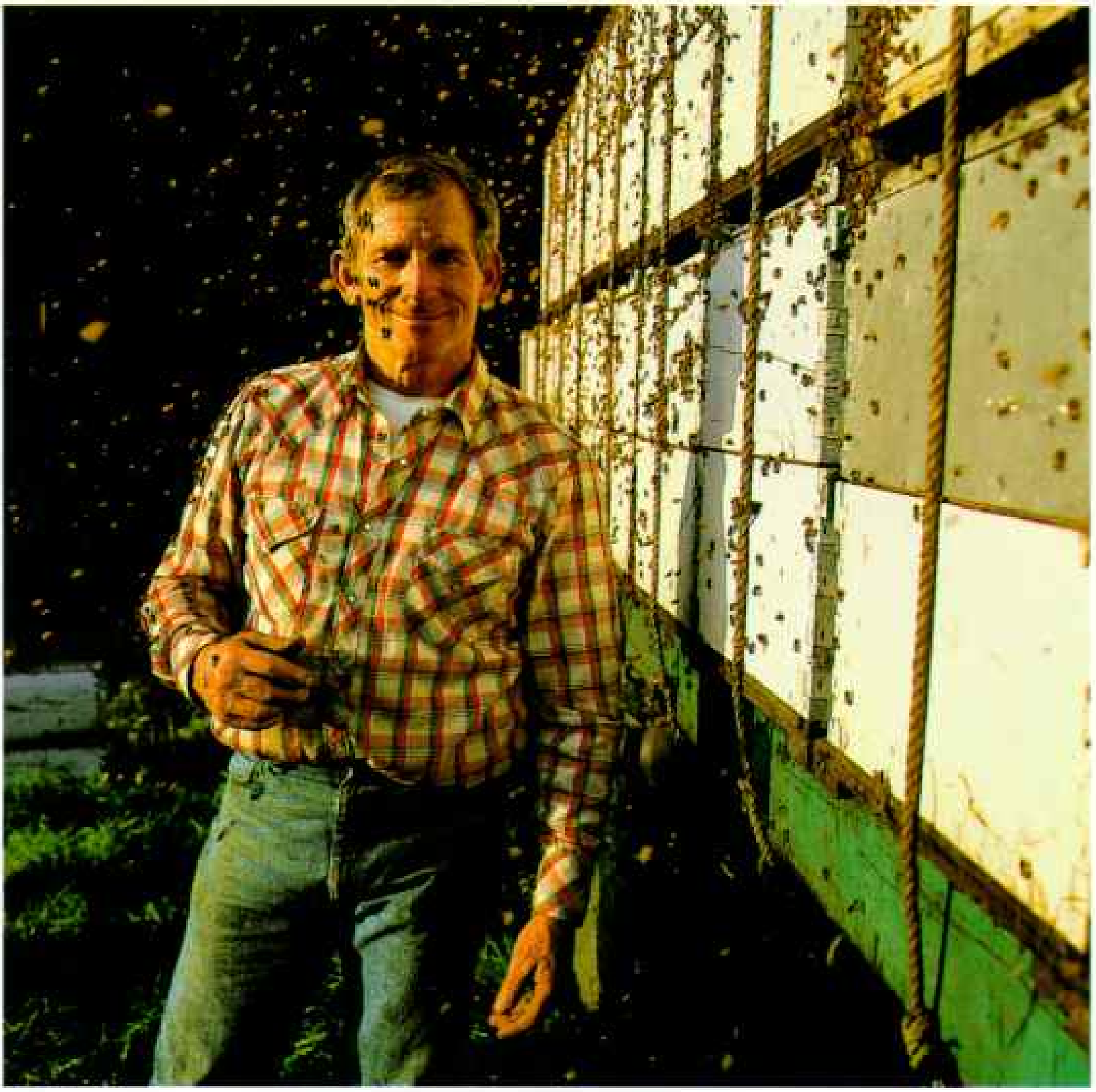
"I don't pay attention to how many times I get stung," Joe said. "The pain is still there but I don't swell, unless I get it in the eyeball or under a fingernail. On the tongue is awful painful. The private place is painful too."

Oddly enough, beekeepers' families tend to develop sensitivity to beestings more often than the general population. Some doctors believe the allergies arise because beekeepers come home with their clothes dusted with a fine white powder of bee venom. The venom drifts into the air, and the family inhales it. That may have happened to Jeff and Christine Anderson's daughter.

"Rachel was two when she got stung on the foot," Christine told me. "Her little nose and eyes and ears and lips all swelled up, and she had welts all over her body."

To build up her immunity, doctors gave Rachel a series of injections over a four-month period. To maintain immunity, she needed a shot or a beesting every six weeks for several years.

"So we'd go outside and catch a bee," said Christine.



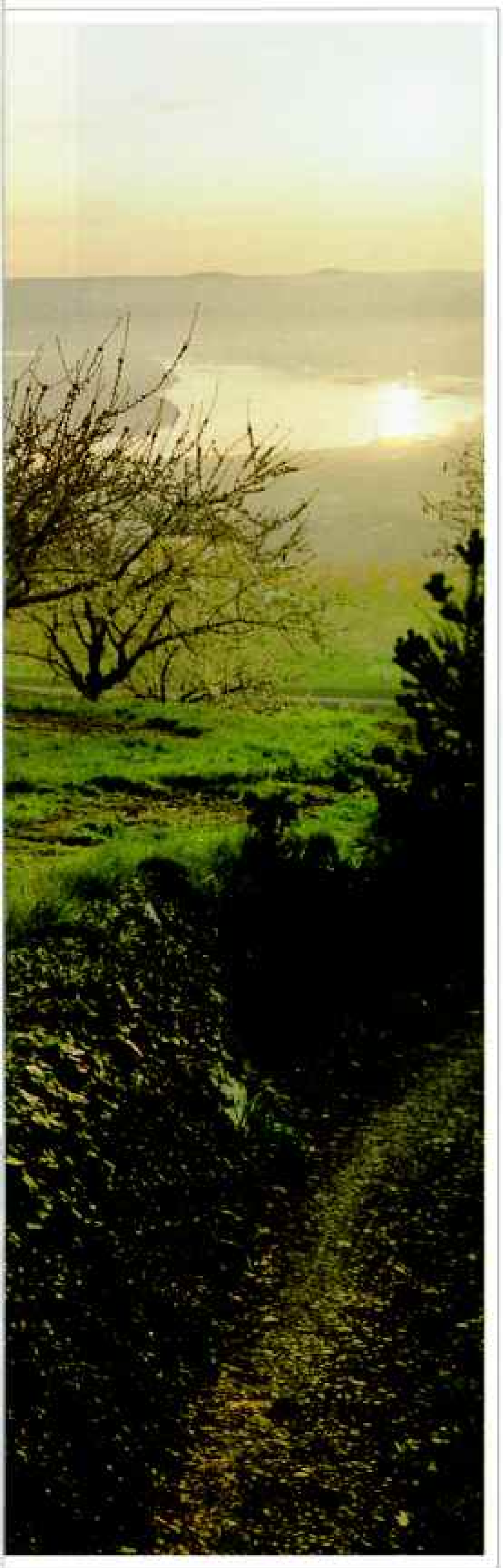
Rachel, now 13, remembers this ritual clearly: "Mom would take hold of my arm and roll my sleeve up. Then my Dad would make the bee mad and stick it on me and count to ten before he took the stinger out. But it worked. Now when I accidentally get stung, it barely swells, it barely hurts."

JOE TWEEDY never finds enough cherry growers to rent all his bees, cherries being a much smaller crop in California than almonds. But the bees still need nectar and pollen, or Joe will have to feed them sugar syrup, and that's expensive.

So one morning before dawn we drive 600 unrented hives to the foothills of the Sierra Nevada. Winding roads lead us to the town of Sheep Ranch, 2,400 feet up. We carefully settle the hives into several clearings, ringed by scrubby manzanita brush that blushes with clusters of tiny, bell-shaped flowers.

Joe wants to work inside his hives, so we pull on protective gear—nylon coveralls, gloves, boots, broad-brimmed hats with veils—and pry open the hive covers. We smoke the bees to calm them down, but that doesn't help. Soon the sky is dark with them, whirling and whining so loudly and incessantly that I can barely hear Jeff. The bees launch rapid-fire attacks on my suit and veil. I feel like a camper zipped in a tent during a heavy rain.

Mites and various diseases can weaken or kill a hive. Today Joe spreads powdered



sugar laced with an antibiotic on the top edge of the frames. Bees that eat it won't contract a bacterial infection called American foulbrood.

Besides spending substantial time and money keeping their hives healthy, beekeepers must hustle to find good places to put their bees—flowering pastures like this Sierra site where the bees can find food. "Locations," they're called in the trade.

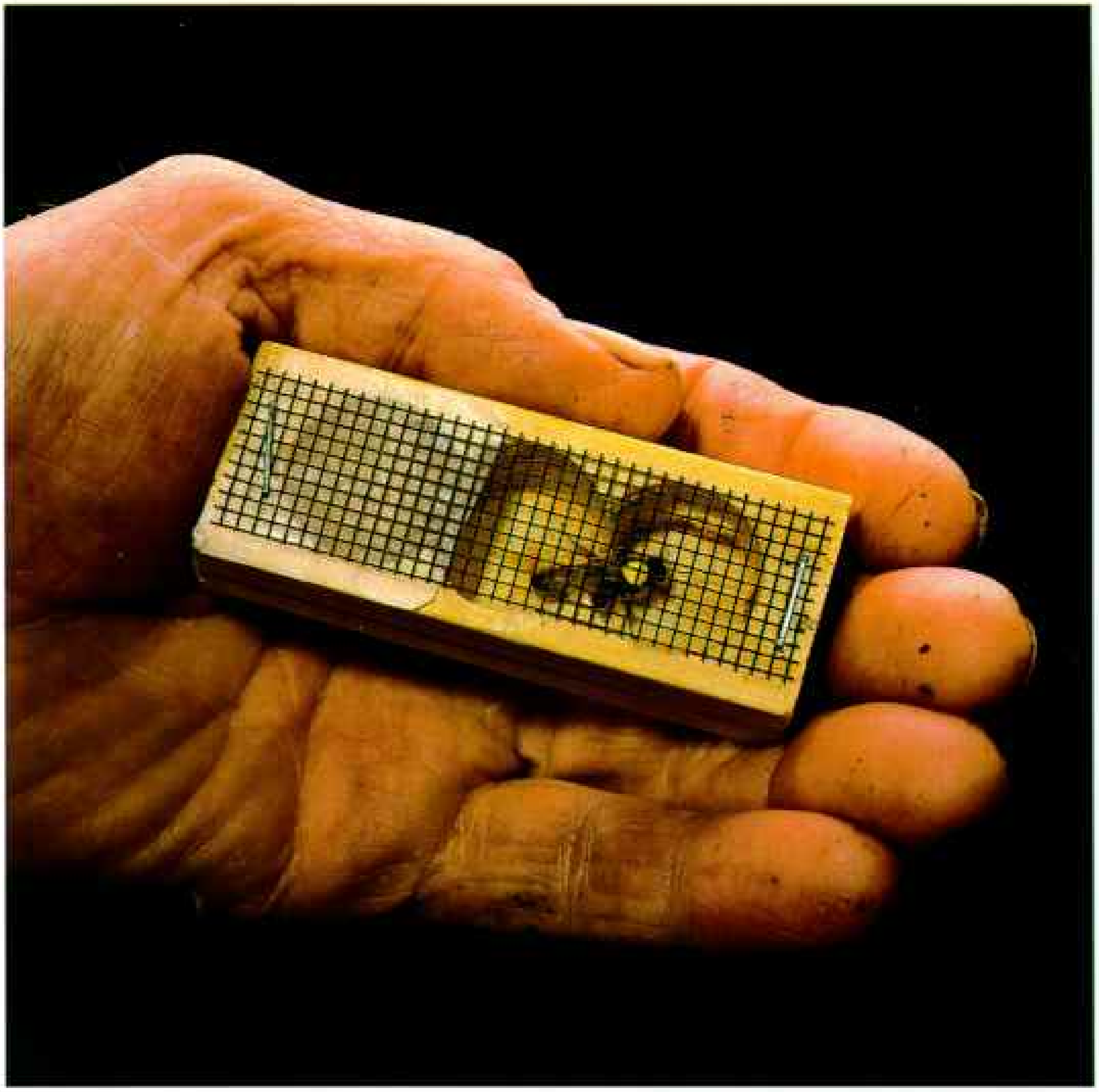
"Locations are the most critical thing in this business," beekeeper Jim Robertson tells me at his home in Dos Palos in the San Joaquin Valley. "And the people who let you put your bees on their property, they're nice people. That's all there is to it."

Jim walks with a cowboy's saddle-sore stride. He drives his 3,000 hives around Nevada, Montana, and central California, where suburban sprawl is chewing up good bee locations. As a result, Jim regularly beats the bushes, asking landowners to allow him to put hives on their property.

The answers vary, according to his wife,

. . . . . .

Ferrying hives with a forklift, Vince Vazza positions his bees to pollinate a cherry orchard near Oregon's Columbia River (left). Farmers insist the bees arrive just as the cherry buds burst, so Vince monitors the trees to ensure on-time delivery. Months later such diligence bears fruit.



Dorothy. "When Jim goes by himself, he gets no locations," she says. "When he takes me and the kids, he never gets any refusals. The landowner can't refuse; he sees you've got a family to support."

Jim doesn't rely solely on the kindness of strangers; he sweetens the deal with honey or oranges.

One morning Jim and I drive west over the Coast Ranges to pay some rent in Watsonville, near Monterey Bay. At 7 a.m. we arrive at the home of Nellie and Stan Ramer. With a case of oranges tucked under his arm, Jim knocks on the door. Nellie, in a red bathrobe, greets us warmly and invites us inside, even though we've interrupted her breakfast.

Nellie tells me that beekeepers have been putting hives on their farm for 30 years. But all those bees can be a nuisance, she readily admits.

"You see beeswax on the clothes, and the car, and the. . . ."

"It's not wax," Jim interrupts.

"Oh," says Nellie, a bit surprised. "You mean it's . . . excreta?"

"Yup."

Nellie's eyes widen and then she smiles, remembering the frequent exchanges she has had with Stan.

"I'd say, 'We must wash the cars. They're full of beeswax.' And he'd say, 'Oh no, we'll just rub it off and we've got a wax job.' "

"And you know what?" says Nellie, letting out a laugh. "It looked pretty good!"

TEAM TWEEDY moves the hives again in mid-April from cherry orchards and manzanita to orange groves near Fresno. Navel oranges don't need bees for pollination, but Joe Tweedy can sell the honey—fragrant and sweet, not bitter like almond honey. To put his bees among these blossoms, Joe pays the orange grower about a hundred dollars a location.

The men dress in full protective gear before opening the hives and stacking extra boxes called supers on top. These temporary hive extensions contain frames of empty comb for the bees to fill with honey. In the brood chamber below, the bees will stash honey for themselves. To prevent the queen from crawling up top and laying eggs, Joe inserts a screen between the brood chamber and the supers.

Three weeks later 50,000 pounds of honey is ready to be gathered. The men pack chunks of ice in the pockets of their protective coveralls to stay cool in the 90-degree heat.

Pulling supers off hives is a nasty job. Joe sprinkles Bee-Go, a chemical that smells like vomit, on a wooden-framed sheet of fabric called a stink board. When he replaces the cover on the supers with the stink board, the fumes irritate the bees and drive them down into the hive's two bottom boxes, leaving the honey-filled supers more or less bee free.

At dusk, after ten hours of pulling honey supers, some as heavy as 90 pounds, there's still another six hours of work ahead. The men must begin to replace 1,200 "dead outs"—hives weakened by disease, mites, or an aging or dead queen. These are average losses for a 4,000-hive operation like Joe's.

To create new colonies, Team Tweedy performs a bit of beekeeping magic. Joe takes a healthy double hive teeming with bees and separates the top and bottom boxes. One half holds the queen, so he puts a young, already mated queen in the other half. Voilà: two hives from one. By the time the flowers bloom in Minnesota, the new queens will be laying eggs, filling each hive with young worker bees.

In hives that produce meager amounts of brood and honey, the queen is killed and replaced. "Colonies with young queens make the most honey," explains Joe.

It takes four grueling days and nights to pull the honey, split and re-queen the hives, and load the bees on five commercial trucks that Joe has hired for the move to Minnesota. When the last two loads are stacked on Joe's own trucks, the cross-country migration is about to begin. After the Sabbath.

For these men and their families, devout

Getting hands on a queen bee is mail-order easy. Bee breeders send them in a cage (facing page) to beekeepers, who place the captive in a queenless hive. During the two days it takes the hive's residents to eat through the cage's candy plug, they grow accustomed to the scent of their new leader. Upon liberation, the queen begins laying eggs in the hive's hexagonal cells. Three weeks later, worker bees emerge (below).

Pellets of pollen, scraped off bees' legs by wires placed strategically at a hive's entrance, sell as health food—but honey is a much bigger cash crop, earning more than a hundred million dollars a year. At a beeyard in Minnesota, Joe Tweedy and his men suit up and pull off supers—frame-filled boxes where the bees stash their surplus honey.

* *

Seventh-day Adventists, the Sabbath comes on Saturday. After church, to celebrate the end of the California beekeepers' spring, Joe and Florine Tweedy throw a picnic for 40 friends and family members.

It's a glorious afternoon, and we savor it—eating, taking walks, listening to gospel music, and talking about the trip to Minnesota. Most of the family will be leaving the next morning, all except Joe's mother, Helen, and the family of his youngest daughter, Kathy, whose husband is not a beekeeper.

"It's pretty sad when they drive out," Kathy tells me. "We have the most outrageous phone bills during the summer."

Early the next morning everyone is in motion. Jeff double-checks the straps that hold the hives on the truck and the nets that keep the bees in. His ten-year-old son, Aaron, sprinkles the hives with water to keep the bees cool. Florine packs clothes, a typewriter, treadmill, and VCR into the

Admiring nature's handiwork, Dave Stomberg basks in the glow of a frame full of honey. Beekeepers shave off the comb's wax seal before they extract the honey and pour it into barrels for shipment to wholesalers, who filter and market it. "You never know how much honey you'll make," says Dave, who hustles to keep his bees healthy and prays for the warm, wet days that grow nectar-laden flowers.

motor home while Christine and her kids pack their van and trailer.

At 8 a.m. we gather beside the trucks for a prayer. Moments later our caravan—a motor home, a van, two 18-wheel trucks, and 1,120 of their beehives—hits the road.

It's Mother's Day—just as it was seven years ago when Jeff spilled his bees. "But I'm not superstitious," he says, "else I wouldn't be driving down the same road at the same time." We pass Sacramento without incident. Jeff turns east on I-80, downshifts from thirteenth to sixth gear, and crawls up the Sierra at 25 miles an hour. The engine groans hauling 80,000 pounds up Donner Pass, but his load will become lighter; by the time we reach Minnesota the bees on each truck will have consumed and burned off 1,500 pounds of honey.

At the top of Donner Pass we stop for a quick lunch, a luxury we can afford because cool weather is keeping the bees inside their hives.

"When it's in the 80s or 90s," says Jeff, "you'd better already have a jug of water, a couple of cans of soda pop, and something to eat 'cause you're not stopping."

We are nearly across Nevada when we stop for the night at 8 p.m., eating dinner then scattering ourselves among the bunks in the trucks, the motor home, and a nearby motel.

The next two days are as perfect as the first. Cool, dry, and breezy. We pass potato fields in Idaho, meander through Montana, and with a brisk tail wind chase cloud shadows across North Dakota.

"I haven't had such an ideal trip for hauling bees in years," says Joe. No flat tires. No torn transmissions. No collisions. No burned bees. The only snag comes when Joe snaps his gearshift. He jury-rigs a splint with three pens, a roll of heavy tape, and a plastic bottle of Tums. Not pretty, but it works.

When we pull into the Minnesota homestead in Eagle Bend—population 531—it is one o'clock Wednesday morning. The family compound they call Bee Hill looks remarkably like their winter base in California: a small house and three mobile homes. I find an extra bed and fall fast asleep, but Joe and Florine must need a night to readjust to life off the road: With their bed waiting inside, they sleep in their motor home.

NO MAP of Minnesota marks Slewhole, Mulberry Tree, Rockpile, Graveyard, Pimple Pasture, and Rotten Bridge. Team Tweedy made up these names for a few of the 70 different locations where they park their hives for the summer. The bees forage on white clover, yellow sweet clover, alfalfa, and basswood tree blossoms, filling their hive

supers with honey. In mid-August, Joe and his crew begin to extract it.

With the nauseating stink of Bee-Go in the air, they truck the supers to a warehouse on Bee Hill. In the extracting room Joe lifts out the frames and lowers each into an "uncapper," where rotating blades shave away the wax that covers each cell.

Joe and Chris Slater put the uncapped frames in a carousel that sits on the bottom of a large stainless steel drum. They fill the carousel to capacity with 72 frames, and Joe flips a switch. As the frames whirl at 300 revolutions a minute, centrifugal force throws the honey out of the combs.

Finally the honey is poured into barrels for shipment to a honey-marketing cooperative in Sioux City, Iowa. But not before I taste a finger full. It's delicious—light and not too sweet, with a slight bite from the basswood—and a soothing salve for all my beestings.

By the end of September Joe has finished harvesting 330,000 pounds of honey, which now sells for 52 cents a pound. But after paying his expenses—including equipment, fuel, insurance, and labor—there's not much money left over. After 30 years of migratory beekeeping, Joe and Florine have $11,000 in savings.

"Clearly we're not in the bee business to make money," says Joe. "We're in it to make a living and have a good family life."

That way of life—the whole face of U. S. beekeeping, in fact—may be changing.

One of the first cuts in the federal budget


BEE
DROP
20

Dropping their petals after pollination, California's 400,000 acres of almond trees start growing nuts. Many beekeepers enjoy a big payday in these orchards, but selling honey still generates most of their income. Without federal support in the face of cheaper imported honey, beekeepers say, their business will collapse, leaving farmers up a tree.

this year could be the price supports for honey. Without this subsidy—which varied from three to eight cents a pound in the past year—many beekeepers say they will go out of business. Countries such as China, Mexico, and Argentina are producing honey far more cheaply than the U. S.

The beekeepers' main argument for retaining the subsidy is pollination. The American Beekeeping Federation and the American Honey Producers Association like to remind Congress that while it may be easy to import honey, U. S. agriculture has come to rely on the migratory beekeeper. If small, family-run honey businesses fail, pollination would be left to the country's very few big beekeepers—those who run as many as 50,000 hives. They could demand higher prices for their bees, pushing up the price of food.

NONE OF THIS is on Joe Tweedy's mind this October day when the basswood trees are turning gold. He is thinking about moving his family and bees back to California. It will take Joe and Jeff the entire month—four round-trips—to shuttle all their hives from Eagle Bend to Oakdale.

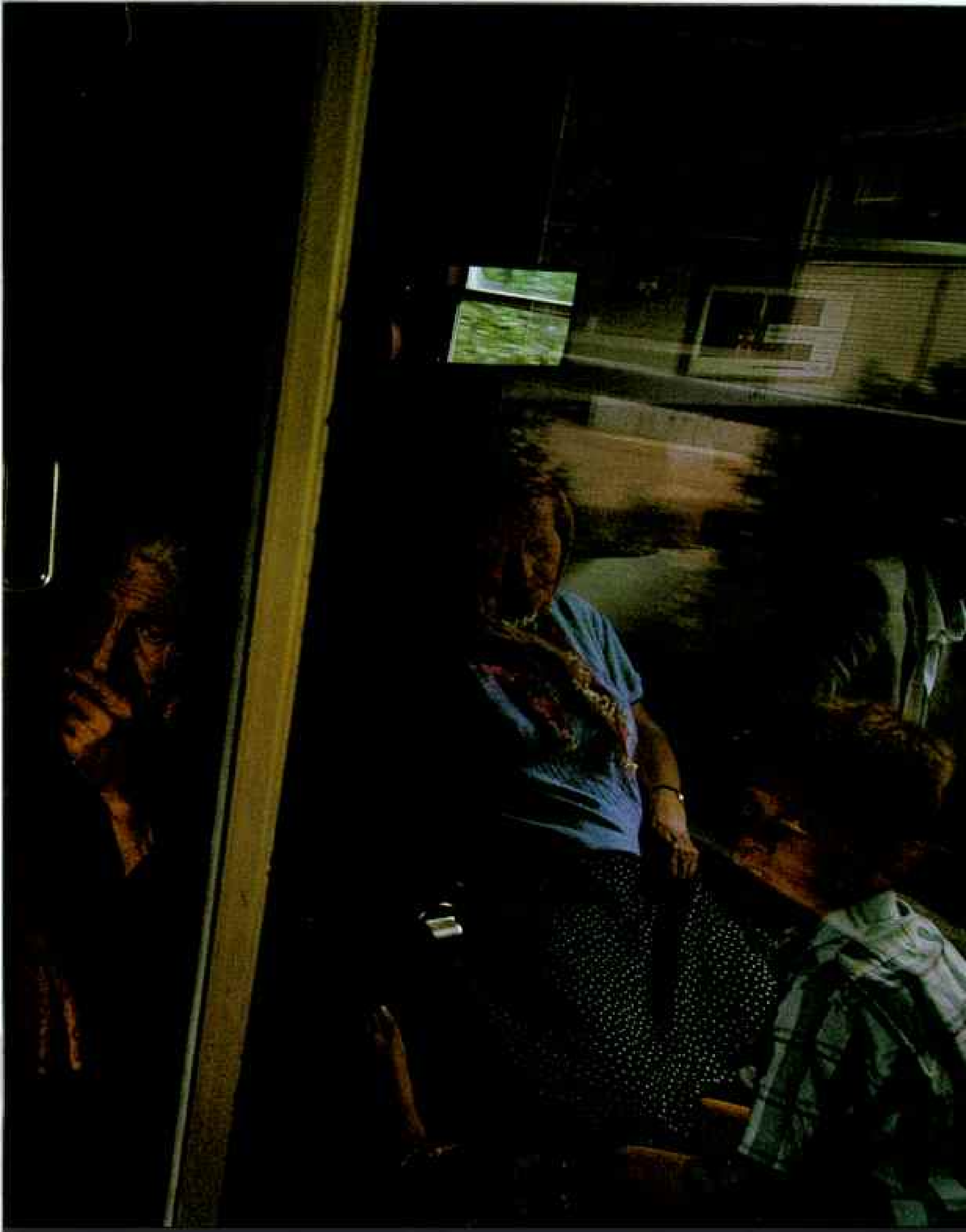
Even during their slow season from November to January, Joe and Jeff will be traveling a lot—rustling up new locations, attending beekeepers' meetings, vacationing with their families in Baja, and checking on the hives that stay in the Sierra foothills during the winter. Come February the almond trees will bloom again, beckoning the bees and their keepers.

It is time for me to hit the road too. After one final breakfast on Bee Hill, I say goodbye—and so does Joe.

"Come back and see us," he says, "... if you can find us." □

Wrenched from their homes by civil war, Bosnians on a relief train flee for their lives to

Europe Faces an



Germany. Masses of similarly desperate refugees scramble into Western Europe each year.

Immigrant Tide

From a leg-numbing kneel, a Senegalese laborer harvests tomatoes near Naples, earning about a dollar for each crate filled. One million foreigners now live and work in Italy, perhaps a third of them illegally. Neighboring countries with more effective immigration controls worry about invasions of the needy across their borders.

Restrained in a makeshift cell at the Perpignan police station, Mustafa Bouzzi appeals to the French plainclothes officer who just arrested him. Bouzzi, a Moroccan living legally in France, was caught trying to smuggle his brother into the country from Spain. "You can't refuse to help your family," he explains. French hostility toward immigrants focuses mainly on North African Muslims, whose customs clash with local ways.

By PETER ROSS RANGE
Photographs by JOANNA B. PINNEO

IMAGINE YOU'VE LEFT your home and family in a small village in Pakistan because you have a chance to make a decent living in a country wealthier than your own. A stranger takes a few thousand dollars—your entire savings—to smuggle you safely across six countries, with the promise of a new life in Austria. After riding for weeks in a succession of trucks, buses, and old cars, you're finally dropped off in a cornfield in Hungary, only a half mile from the Austrian border. Waiting until nightfall, you and a few other migrants creep through moonlit cornstalks toward a dark stand of spruce.

But then you notice tall lookout posts rising out of the night. Suddenly soldiers appear and shout "Halt!" Just a few feet beyond the old divide between Eastern and Western Europe, your trip has ended—in failure.

Scenes like this happen on the Austro-Hungarian border every day. For 44 years this was the first line of escape for East Europeans fleeing communism, and Austrians welcomed them with open arms. As the Iron Curtain fell four years ago, Hungary tore down the watchtowers and barbed wire it had built to keep its people in. Within months, though, Austrians built towers to keep newcomers out.

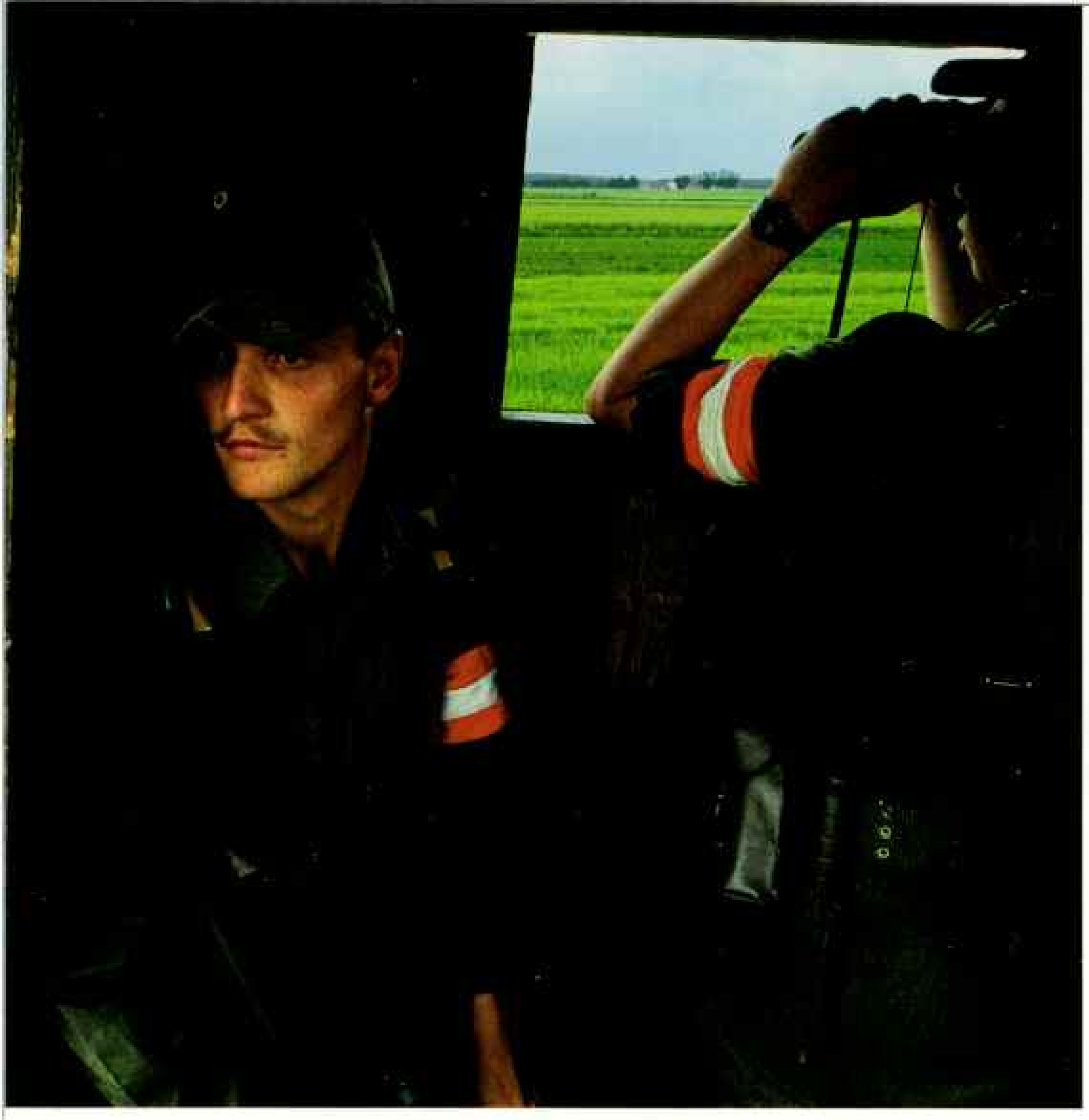
"We catch maybe half of those who try," Raimund Wrana, an Austrian lieutenant, told me as we walked along this frontier one sunny afternoon. "They're often in very bad shape. We give them some food and send them back. Yet even those poor devils often try again two or three times."

Last year I spent ten weeks visiting the immigration battlegrounds of Europe, where the new migration is creating political shock waves, awakening old ethnic and racial prejudices, and severely testing the patience and resources of Europe's most affluent nations.

Austrian soldiers guard the border with Hungary, a major gateway westward for East Europeans. Romanians intercepted crossing the border at night undergo a strip search at a processing center. Flooded with immigrants since the Iron Curtain fell in 1989, Austria recently enacted Europe's strictest asylum law.

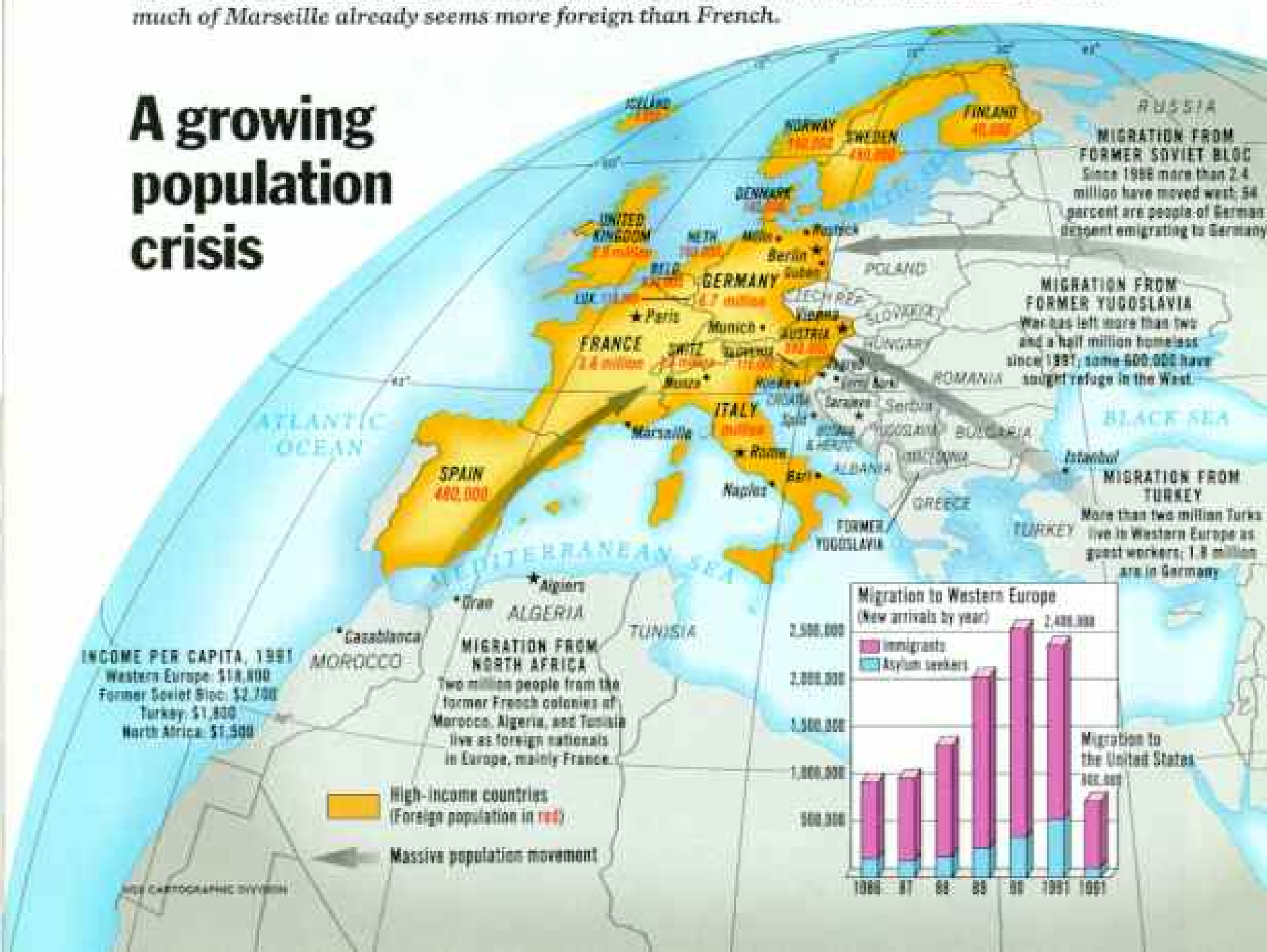
In a world of shifting demographics—where the poor, the dispossessed, and the warravaged are on the move—Western Europe has become the migrant's preferred destination. There are nearly 20 million legal immigrants there—plus an estimated two million illegal aliens, whose numbers would double by

PETER ROSS RANGE, a free-lance writer based in Washington, D. C., began his career 26 years ago in Berlin as a foreign correspondent for *Time* magazine. Since then he has reported stories from more than 30 countries for numerous publications. Photographer JOANNA B. PINNEO, also of Washington, covered Palestinians for the June 1992 issue of NATIONAL GEOGRAPHIC.



War, poverty, and oppression are driving people into Western Europe in unprecedented numbers. The region receives more than two million immigrants a year, almost triple the influx into the United States. With its high-rise ghettos of North African families (above), much of Marseille already seems more foreign than French.

A growing population crisis



the year 2000 if the present trend continued. In 1992 more than 750,000 political asylum seekers crowded into Europe, more than half of them into Germany. Almost all became economic wards of their adopted nations. And as unemployment and housing shortages worsened, the call was heard to stem the tide, to seal the walls around the periphery.

For several nights, photographer Joanna Pinneo and I stood watch with French frontier police in the Pyrenees mountains, where they tracked Moroccan illegals being smuggled through the rugged terrain along the Spanish border. On Germany's eastern frontier with Poland, we patrolled all night with immigration cops along the narrow, shallow Neisse River, where determined immigrants—mostly Romanian Gypsies—often wade across under cover of darkness. On the banks of the Sava River, near the Bosnian border with Croatia, we watched dispossessed Bosnian refugees stream northward, fleeing from war in the crumbling former Yugoslavia.

ALL ACROSS EUROPE those who have made it through the external defense lines are surprised to find no streets paved with gold. And the warm welcome they expected is often chilly instead. In a shantytown on the grimy outskirts of Rome, I watched a robed Moroccan raise his palms and intone the afternoon call to prayer—*"Allaaaaaaah akbaaaaar!"* Standing in a muddy street of the village, I saw his mosque, a metal-roofed shack with small rugs scattered on the floor, slowly fill with the Muslim faithful—Moroccans living in poverty as they seek a new life in the free-for-all of capitalism.

Farther north, on Munich's green fringe, the unexpected aroma of curry and cardamom wafted from a refugee camp set in a damp Bavarian meadow. One hundred sixty Pakistanis, Bangladeshis, Nigerians, and Togolese were squeezed into 42 ship containers—oblong boxes that were weathertight and secure but clinical and bleak. These foreigners were asylum seekers waiting for their cases to be decided. Although they received modest allowances, they complained about government agencies. "We are not animals, but they treat us like animals," said Kuule Kayole, an angry and loud young Nigerian, when I visited his crowded container, where we sat at a simple table beside two double-deck bunks.

Some Europeans feel that their very identity is at stake. Unlike the United States, most European countries do not think of themselves as multicultural, multiethnic, multireligious societies. And as I roamed from Berlin to Zagreb, from Rome to Paris, I realized many Europeans felt overwhelmed by the influx of newcomers, who not only are poor and lacking marketable skills but also have a different culture, a different language, a different religion, and sometimes are a different race.

Perhaps half the immigrants are Muslims in search of work and peace. The majority of these are North Africans; most of the others are Turks, Pakistanis, Egyptians, Somalis, and Bangladeshis.

In France, which is historically Roman Catholic, Islam has replaced Protestantism as the second largest religion. Violence in the Paris "suburbs"—as North African immigrant quarters are euphemistically called—has triggered xenophobic outbursts that boost the political fortunes of Jean-Marie Le Pen, an extremist who heads a right-wing party called the National Front. In Belgium, Austria, and Italy, anti-immigrant political parties have swept into legislatures in Antwerp, Vienna, and Monza. In Spain, where the bodies of Moroccan boat people often washed up on the southern beaches last summer, nationalist gangs have killed immigrants and called for the expulsion of Arabs and blacks. Britain, despite its long experience in absorbing immigrants from its former colonies, has seen an increase in xenophobic violence, as has traditionally tolerant Sweden.

But antiforeign sentiment has been ugliest in Germany, which received by far the largest number of asylum seekers last year—438,000. With 80 million people living in a country smaller than Montana, blame for social ills growing out of German unification is often placed on immigrants or on the nearest foreign-looking face. Right-wingers have mounted more than 3,500 attacks on foreigners in the past two years, killing eight and injuring scores.

"I used to think Germany was the most democratic land in the world," said Enver Shala, a refugee from the former Republic of Yugoslavia whom I met in a crowded hostel in an old school in Munich. "Now I get nervous here. They don't care for us. I can see that."

Yet Europe's immigration story is not all negative. More than 100,000 French citizens have taken part in demonstrations organized

Despair overcomes Ramadan Bahran, a Kurd, as he learns that his final appeal for asylum in France has been turned down. A bus driver in Turkey, Bahran was beaten by soldiers there who accused him of transporting terrorists. He fled with his wife and five children and believes he will be killed if he returns.

by SOS Racisme, the country's largest antidiscrimination group. Most Germans condemn the violence of young neo-Nazis. Since last November, when three longtime Turkish residents of Mölln, Germany, died in the firebombing of their home, more than three million German citizens have demonstrated against attacks on foreigners and German leaders' inability to stop them. The government cracked down on neo-Nazi groups but at the same time agreed to restrict the right to asylum. This winter, after a year of bitter debate, a German Parliament committee drafted constitutional changes that would drastically limit the eligibility of asylum seekers.

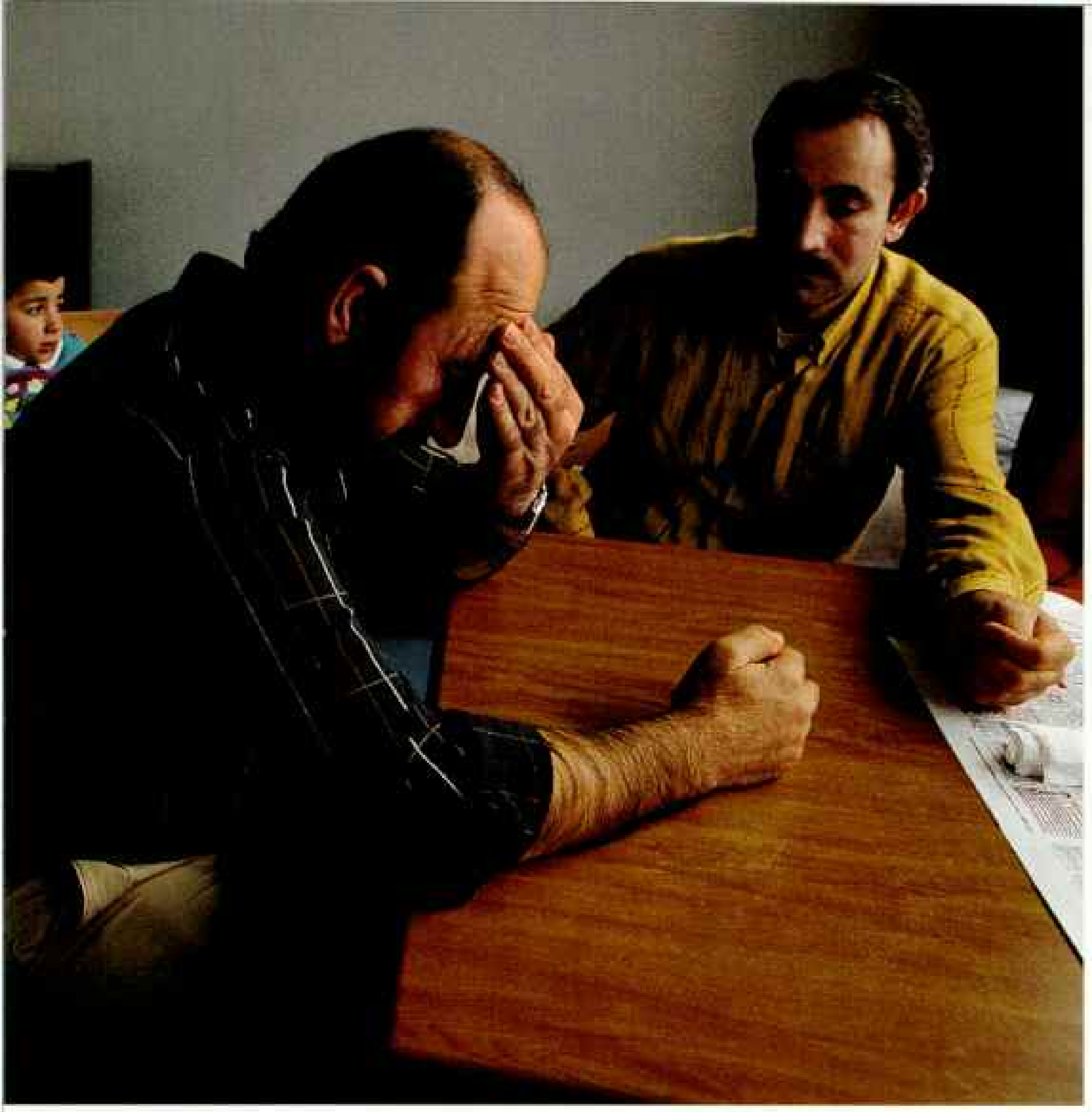
There are success stories as well, tales of immigrants assimilating the old-fashioned way—through economic achievement. I met Turks in Berlin and Paris who had become citizens or owned their own businesses; a TV anchorwoman in Rome who had worked as a maid when she first arrived from Cape Verde. Throughout Europe I met immigrants struggling to be one of those exceptional successes.

"I HAVE EXPERIENCED racism everywhere," says Touty Coundoul, a former trinket peddler who moved beyond his humble beginnings to a respected place in Italian society. Born into a poor artisan family in Senegal, Coundoul is now an official in charge of immigration questions for the Refounded Communist Party. After two years of selling trinkets, the wiry, ebony-skinned Coundoul learned Italian and volunteered to work for labor and party causes. The party rewarded him with a paid position. Today he lives with an Italian woman and travels the country making speeches and writing articles—in Italian.

I found Coundoul one spring afternoon in his office in a building near the Tiber River. As dusk fell and the sounds of motor scooters and café life echoed in the street below, he told me about his first years as an immigrant. "I thought I could find work and a more tranquil future in Italy," he said. "But in the beginning I sold things on the street. It is inhuman work. Every day I had to lose my dignity just to earn very little. I couldn't continue. That's when I became more active politically."

Few immigrants have the luck or resourcefulness of Coundoul. In 1991 Italian authorities allowed several ships overflowing with 25,000 Albanians into the port of Bari. But when another wave of refugees showed up several months later, the government reversed its policy, detained the newest immigrants in a soccer stadium, and shipped them back home.

"We're going to send back every Albanian who enters the country illegally," Margherita Boniver, then the Italian immigration minister, told me in her office in Rome. "We know we're sending them back to hell, but our responsibility is to help Albania attain some normalcy. We invaded Albania 54 years



ago. Now we should invade economically."

Because Italy has historically been a country of emigration, sending workers out from its poor agricultural regions in the south to seek better lives beyond, it was the least prepared of Western Europe's major nations for the onslaught of new immigrants.

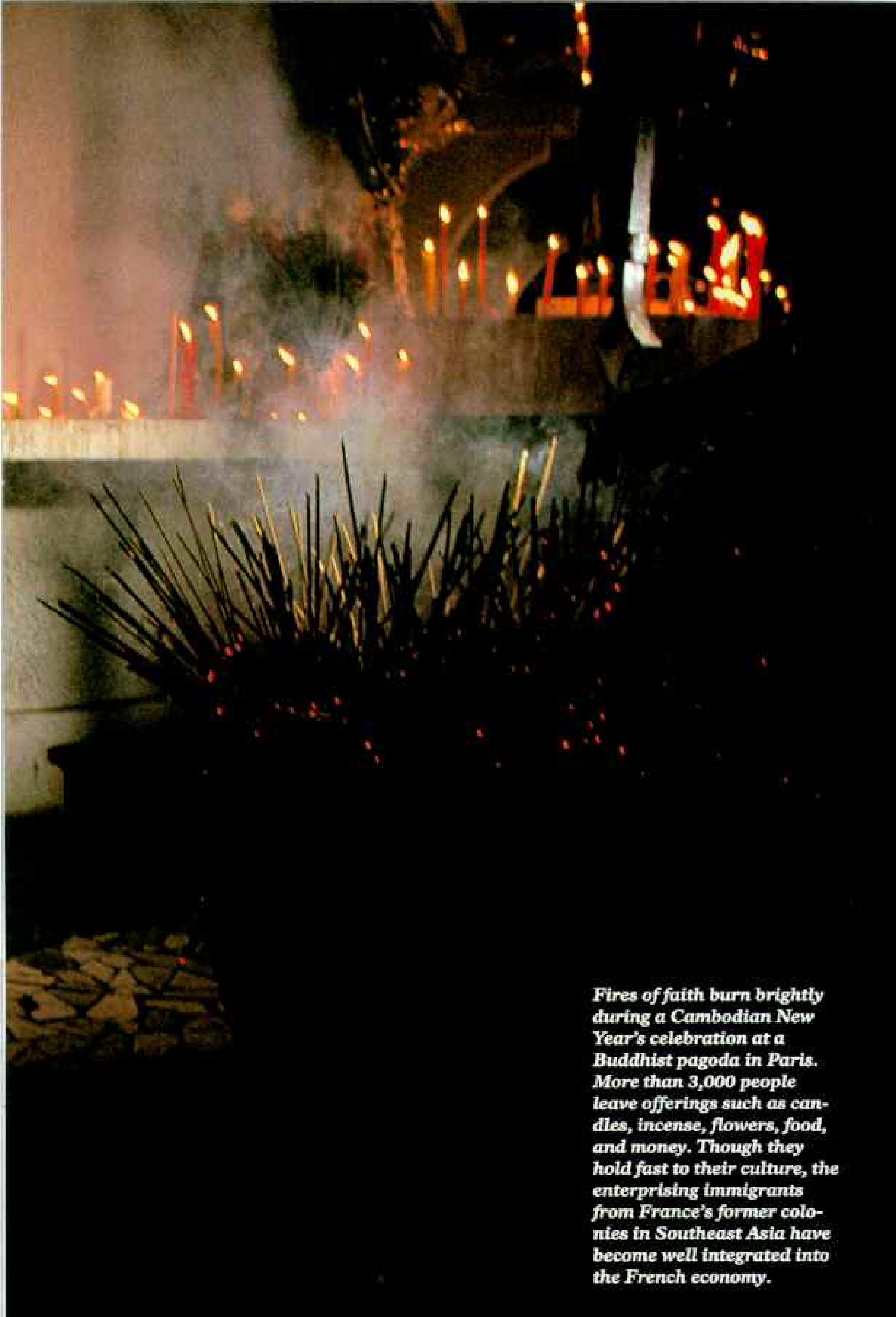
But in the 1960s and again in the 1980s Italy experienced an economic boom. "Now we are rich, and the people come to us," says Ambassador Pietro Calamia of Italy's foreign ministry.

The newcomers, an estimated one million out of a population of 57 million, have nearly all entered Italy in the past ten years. But because of a recent rise in unemployment, their presence has triggered resentment and a surge of self-interest.

Such sentiments became particularly evident as Moroccans and black Africans arrived in large numbers at a time when crime rates also began to rise. Many Italians were quick to blame immigrants when they saw them sleeping in train stations or dealing drugs.

"Ninety-five percent of the immigrants work hard," says Guido Bolaffi, an immigration official, "but the other 5 percent are involved in crime, and they're very visible."

The citizens of Rome wanted that 5 percent removed from sight. But when police cleared the city's main train station of homeless migrants three years ago, they succeeded only in driving hundreds of them into a squatters' camp in an abandoned pasta factory. Within months it became a small city of 2,000. Moroccans, Bangladeshis, Sri Lankans, and



Fires of faith burn brightly during a Cambodian New Year's celebration at a Buddhist pagoda in Paris. More than 3,000 people leave offerings such as candles, incense, flowers, food, and money. Though they hold fast to their culture, the enterprising immigrants from France's former colonies in Southeast Asia have become well integrated into the French economy.

others camped out in the dilapidated quarters.

After nearly a year of bad publicity, Rome police decided to clear the plant. But the government made poor arrangements for alternative housing before it routed the immigrants a second time. The squatters set fire to the factory as they left, creating the international sensation the city was trying to avoid.

Many Moroccans then fled to a shantytown on the edge of Rome. There I met Hamid Saydawi, the man who issued the call to prayer on the evening I visited.

"At home we live better than this," Saydawi told me as we walked through the camp. The streets were potholed and unlit, the homes slapped together from scrap lumber and abandoned doors, the sewers nonexistent, and the water supply a single faucet more than 500 yards away. Laughing children rode castoff bikes with bent rims through the mud. Far from the familiar wash of the Mediterranean, the Moroccans listened to the relentless roar of Rome's evening rush hour.

"We live here because the rents are too high elsewhere," said Saydawi. "And we must save to send money home."

Like Saydawi, many foreigners live in fear of a sudden police check and summary deportation. "The police say, 'If you talk to journalists, we'll send you home,'" one African woman told me furtively. She had worked in Rome for ten years as a professional nurse but maintained a low profile and implored me not to use her name.

Other immigrants have overcome their fears, and a few have risen to prominent positions in Italian society. Maria de Lourdes Jesus has become one of the most visible foreigners as the anchor of a weekly television show on immigration called *Nonsolonero—Not Only Black*. Maria left her home in the Cape Verde Islands off the coast of West Africa when she was a teenager. For almost a decade she worked for Italian families, cleaning their homes and minding their children but always nurturing the dream of someday returning home to start a family of her own.

"It wasn't exactly slavery, but I was very frustrated," Maria said as she showed me around a studio of the Italian television network RAI Due. "There was no chance to improve my life. After six years I saw that even people who stayed ten years couldn't improve their situation. Nobody realized the dream. Nobody returned home. So I tried to better myself. I went to school."

She also improved her Italian and met Massimo Ghirelli, the producer of *Nonsolonero*. He told me he was impressed by her straightforward way of speaking and her dignified manner. "She's real, and she knows the problems," he said. "She does not reflect the image of the poor immigrant in the street."

Today Maria's show has almost eight million viewers.

CELEBRATED since the French Revolution as the land of human rights and as a refuge for any race, religion, or political persuasion, France has been absorbing waves of immigrants since the 18th century. Many came from France's far-flung colonial empire.

Yet today, with three million of its citizens unemployed and with unrest brewing in immigrant ghettos, French hostility toward foreigners is on the rise. The irony is that one out of four residents of France claims at least one grandparent born abroad.

Many new migrants are non-European, non-Catholic, and nonwhite. France has absorbed several million Arabs from its former North African colonies, and the country is now home to some three million Muslims in a population of 57 million. With a culture far different from the Europeans'—and with less willingness to forsake their customs to assimilate into Western society—the North Africans are more visible and thus more culturally threatening than past immigrants.

In the Goutte d'Or neighborhood near the Place Barbès in Paris, I wandered through narrow streets of Islamic butcheries, spice shops, and tiny cafés that seemed lifted directly from the crowded alleyways of Casablanca or Algiers. On Rue Polonceau, Arab men sipped tiny cups of coffee at a run-down corner café. Along Rue des Poissonniers, pieces of beef and mutton hung in the windows of butcher shops, each carcass stamped with the word *halal* to show that the animals had been slaughtered according to Islamic law.

An Algerian butcher named Attou Mohammad told me how he had left his wife and five children behind in Oran to seek his fortune in France. He found a job in this Arab butcher's shop. Looking over his shoulder to check if his boss was watching, he said, "It's hard here. We live two guys to a hotel room. I'd like to go back, but the economy is so bad in Algeria."

A Fiat becomes a fast-food stand as Emelina Samaniego serves specialties from home to fellow Filipinos gathered outside a Rome church on their day off. "My friends told me, 'You cook well. Cook, and we will buy from you,' " she says. Now serving la dolce vita poolside, Pia Padilla followed her parents from Manila to Rome in 1988. Two-thirds of Italy's 44,000 Filipinos work as domestics in wealthy urban areas.

A trip to the backyard barbershop provides an afternoon's diversion for immigrant West African harvesters in southern Italy. Several hundred have taken over this abandoned farm near the tomato fields where they work. Like many of the country's immigrants, they welcome work that Italians no longer want.

Suddenly Attou's boss walked over, ordered him back to work, and began shouting at me: "I hate Americans. Americans bombed Iraq. Americans killed children. Leave!"

Closing my notebook, I walked out into the street, reminded of my own foreignness.

Forty years ago the French welcomed Arabs like Attou. During the Glorious Thirty, from 1945 to 1974, France's booming economy demanded imported labor. Algerians, Moroccans, Tunisians, and others worked in the construction and automobile industries, the coal mines, and the service trades. After establishing themselves, many migrant laborers sent for their families. Mediterranean ports like Marseille and northern industrial cities like Lille acquired large North African populations, and whole neighborhoods became Arab or African quarters.

Then France felt the shock of the Arab oil embargo in 1973. The economy slowed, and by 1974 the policy of recruiting foreign labor ended. But millions of immigrants were already in France, and they continued to send for their relatives. By the time the recession of the 1990s hit, everyone was feeling the crunch, and many foreigners who had spent most of their lives in France were beginning to feel unwelcome.

ONE SUNDAY AFTERNOON I came across a group of immigrants who believed they deserved to be treated as equals in France. They were a ragtag encampment of some 700 Malians in front of the Château de Vincennes on the eastern edge of Paris. For three weeks African men had lived with their colorfully clad wives and children under blue tarps and green tents. Twenty-two families lived in one large makeshift tent made of sheets of plastic hung over a series of poles. The night before, the women and children had slept in shifts while the men stood outside in the rain.

But these Malians were no newcomers fresh off the boat. Many of them had been in France for more than 20 years. Yet they still were unable to find adequate housing and so staged the camp-in to put pressure on the city government. "We have been asking for public housing since 1983," said Diakite Alihamoudou as we walked through the camp, where toddlers played under lines hung with bright laundry.

In the center of the plaza Diakite showed me an old memorial to the fallen soldiers of the two World Wars. Many of the war dead were recruits from France's colonies. He pointed to the monument and said, "Some of our grandparents are honored here." Diakite, who came to France in 1967, considers himself a Frenchman, but his years of work have yielded few rewards for his family of seven.

"The housing office always says, 'You still have to wait.' We've been living in hotels or one-room rentals," he said. "We got forced

out again recently. So we decided, this is too much. Now we are protesting."

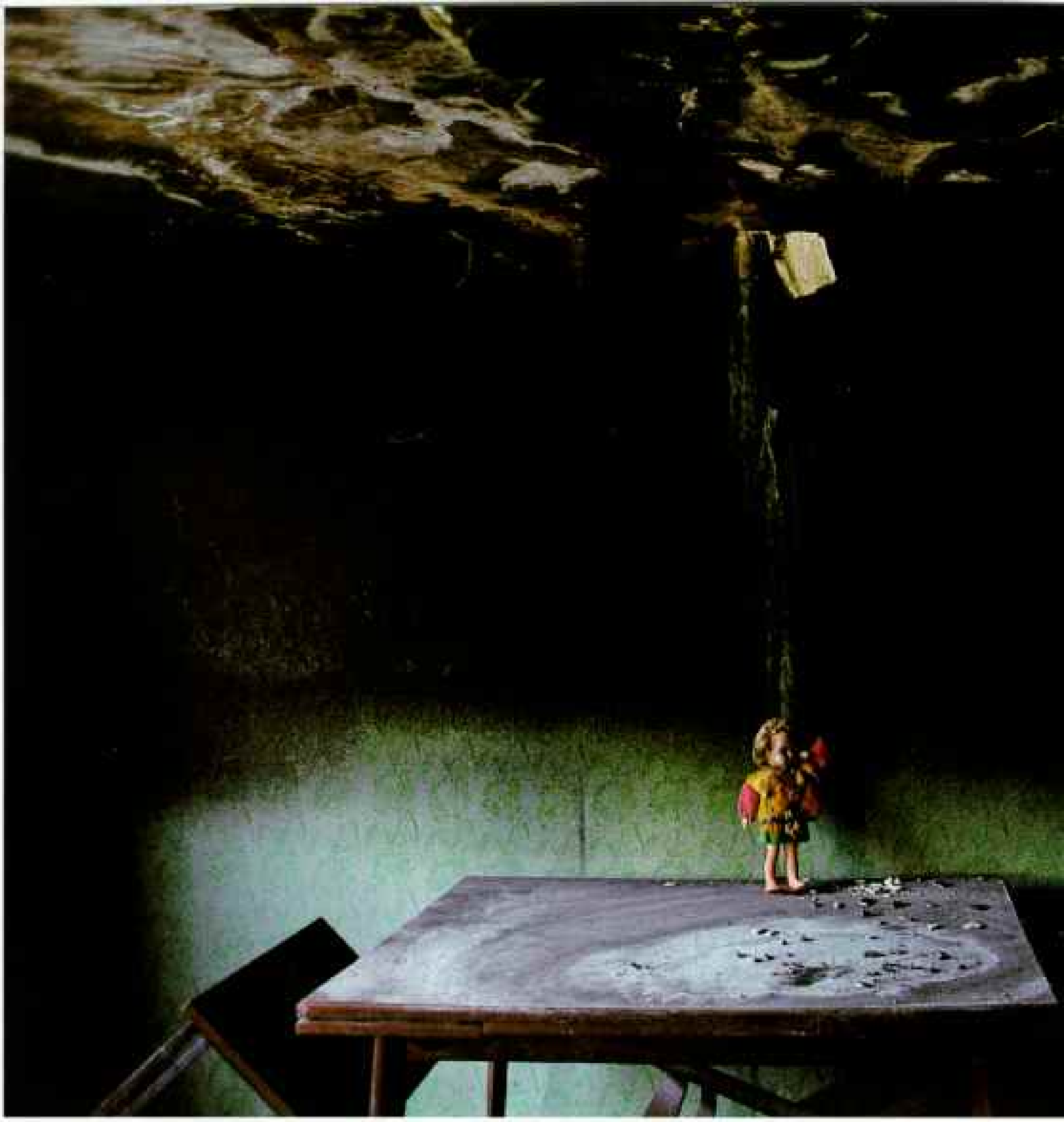
Diakite, who works as a dishwasher in a restaurant, summed up the underlying sentiment of many immigrants who were once enthusiastically recruited during France's go-go years. "It was the French who came down and asked us to work in France," he said. "But now that they have their machines and technology, they have no more need for us. But we've spent all of our adult lives here. We came here to be French. Where can we go?"

While the Malians hope for integration into French society, other immigrants actually find it. In Paris's working-class districts immigrants in scores of tiny Turkish-owned shops sew hundreds of thousands of suits and dresses for the French fashion industry every year.

Alexis Cordesse, a young photographer, took me through one neighborhood, on side streets near the Père Lachaise Cemetery. We turned into Impasse Daunay, a dead-end lane that looked like the Paris of Hemingway's time: narrow, neighborly, with buildings long overdue for paint and plasterwork. Parisians came and went from their bakeries and corner bars, delivery men passed by in tiny trucks, old women gossiped on the curb. I looked inside a one-room atelier to see Garip Yakan, a 29-year-old tailor, working with one employee to turn out the day's order of new clothes. The small shop was jammed with dresses hanging overhead and bolts of cloth stacked all around.

Garip, a Catholic Turk, is a member of the Chaldean ethnic group. He looked up from his ironing board long enough to tell me

Overwhelmed by war, Amela Lojic and her infant son escaped a besieged suburb of Sarajevo by bus caravan along with 1,400 other Bosnians. Hijacked and held hostage for two days by Serbian guerrillas along the way, the refugees finally reached Split, in Croatia, but had no idea where they would end up. Fighting in the former Yugoslav republics has left more than two and a half million people homeless.



the story of his family's migration to France.

"As Catholics, we had problems in a Muslim country. It was hard to get a job. Sometimes the Muslims even killed Christians," he said. "We lived in Kurdish territory, near the Iraqi border. My father was killed when I was five. By Kurds, by Turks—we don't know. We found his body one week later buried in a yard. It was hot. He was barely covered. Because of the smell, we found him.

"We moved to Istanbul and lived there several years. Then eight years ago we came to France. We got asylum for ten years. Now I've applied for French citizenship.

"At first we had a problem getting work because we didn't speak French well. But then we found work with other Turks. A year ago we opened this atelier. This is a good job because the whole thing belongs to us."

Garip succeeded the way immigrants have for generations: He went to relatives for help, found a market that needed his labor, and is raising his children to be full citizens. Garip and his wife gave their children French names: Natalie and Simon. Perhaps Garip's good fortune came about because he moved his heart and soul to France. "We work, we're happy," he said. "We're here to stay."

NOT ALL of Europe's strangers leave their homelands willingly. Thousands are fleeing to Western Europe to escape war and political persecution. Today most of those come from the former Yugoslavia, forced out of cities and villages ravaged by war and "ethnic cleansing,"

primarily by Serb forces seeking to expel Muslims from Bosnia. More than two and a half million civilians have fled their homes in that broken nation with tales of massacres, rape, torture, evictions, and imprisonment. Germany has accepted 235,000 of them; Switzerland, 80,000. The refugees hope to return home, but may not for years, perhaps decades.

"Two grenades came into my house," an old Bosnian man told me. He slashed his hand across his belly. "My wife was cut open in the stomach and killed."

The man was one of 2,300 Bosnian refugees who sat for three days in a steamy 18-car train near the Croatian capital of Zagreb last summer. They had wandered for weeks from place to place, accepted by no one. Croatia, already burdened with 600,000 refugees, asked the West to take them. And Slovenia, the republic to the north, would not allow the train through without a guarantee that they were spoken for.

The Bosnians were guarded by Croatian soldiers, who sealed the train at night. One evening I watched exhausted mothers and children lie down side by side in the narrow aisles of the train. It was only after European television broadcast pictures of the suffering refugees that Western nations took them in.

Most refugees go to Germany because of the

Token of happier days, a doll survives the destruction of a Serbian family's house in Gornji Borki, Croatia, where fighting has turned neighbor against neighbor. In another ethnically mixed community nearby, ruined Serbian houses flank a Croatian home left unscathed.

A lifetime of sorrow floods the face of Dragica Kostadinović, who fled to Serbia when her Bosnian village was shelled. During World War II, when she was a teenager, her whole family died in a Croatian work camp. Today her son and daughter-in-law are with her, but she has had no news of her three daughters.

country's liberal asylum policy. "Thank God for Germany," a Croatian woman told me in Berlin. She had been forced to flee her home in Prijedor, Bosnia. Her husband stayed behind to fight, and she had not heard from him in three months. "I cried for ten days," she said. "Now I have no more tears."

GERMANY, the salvation for so many refugees, has been the setting for some of the worst violence against them. Right-wing youths attacked foreigners across the nation almost every day last year. Some of the worst incidents occurred in eastern cities demoralized by high unemployment. Ordinary citizens of these towns often looked the other way or even cheered the attackers.

For several fiery August nights in Rostock, an old port on the Baltic Sea, angry young men filled the streets and shouted, "Foreigners out! Foreigners out!" They gestured obscenely, lifted their arms in a fascist salute, and threw stones and Molotov cocktails until flames covered the reception center for refugees. Vietnamese workers and Romanian Gypsies ran through the night and boarded buses, which hustled them out of town. The rowdies of Rostock had won.

This scene recalled prewar images of Nazi pogroms, including the infamous *Kristallnacht*—the Night of Broken Glass—in November 1938, when Hitler's thugs destroyed Jewish synagogues and businesses.

The dark nights in Rostock and other towns were the most ominous signs yet of growing resentment against the waves of poor foreigners arriving from the east and south.

"It's because Germans have a weak sense of identity that it is difficult for them to accept other nationalities," contends Barbara John, Berlin's commissioner for foreigners. But the reality of contemporary Germany is that German women are bearing fewer children and the country needs these outsiders. Without immigrants, Germany couldn't work.

"Construction would come to a stop," says Cornelia Schmalz-Jacobsen, the national commissioner for foreigners' affairs. "The automobile industry and restaurants couldn't stay open; shipbuilding, mining, textiles, the service trades—all would be impossible without foreign workers."

Although foreigners began arriving 30 years ago to partake of West Germany's economic miracle, it was the recent arrival of hundreds of thousands of refugees seeking asylum that inflamed the country's immigration debate. Until this year, Germany's constitution guaranteed asylum for political refugees, yet only 5 percent of those applying were found to be truly fleeing persecution. Most of the others were judged economic migrants seeking a better life in the West. This abuse of the law is partly what has caused German resentment.

Under the old law, asylum seekers received food and housing in Germany while they waited for a decision on their applications—sometimes as long as three years. Many Germans perceived this as unjustifiably generous, even though the refugees' living conditions were barely adequate and some migrants had to take menial jobs to augment their meager government allowance. Under the constitutional changes being debated this spring, far fewer foreigners would be able to apply for asylum and receive the benefits.

In a hostel in Berlin, I found two young Ethiopians with too much time and too little to do while waiting for their applications to be resolved. Outside the small prefab bungalow they shared with other immigrants, they told me their story. "If they turn us down here, we'll just go to the next country," said Amanuel Hailu, 23, who had been waiting three years.

Like generations of immigrants before them, Hailu and his friend, Kalegzabher Mengstalem, accepted scholarships in Europe so they could return home to Ethiopia with useful careers. Hailu had studied medicine for a year in Halle, East Germany. He paid a policeman a hundred-dollar bribe for a visa to West Germany before unification, because he no longer felt safe after several Africans were attacked by hoodlums. Mengstalem had studied law for three years in Czechoslovakia. He lost his communist-sponsored scholarship after the revolution in 1989.

But German law forbids asylum seekers to take advanced or vocational courses or to

Goalposts collect laundry in a sports center housing Bosnian refugees in Split. Farther up the Croatian coast, in Rijeka, a Bosnian family enjoys a shower, most likely their first in days. Refugees here sweated out the summer in a tent camp set up by the Red Cross.

apply for most jobs, so many work illegally.

"I worked for three months in a pizza restaurant," said Hailu. "I quit because too many police were coming. But sitting around here is bad for our morale."

"Sometimes sitting in my room, I have nothing to do, nothing to eat," Mengstalem added. "I think, 'Why not just go take something? Why not?' So I go steal something. Usually bread and beer. Not chocolate or cake. Just alcohol or food. Why not? I am hungry. Must I die?

"When we study or have work, we are proud," he said. "We don't steal. We live like normal people."

The Ethiopians were hardly near death, but I could not help but wonder about their plight. According to the rules, they should return to Ethiopia, apply for student visas and fellowships, and then return. But they and I knew why they stayed, and I could not blame them for seeking what poor immigrants have sought for centuries—a better life.

And yet there are some people who might not care much whether Mengstalem and Hailu live or die. Across Berlin in a cinderblock building next to a sprawling public-housing project I found a youth club called Roots,

where skinheads gather and complain about people like Hailu and Mengstalem. Organized by Michael Wieczorek, a social worker, the club is designed to bring peace and purpose to the lives of rootless youths from East Berlin.

Over beer and booming music I talked for several hours one night with Wieczorek and the young Germans. Several platinum blondes and a dozen or so young men wearing tattered jeans, heavy boots, and short hair milled about. The skinheads, who call themselves *Glatzen*, or "baldies," were a rowdy bunch. They wisecracked and showed off in the indecipherable code of youth, made all the more impenetrable by their thick Berlin dialect.

The skinheads described themselves as right-wingers if not neo-Nazis; they reject foreigners and left-wingers with equal passion. One 18-year-old had been drinking heavily, splashing liquor into his glass between swigs of beer from a bottle. "We'll beat up those vermin," he growled once at the mere mention of a left-wing youth movement.

As the evening wore on, a heavyset youth with a fuzz of hair on his shaved pate told me he spent eight months in jail for the knife-point robbery of an African on a train—even though he claimed he was rescuing a young German woman from being molested. He said he shouted, "Don't you ever touch a German woman again!"

"Germany should stay German," he added. "Why don't the Turks go home?"

Then there was a bright man of 27 who calls himself Franki and works as a cook in the restaurant of a Berlin department store. He claimed not to want "anything to do with Adolf Hitler"—it seemed that he wanted an

authoritarian government without the genocide. Still, he sometimes wears a Hitler T-shirt to shock his elders, and he admits that except for true political refugees, he would just as soon see no foreigners in Germany. In quick anecdotes Franki described how life under communism in East Germany produced a sense of hostility and helplessness among young people:

"First, the East German government brought all the Vietnamese and Mozambicans here to work. They put them up right away in decent apartments. But I had to wait eight years to get an apartment.

"And there never were enough discos. We usually had to stand outside at least two hours to get in. Yet the foreigners could pay the guy at the door five West German marks and get in right away. Also, the American soldiers always used to come over from West Berlin and buy up all the good things over here. No normal citizen of East Germany could afford to buy a camera, but soldiers bought them all."

Like young people anywhere, Franki expressed his resentment by lashing out at authority. But in Germany this sort of teenage rebellion has often exploded into horrible violence. In Eberswalde, a small industrial town in eastern Germany wracked by high unemployment, I sat in on the trial of five right-wing Germans accused of killing an Angolan guest worker simply because he was a black African. The men, 18 to 21 years old, beat Amadeu Antonio Kiowa to death as he walked home from a pub at midnight. "I was angry at blacks and foreigners," said one unrepentant young

The sensual abandon of a belly dancer brings smiles to Germans as they wind up classes in Turkish culture with dinner at a Turkish restaurant. Begun 14 years ago to train Berlin police officers, the program is increasingly popular with professionals who have regular contact with the city's Turkish residents.

defendant, Sven Böcker, when the presiding judge asked his reason for such violence.

"So a Negro's life means nothing to you?" the judge asked of another young man who watched the attack and did nothing to stop it. "No," he replied.

Months later the judge sentenced several of the men who attacked Amadeu to a maximum of four years in jail.

MANY THOUSANDS of Germans volunteer to fight violence and help immigrants adjust to their new home, but they don't receive the kind of publicity the skinheads do. After seeing the intolerance of the Berlin youths, I was encouraged and relieved to meet Gerhard Lüder.

Lüder is a Berlin police captain who has worked with the Turks, the city's largest minority group, for the past 21 years. A native Berliner, he investigates crimes committed by foreigners and is responsible for community relations between foreigners and Germans.

"We saw right away that we couldn't accomplish anything if we didn't win people's trust," he told me. "To get that, you have to learn their language, study their customs, understand their religion." Lüder, a strapping, gray-haired man with a hearty manner, learned Turkish and now takes all his vacations in Turkey.

"Turks are just like Germans when you come down to it," he said as we walked one morning from police headquarters to Berlin's main Turkish mosque, near Tempelhof Airport. "They have wonderful people, they have criminals. What we have to do is watch out for the cultural frictions and try to work things out before they explode."

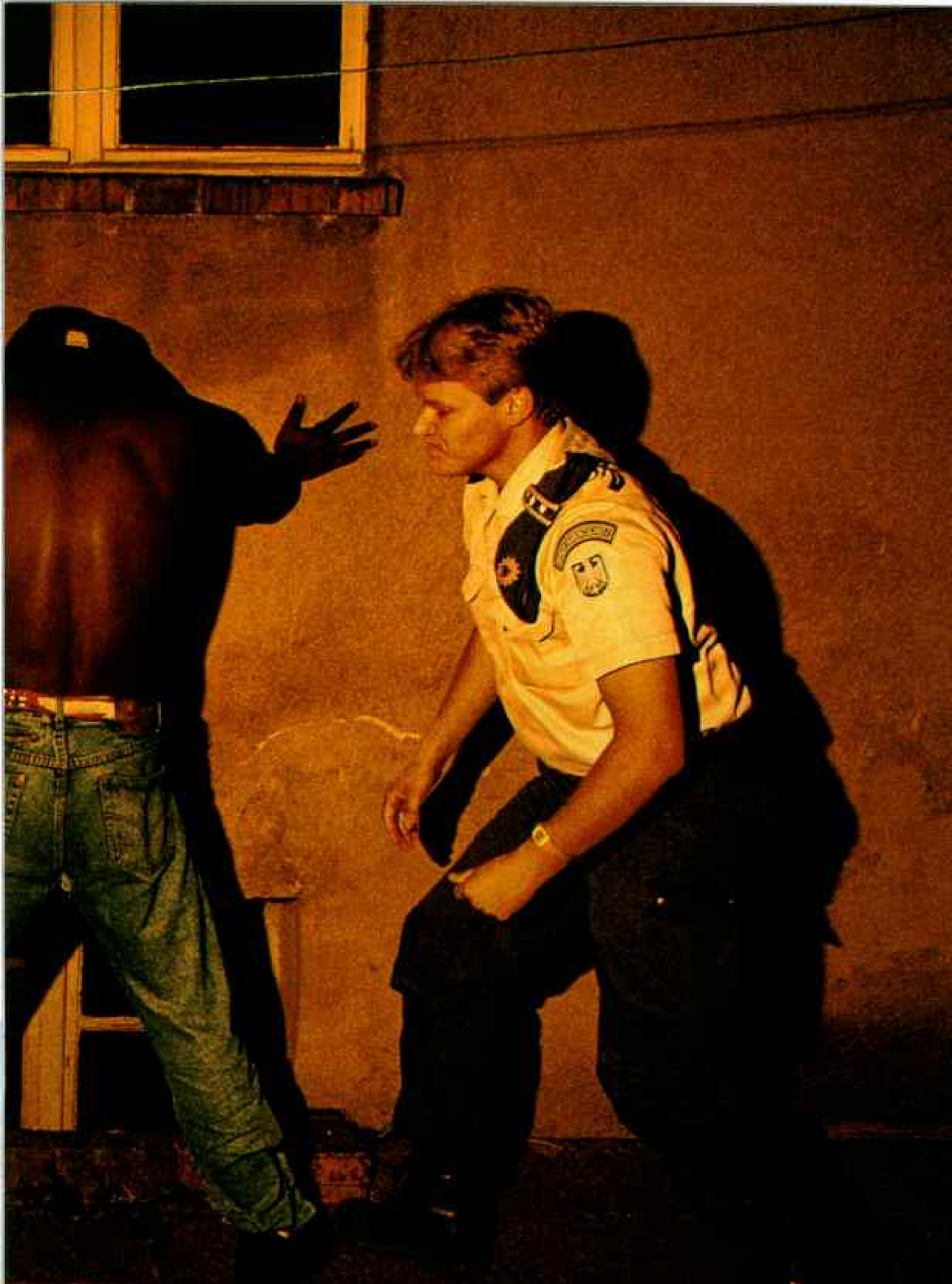
Lüder tries to maintain peace not only between Germans and Turks but also among Turks themselves. Once a dispute arose over a Turkish woman who had been promised in marriage to a family in Turkey. But the young woman had run off with a Turk in Berlin. A feud broke out between the lovers' families. There were death threats.

"The issue was the honor of the girl's family," said Lüder. "It was a dangerous situation that would not have happened in a Western society. Yet here it was, right in Berlin. We worked straight through the night, negotiating back and forth to keep them from killing each other. In the end the couple married, and the families became friends."

In a grove of trees beside a busy street, we drank tea and chatted with Turkish men who had gathered at tables outside the mosque. It was a scene straight out of rural Anatolia—except for the planes overhead and the tall German police captain conversing volubly with his friends in Turkish.

Lüder, I decided, is in many ways the model European of the future. He is committed to

Forced to the wall, a Nigerian who slipped into Germany from Poland almost escaped arrest in a chase through the town of Guben. Along a 30-mile stretch of border, police apprehend some 20 illegals a night, mostly Romanians and Bulgarians. Germany took in an estimated one million immigrants last year, more than any other country in Europe.



cross-cultural rapport but knows it takes work. He spends many weekends running sensitivity training sessions for Germans, often taking them to a poor Turkish neighborhood in the district of Kreuzberg, then to dinner at an outdoor Turkish restaurant.

Late one Saturday afternoon I joined Lüder's group in the restaurant. I sat next to Barbara Kramer, a Berliner who spoke with candor about the attitudes she developed while growing up in the closed society of communist East Germany. "I have a prejudice against blacks, and I have problems with other cultures," she told me. "I can't help it. I don't know where it comes from. But coming here helped me release some of my anxieties. I've made a first small step toward getting rid of my negative feelings."

The success of the German industrial machine has made it a magnet for the downtrodden of the earth: the poor Nigerian, the unlettered Gypsy, the wandering Bosnian. Like the United States, Germany now faces the fundamental questions: What is the obligation of the rich countries to the poor ones? Immigration has enriched nations for generations—should it be stopped now?

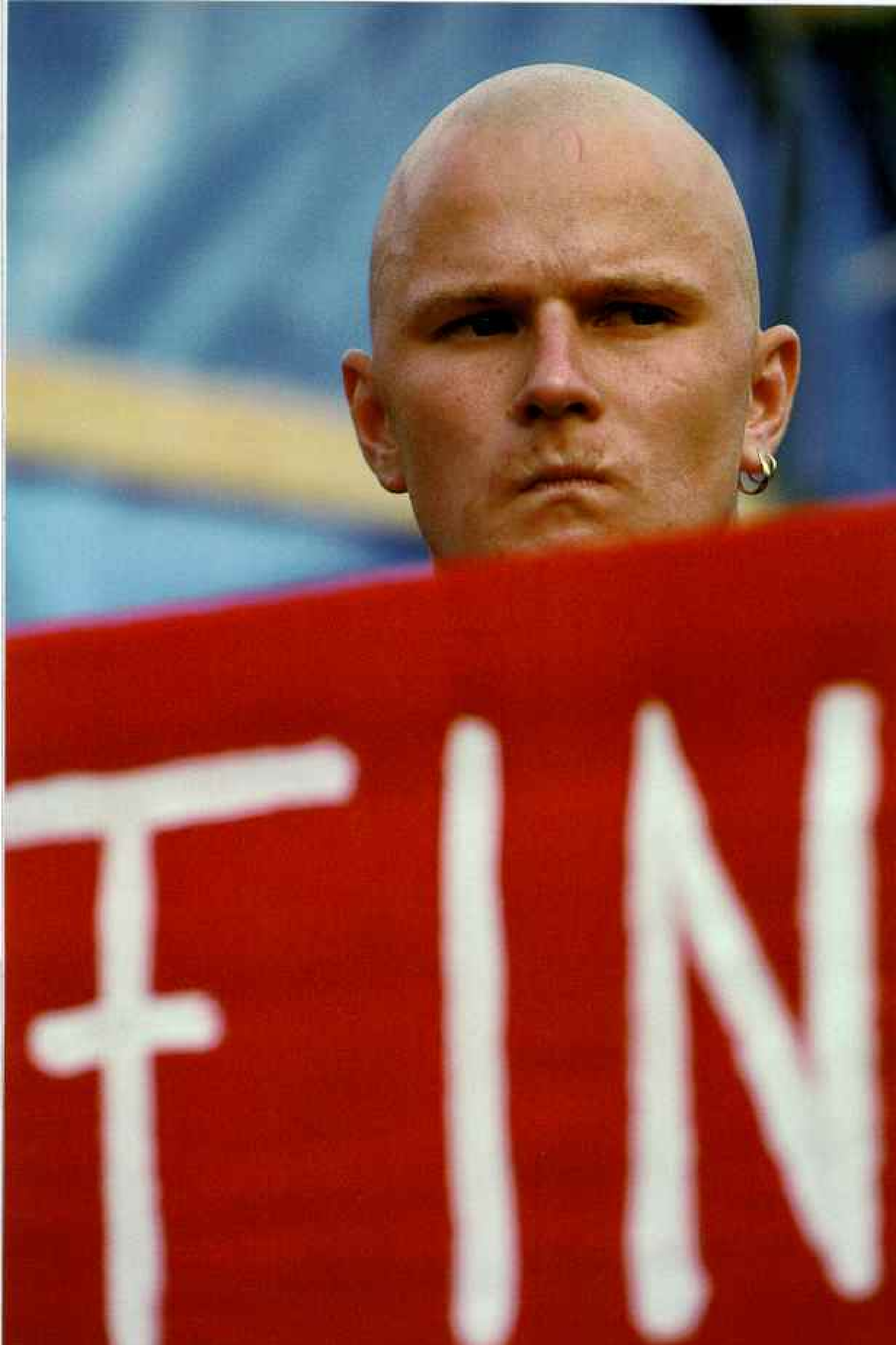
"Half the Americans are Germans who went to America to better themselves," said one Iranian-German in Berlin with some exaggeration. "Why shouldn't others be allowed to do it? Of the five billion people on earth, a small percentage live in good circumstances. The world can't continue that way."

Perhaps not. The wealthy countries may either have to accept refugees or offer them the means to stay where they are. As Kofi Yamgnane, the French state secretary for integration, told me, trying to halt immigration is pointless.

"You can have a policy of stopping immigration," Yamgnane said, "but you won't really stop it. The border is a door that you open and close, but it's always porous. When people are hungry for freedom and hungry to eat, there's nothing you can do.

"The West is like a great beacon in the night," he added. "And all the birds of the night will come to it. What we have to do—through development aid—is make the beacon shine in a much greater circle. Then the birds can stay where they are." □

With salutes and slogans that echo Germany's past, neo-Nazis mark the anniversary of the death of Rudolf Hess, Hitler's deputy. Such right-wing groups have led hundreds of attacks on foreigners, some lethal. Like their neighbors across Europe, Germans are struggling with the force of mass migration, a critical test of compassion in the wake of the Cold War.



Past Becomes Future for

MONGOLIAN NOMADS

Text and photographs by
CYNTHIA BEALL and MELVYN GOLDSTEIN

Where Genghis Khan and his hordes once rode, a herder moves his household by Bactrian camel from one camp to another. In an uphill climb, Mongolia's nomads are struggling to adjust to democratic ways as the nation leaves behind seven decades of communism.

They appeared suddenly from a ravine, two nomad horsemen driving a herd of sheep across the path of our truck. On and on the animals came, a sea of brown, black, and white against the golden grasses of the broad plain. The herders, darting here and there on mounts no bigger than ponies, rode with a fluid grace worthy of their famed ancestors, the Mongol cavalry that had terrorized Asia and eastern Europe 750 years before. A deeply suntanned man in his 60s dismounted and greeted us with a big smile.

"*Sain bainu?*—How are you?" he asked. "*Saixan namrijija bainu?*—Are you having a good autumn?"

We returned the greeting and told him we were American anthropologists, come to study the life of nomads in his country. Thoroughly bemused, the old man pulled a long metal pipe from inside his boot and lit it.

"You know, I heard on the radio that our two countries are friends now," he said. "That is good. Come visit my camp later. I have a lot to say. Many things are changing here."

Indeed they are. As we saw during three recent visits to the mountains of western Mongolia, this Central Asian nation is going through an upheaval as great as any since the Mongolian communists seized power in 1921. With the disintegration of the neighboring Soviet Union, which had set the pace for progress in Mongolia, the national economy suffered a dramatic decline. And the nomads, tied to the centralized economy, are struggling to adapt.

Of course, living with uncertain circumstances is nothing new for Mongolia's nomads. For centuries they have weathered one of earth's harshest and least predictable environments. Winter winds at camps high in mountain valleys (right) can howl at minus 20° to minus 50°F, and sudden blizzards can bury pastures and starve herds.

Now the nomads must deal with political changes as well. Following Mongolia's first multiparty election in July 1990, the government decided to move away from Soviet-style communism toward a market economy. No longer would state planners tell the nomads how many sheep, goats, yaks, camels, and horses to raise. Nor would the government guarantee an income from the herders' goods. The nomads would have to find new ways of surviving.

Popping barley kernels with her grandchildren, Otgon (below) told us one way they would adapt. "When I was a girl, before the state farms, we almost never had wheat flour," she said. "We ate local barley back then. And that's what we'll do now."

CYNTHIA BEALL and MELVYN GOLDSTEIN reported on Tibetan nomads in the June 1989 NATIONAL GEOGRAPHIC. They plan to publish *The Changing World of Mongolian Nomads* this fall.

LIVING OFF THE LAND

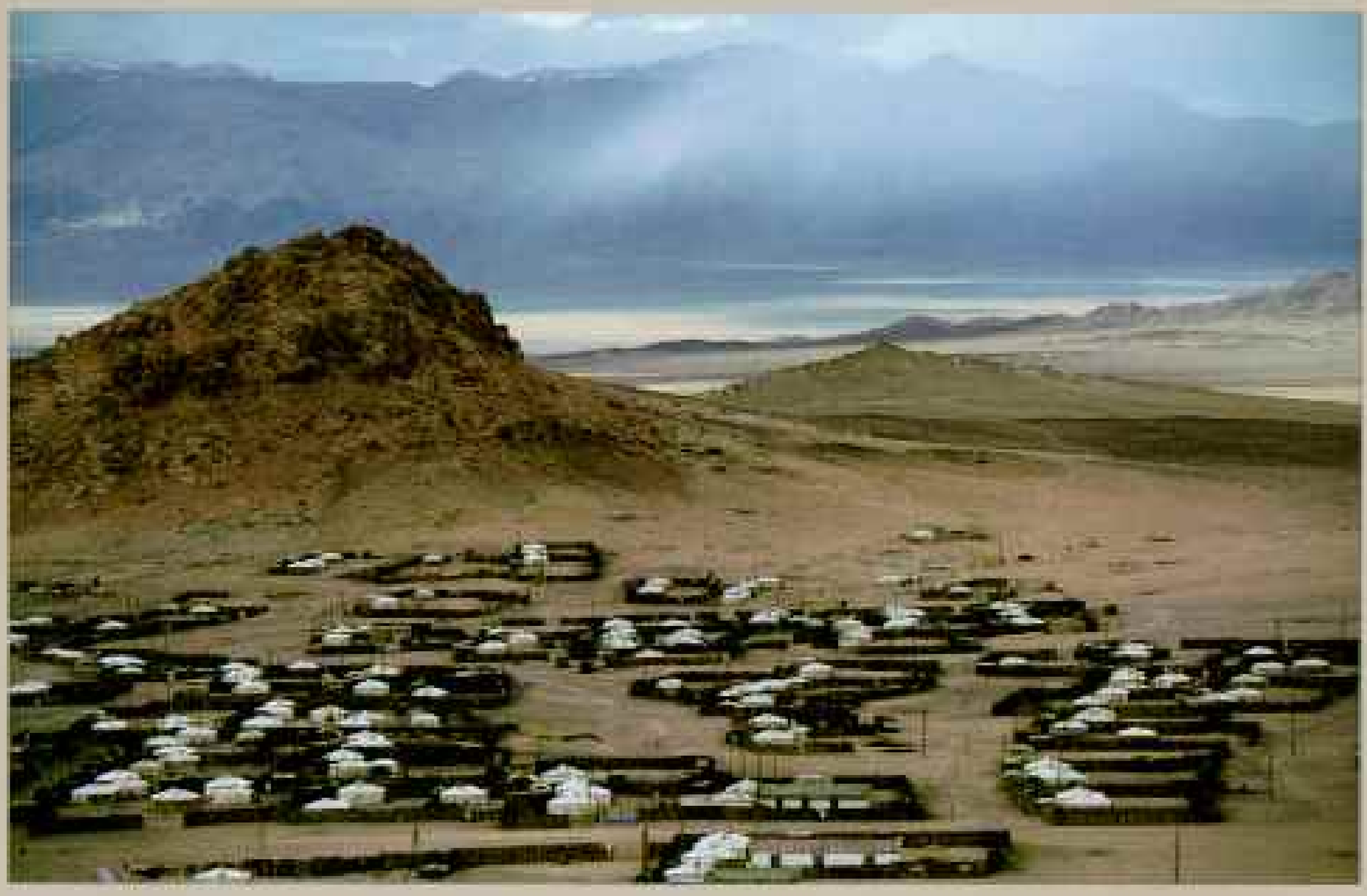
Scattered across one of the world's most sparsely populated countries, nomadic herders account for about two-fifths of Mongolia's 2.2 million people.

The authors spent a total of six months living with nomads in western Mongolia's Altay Mountains, which stretch 1,200 miles from Siberia to the edge of the Gobi desert and have peaks reaching more than 14,000 feet. During the 13th century nomadic horsemen from this part of Central Asia conquered Russia and China and invaded Europe as far as the Danube River.

Professors at Case Western Reserve University in Cleveland, Ohio, the authors focused their research on the livestock collective of Moost, which covers 1,500 square miles and is home to 4,000 nomads. Their project was supported in part by the National Geographic Society and the Washington-based International Research and Exchanges Board.

Long retired from the livestock collective, 78-year-old Narantsetsik still tends sheep with her family during the

warm months. When the weather turns cold, she moves to the town of Moost, where life is easier for the elderly.



No sooner had we arrived at Tsaganburgas herding camp in the fall of 1990 than 44-year-old Haltar invited us into his tent. His wife, Badam, was using a butcher knife to chip a handful of leaves off a rock-hard brick of Georgian tea. She boiled the leaves in water, adding milk, butter, and salt to make *suiey tsai*, or Mongolian milk-tea. Then she offered us the "hospitality bowl" that each household prepares for guests. It was piled with chunks of tart homemade cheeses, sugar cubes from Russia, candies, and the *bordzig* pastries the herders deep-fry in yak and mutton fat.

Having just slaughtered a sheep, Haltar also set out a big metal basin steaming with freshly boiled lungs, heart, stomach, liver, intestines, and the Mongol's favorite delicacy—pieces of solid fat.

We sat on foot-high stools in the family *ger*, the traditional round tent known elsewhere as a yurt. Windproof, easy to put up and transport, the ger is superbly adapted to nomadic ways. Its wall consists of wooden lattice fences (lower left), which, when spread open and tied together, form a stable circular base about 16 feet in diameter. The roof is made of poles attached to a wheel at the apex, with a hole to vent smoke. Felt pads (below), lashed over an inner layer of cloth, are covered with white canvas to provide insulation and rain protection.

With a yak-dung stove fired up inside the ger, we were normally quite comfortable. Even when the temperature outside dipped into the low teens, we could sit in shirtsleeves a half dozen feet from the fire.

In the spring of 1991, when we next visited Tsaganburgas, we discovered that the nation's problems were forcing our nomad friends to "tighten their sashes." No sugar cubes in the hospitality bowl. No strawberry jam from East Germany. Our hostess was embarrassed.

"I'm sorry we can't offer you as much as before," she said. "Things are difficult because of the rationing and shortages."

For decades under the communists, the nomads, like all Mongolians, enjoyed a cradle-to-grave welfare system. In addition to a generous salary—a herder in 1989 earned 30 to 50 percent more than a restaurant worker in the capital—nomads received vacation pay, maternity leave, child-support payments, and retirement pensions for both men and women.

A RESEARCH PROJECT SUPPORTED IN PART BY YOUR SOCIETY

"The collective was good to us," said Haltar. "We had enough food, free health care for our children, free education." Two of Haltar's sons were attending boarding school in the district center of Moost (upper left), where the collective also ran a clinic, bakery, and boot and tailor shop. This system had been made possible by subsidies from the Soviet Union, which had helped launch the Mongolian People's Republic decades ago. But the Soviets, reeling from their own problems, canceled support in early 1991.

The transition to a market economy was going to pinch, the nomads were learning. "But I am a Mongol," said Haltar, "so if our government now says we need to change to have a better life, then perhaps we do."

"Come on, the horses are arriving," a neighbor shouted into the ger of Ajii and his wife, Shuraa, one day at Moxorix, a yak herder's camp. Ajii leaped up and grabbed his handmade rawhide lariat.

Outside, riders raced back and forth trying to contain a herd of 50 semiwild horses brought down from a mountain pasture, where they had been grazing unattended. Except for one or two horses that each household keeps on duty at camp—saddled and tethered beside the ger like a family car—the main herd roams freely. Ajii and some of the others lassoed mounts to take their turn in camp. The men showed off their horsemanship (left) as they broke the broncos.

Over the years, Mongolian herders have lost few of their traditional skills. Despite outward appearances, the communist collective, or *negdel*, was little more than classic Mongol pastoralism overlaid with centralized planning. Each herdsman still made the everyday decisions—where to graze, when to move camp, when to freeze blocks of milk and water for later use—while the government handled marketing and set production targets. If a sheep stuffed into a washtub for weighing (upper left) didn't show enough growth when the time came, the nomad who tended it during the year wouldn't receive full payment from the collective for his work.

After the Moost collective became a shareholding company in 1992, herders used government vouchers to buy a third of the negdel's herds, many families owning more than a hundred animals. These privately held animals provide necessities like milk, butter, cheese, and meat, as well as *airwalike*—milk-vodka.

"We herd our goats together with those of the share company," said one woman (above, at right), "so my daughter and I are painting one horn of each to mark them."

Roping a 500-pound yak is all in a day's work for a herder, who leads the animal into a stone chute for weighing on a scale. Capable of digging beneath snow to find grass and of surviving at extreme temperatures, yaks are ideal livestock for high altitudes.

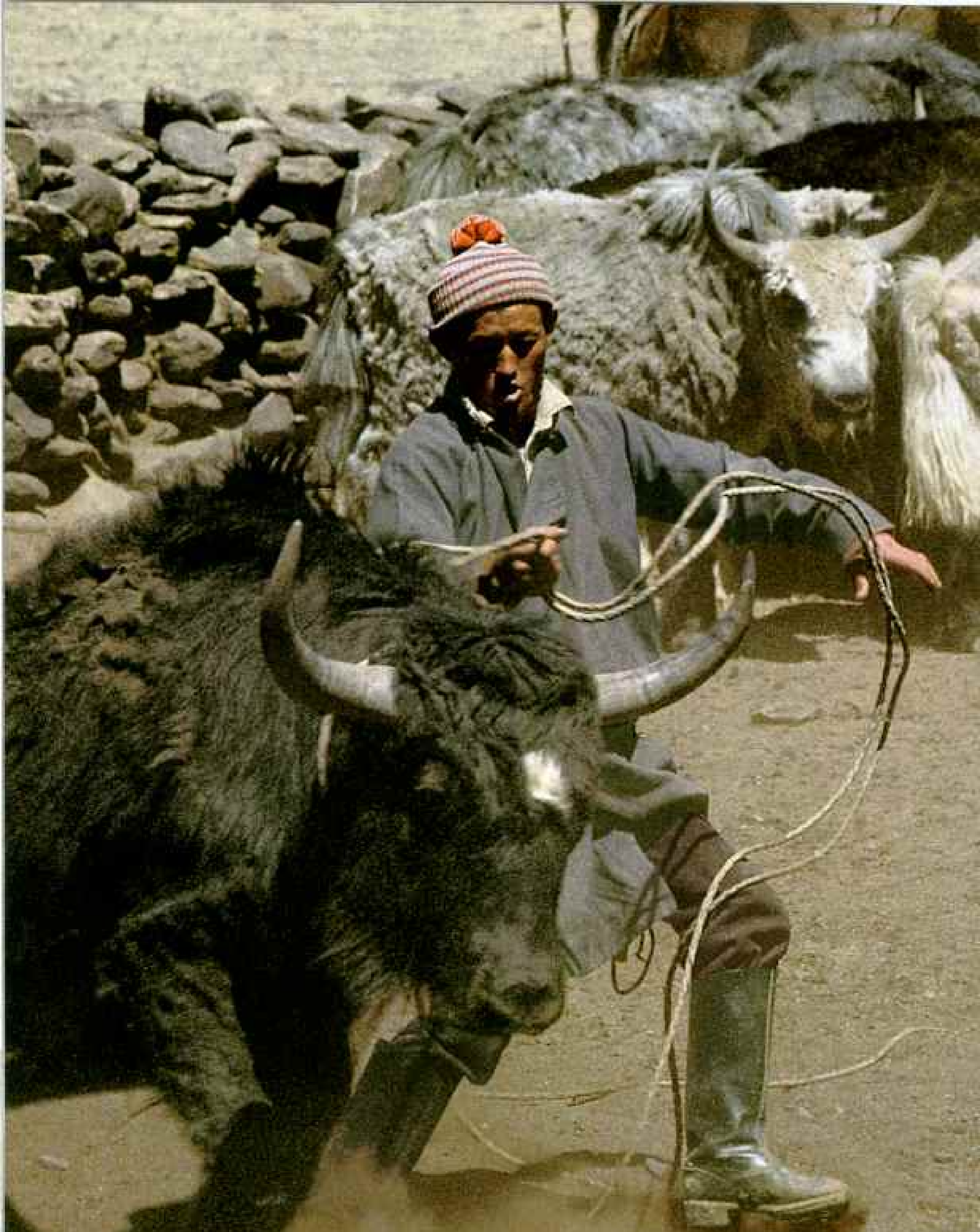
In the past the nomads annually drove their yaks 250 miles north to Siberia, where the Mongolian government traded them for Soviet oil, manufactured goods, foodstuffs, and machinery. Now the nomads, or their company, must bargain for themselves—while the Russians have fewer goods to offer and less money to spend.

"To be honest, I don't understand how a market economy will work," one herder confided. "I've never sold my livestock privately and don't know where I would do this. Who would buy my cashmere? I can't go to America to sell it."

Looking for new business, the shareholding company in Moost struck a deal in 1992 with China's Xinjiang Province. In return for wool and skins, the company received Chinese canvas, tea, matches, flour, and a mill to grind wheat.

Between 1929 and 1932, when the communists first forced collectivization on the herders—just as Stalin was doing with farmers in the Soviet Union—nomads slaughtered millions of head of livestock rather than turn them over. Yet eventually they were persuaded to support the system and are now reluctant to abandon it for something unfamiliar.

"It will take time to educate the herders about managing and marketing," said Puravdorj, the local district chief. "But it must happen. A free market economy is our only hope for security and prosperity."



When fuel was plentiful a few years ago, nomads such as Haltar (above) bought Czechoslovakian and Soviet motorcycles to run errands, visit friends, or ferry children between camp and boarding school. Now that gasoline is rationed, most nomads have sold their motorcycles and returned to horseback.

As they cope with such disruptions, herders try to become more self-sufficient. Unable to buy felt from the decrepit factory in Ulaanbaatar, as they have for 40 years, some nomads ask elders to teach them to make it. Using two thin sticks, a woman (center) fluffs a pile of wool before wetting it. Then she rolls it in a skin, so it can be dragged behind a horse to compact the fibers. It takes two weeks to make

enough felt for an entire ger.

When the government began to eliminate price controls in 1991, the cost of living zoomed throughout Mongolia, imports dwindled, and manufactured goods became harder to find. Basic foodstuffs such as sugar, flour, rice, butter, and meat were temporarily rationed. Yet the nomads, for all their difficulties, fared relatively well.

"Because we have our own animals to give us much of what we need, we are better off than people in the cities," said Batarjav, a young herdsman. "Unless the price is right, we don't want to sell animals. So meat and milk in the cities are getting scarcer and more expensive."

As we said our farewells, we could not help worrying about our nomad friends. Yet we saw how quickly Mongolia's former communist leaders were becoming hardworking market traders. And we were heartened by how efficiently the nomads were taking matters into their own hands, looking into their past to find a path to the future. □

Judging from their products, a lot of people in Detroit who design traditional luxury cars must think you're an over-the-hill fogey. At Chrysler, we know better. Buy a Chrysler LHS and you'll be going over hills all right. And around curves. And through

Reverse the aging proces

switchbacks. But at a much brisker pace than usual. Thanks, in part, to a 24-valve, 214 horsepower engine that delivers more torque than a Nissan 300 ZX. And Chrysler's unique "cab forward" design, which gives this car a cornering ability usually found in small sports sedans. (A four-wheel independent suspension with gas-charged struts

*CD player optional. Buckle Up For Safety.

doesn't hurt, either.) Of course, you'll be doing all this while ensconced in leather-trimmed bucket seats, listening to your favorite CD on an 11-speaker Infinity Spatial-Imaging System.* Who knows? The whole experience may take you back to your youth,

ıt an accelerated pace.

and remind you of the first car you ever truly cared about. What was it? A '49 Merc?

'57 Chevy? '65 Mustang? '68 Corvette? '70 "Hemi" Charger? Whatever it was, congratulations. It's back. For more information, call 1-800-4A-CHRYSLER.

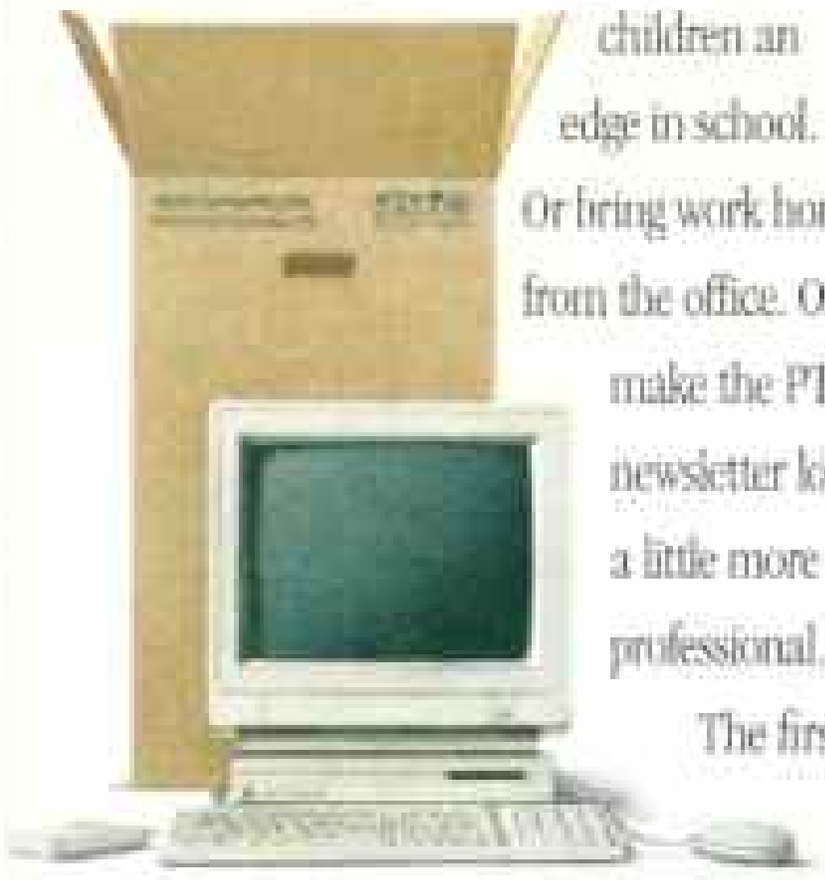
ADVANTAGE:CHRYSLER

A DIVISION OF THE CHRYSLER CORPORATION

How to buy your first personal computer.

This year, millions of families just like yours will decide to take home their very first personal computer.

You might be looking to give your children an edge in school. Or bring work home from the office. Or make the PTA newsletter look a little more professional.



A computer should be easy to buy. So Macintosh Performa puts everything your family needs in one box.

The first step in finding the right computer is to ask a few simple questions.

What do you really need in a computer?

You can plunge into books thicker than the Peoria white pages to find the answer, immersing yourself in the megabytes and whosiwhatzits of computer terminology just to figure out your choices.

Or, you can look into a new kind of personal computer: Performa.™ The family Macintosh.®

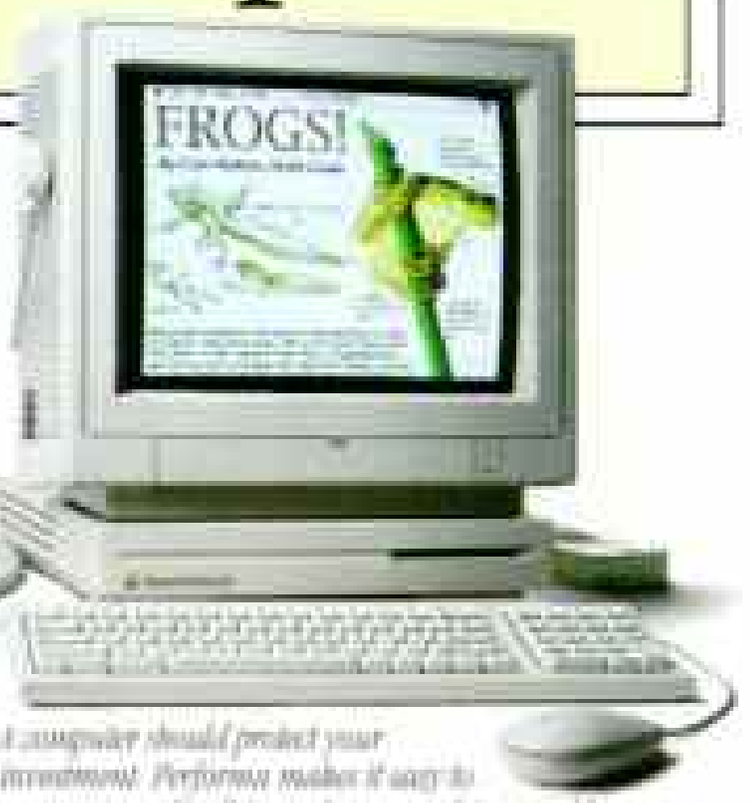
We started by putting everything together in one box, so you wouldn't have to figure out what components to buy. Plug the monitor into the computer, plug the power cord into the wall, and you're ready to go.

What software do you need?

The magic of a personal computer is that you can change what it does simply by changing the software.

You can turn the same computer from a powerful calculating tool into an artist's palette into an arcade game.

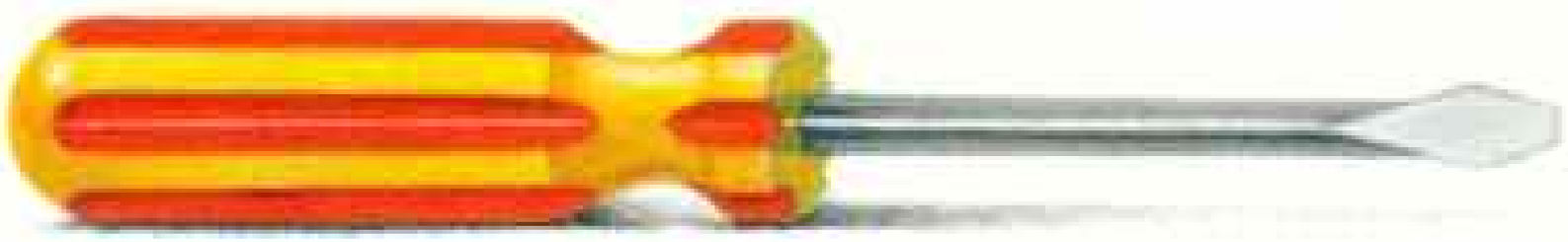
A Macintosh Performa arrives in your home with the most popular kinds of software already installed. So right out of the box, your family can do things like write a term paper, calculate the household budget, organize an entire scout troop or keep a mailing list of all your relatives. (Plug in an affordable Apple® StyleWriter® II printer, and all these projects take on the professional look of typeset documents.)



A computer should protect your investment. Performa makes it easy to grow as your family's needs grow, to let you add new capabilities and take advantage of future innovations.

Of course, Performa also gives you the power to run thousands of other programs you can buy. If you use a computer at work, many of those same programs are available for the Macintosh Performa (from Lotus 1-2-3 to WordPerfect). And it lets your kids run many of the same software programs used in schools (more schools use Apple computers than any other brand).

A computer should help your kids to learn. (Of course, more schools use Apple computers – to teach everything from frogs to Hamlet.



A computer should be easy to set up. So a Macintosh Performa requires no tools – not even one of these.

A computer should help your family do many things. Performa has the power to run over 5,000 learning, business and entertainment programs – all as easy to use as a Macintosh.

Will everybody in the family be able to use it?

It doesn't matter how powerful a computer is if your family can't figure out how it works. Fortunately, Performa combines enough power to run a whole business with the practical simplicity of a Macintosh.

Performa even includes special software called At Ease™ that makes it easy for very young children to use.

Other computers may look simple in the store. But if you click the wrong button, you could find yourself staring at complex computer codes.

Are there any hidden costs?

Often, the base price of a computer doesn't include things you really need or want as soon as you get your computer home.

You may have to pay extra for basic things like sound and graphics. You may have to buy software separately. You may even have to pay extra for a keyboard, a mouse and a color monitor.

With Performa, all of these things are included for one affordable price. Some Performa models even include a modem.*

Where can you get help if you need it?

Even with the easiest computer, you may have a few questions now and then. So every Performa includes unlimited toll-free telephone support. And should your Performa need service in the first year, we'll even come to you.**

A computer should give you confidence. So Macintosh Performa includes a year of in-home service and unlimited toll-free telephone help.

The whole idea is to make owning a computer an incredibly satisfying experience. (We know a few things about satisfying customers. For two years in a row, J.D. Power and Associates has ranked Apple highest in Overall Customer Satisfaction Among Personal Computer Companies.†)

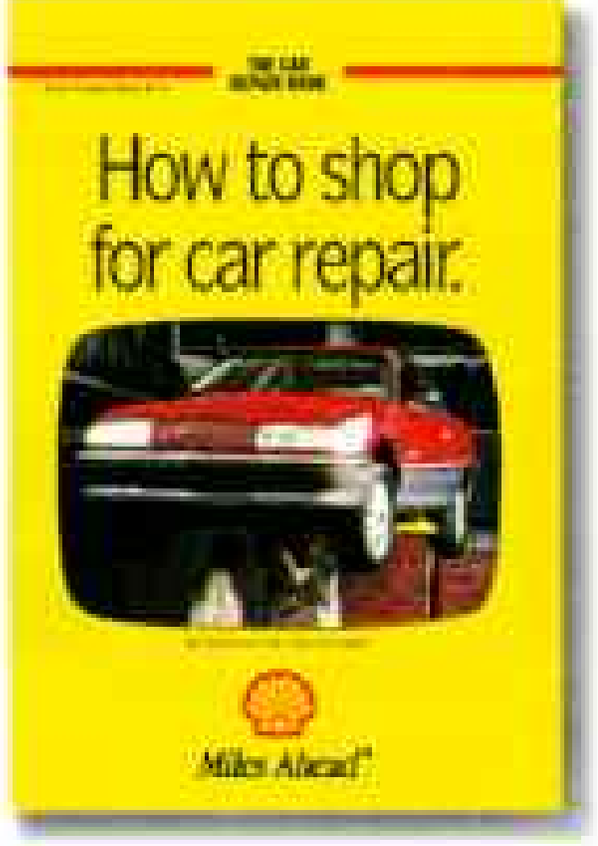
For the number of your local Performa retailer, call us at 800-538-9696, ext. 215.

And discover the most important power a personal computer can bring your whole family. The power to be your best.®

Performa

The Family Macintosh

Before you look in these yellow pages,



take a look in these.

Make sure you're looking for the right things when choosing a car repair facility. What you need is a reliable source for the miles ahead, not just someone to bail you out of an emergency. Look for membership in associations such as the Better Business Bureau. Also look for ASE Certified technicians who have passed certain tests on car repair. To learn more about the mechanics of finding a reputable repair shop, get The Car Repair Book, free at your nearest Shell station. Or call 1-800-23-SHELL for this and other free Answer Books.

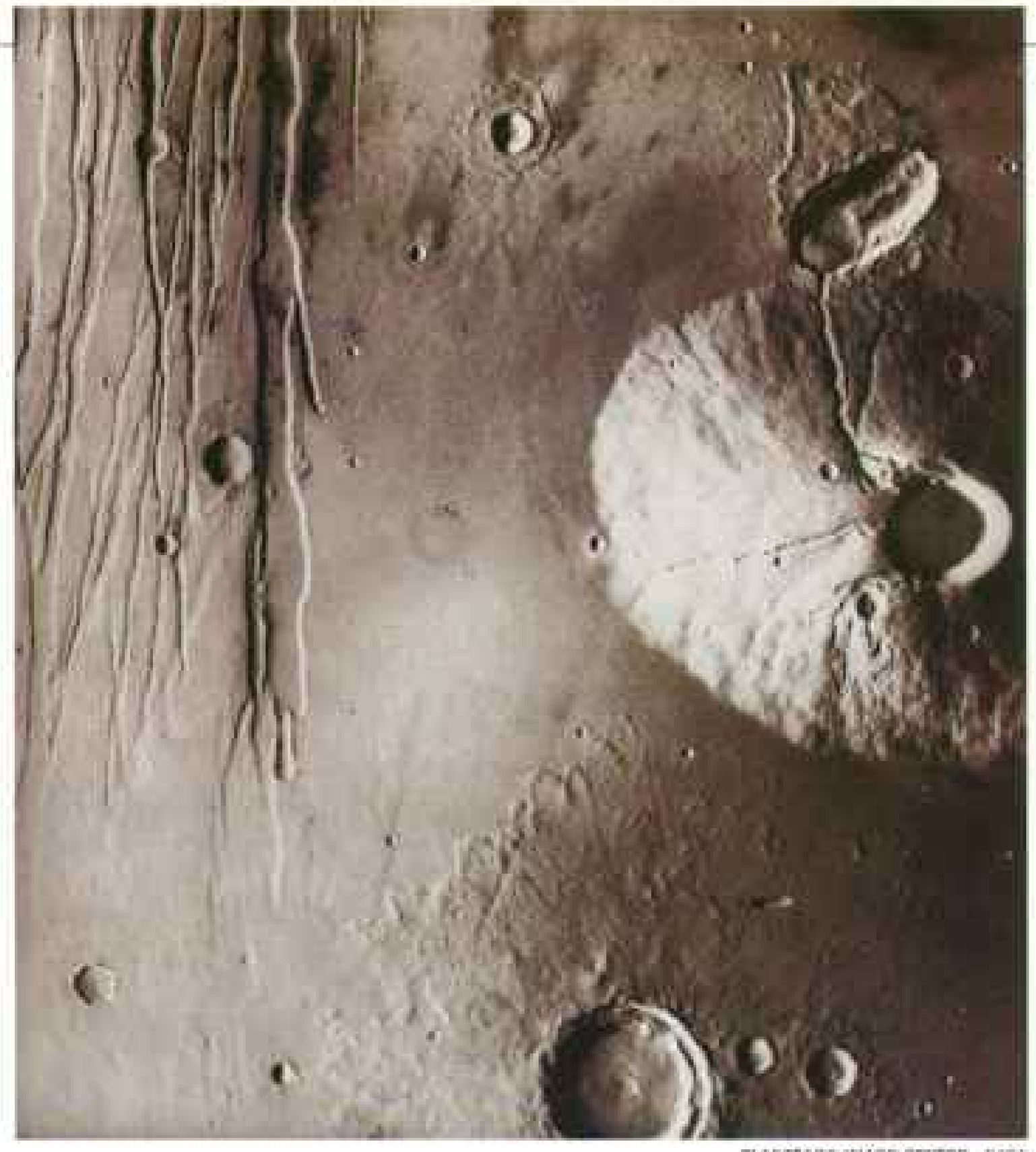
Geographica

Missiles to Earth From a Crater on Mars

About 180 million years ago, a piece of space debris smashed into Mars with such force that it gouged a huge oblique crater, blasting rocks off the Martian surface and sending them skittering through space. Of those that smashed into earth, nine are known, ranging from baseball to bowling ball size—the only meteorites identified by their chemical fingerprints as coming from another planet, not from an asteroid or the moon.

Where on Mars did they come from? Planetary geologists at the University of Hawaii, studying images of Mars (right) created by the Viking Orbiter 1, think they know: a 21-mile-long crater, at upper right, on the northern flank of a volcano called Ceraunius Tholus north of the Martian equator. The team had looked at all Martian craters and ruled out those too old or too small or in the wrong location to be the "parent" of the earthbound rocks. A mere nine craters satisfied their criteria, and most didn't measure up after further study.

Martian rocks have turned up in Indiana, the Antarctic, Brazil, France, Nigeria, and Egypt. The Egyptian meteorite, which struck in 1911, reportedly killed a dog.

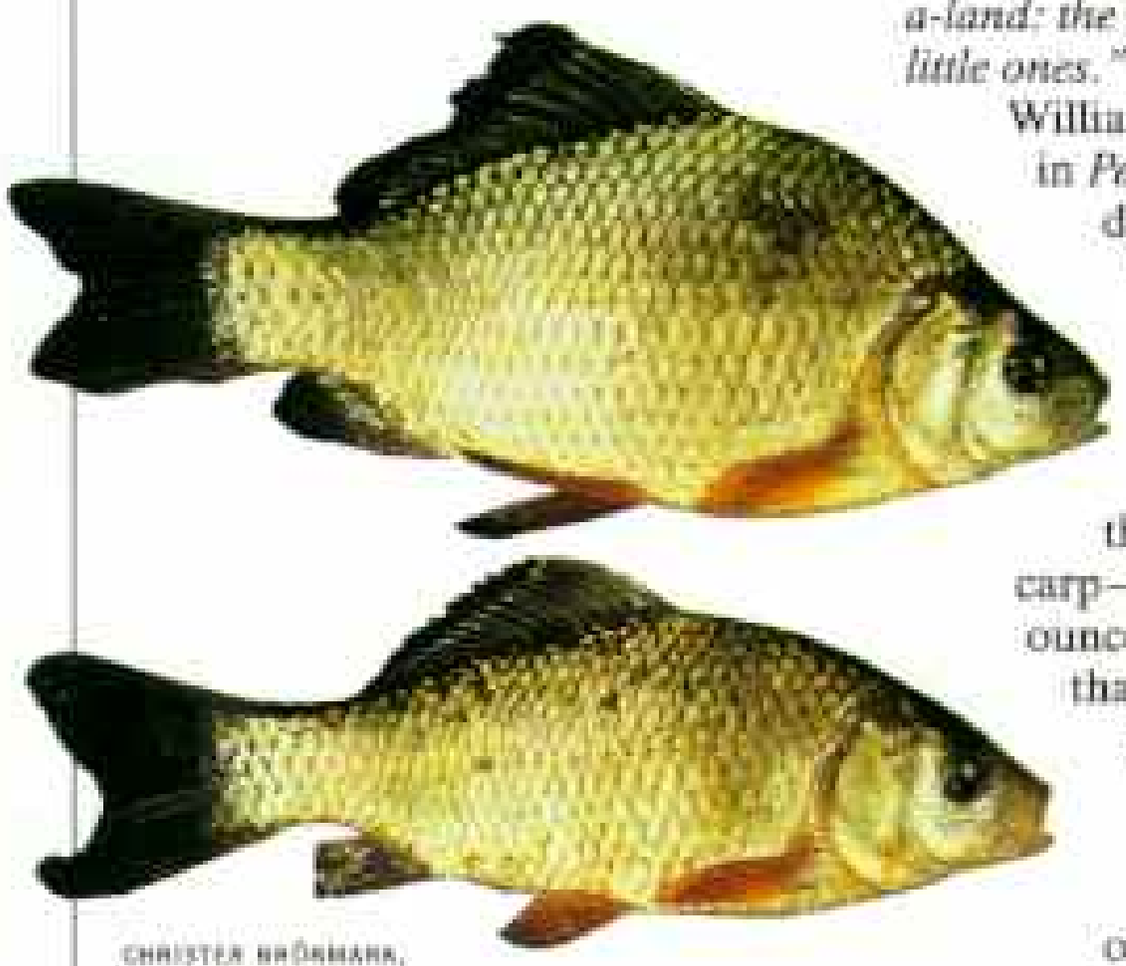


PLANETARY IMAGE CENTER, NASA

How to Avoid Predation: a Small Carp's Lesson

"*Master, I marvel how the fishes live in the sea.*" "*Why, as men do a-land: the great ones eat up the little ones.*"

William Shakespeare's maxim in *Pericles, Prince of Tyre* doesn't take into account the crucian carp, a little European fish that has evolved a unique way to avoid being eaten by its great neighbor, the pike. When crucian carp—which weigh about two ounces and rarely are longer than six inches—swim in pikeless ponds, they present the usual fishy profile (left, bottom). But when pike, which often weigh ten pounds but can tip the scales at 35 pounds, show up, those carp that escape pike jaws begin to grow a mass of back muscle. Within five weeks they have a pronounced hump (left, top), making them too large to swallow.



CHRISTER BRÖNMARK, LUND UNIVERSITY

This is the first documented example of a vertebrate permanently changing its body shape to avoid predation, according to Christer Brönmark of Lund University in Sweden, and Jeffrey Miner of Miami University, Ohio. The biologists thought that a carp grew the hump because it had more to eat after pike gobbled other carp. But experiments showed that food availability made no difference; what mattered was the presence of pike.

Brönmark believes carp pick up a chemical cue from the pike and immediately begin to put their energy into growing a deeper body rather than a longer one.

National Geographic, May 1993

FIND A WORLD YOU THOUGHT WAS LOST.

People were sure they'd never feel that sense of satisfaction again. Not in today's world.

Then, they saw that adventure *and* comfort, style *and* ruggedness, performance *and* roominess could still be found in a single place. Suddenly drivers of everything from trucks to luxury sedans, costly imports to cramped utility vehicles, traded in their old ideas for the versatility plus sophistication Explorer offered. Today, this is the most sought-after vehicle in its class. And finding a different–still special–world is easier than anyone imagined.

A choice of available amenities like leather seating surfaces, an open-air roof, and a sound system with CD player let you make this world your world.

With Touch Drive, you shift from 2WD to 4WD High, and back, with pushbutton ease.

FIND YOURSELF

More overall room than anything in this class. All passengers have easy access. Plus, the benefits of anti-lock brakes and a 4.0L EFI V-6.

A thoughtful feature can make a big difference. With the spare stored under the vehicle, the cargo area is more generous and is easy-to-load.

Ford

Have you driven a Ford...lately?

Buckle up—together we can save lives.

IN AN EXPLORER.

Learning tool or loaded weapon?

By the time the average American child reaches the age of five, he or she will have spent more than 4,000 hours in front of the TV. Absorbing the good, the bad and the frightening.

At Public Television, we've long been sensitive to the power and influence of our medium.

Which is why we believe that education and entertainment should never be mutually exclusive.

It's why programs like Lamb Chop's Play-Along and Shining Time Station nurture young viewers with laughter, enchantment and a sense of belonging.

It's why, in the popular series Barney & Friends, a lovable, 6-foot purple dinosaur inspires his adoring fans to express their imagination and creativity.

It's why, for over 25 years, Mister Rogers has been "a bright light in childhood's sky." One who has boistered the self-esteem of preschoolers by offering them a safe haven to voice their truest feelings, fears and curiosities.

And it's why Sesame Street has moved beyond the home into daycare centers. Where teachers and workers are given the training and materials they need to better prepare kids.

For kindergarten. Grade school. And, of course, the university of life.

PUBLIC TELEVISION

Keep us in mind.

Geographica

RICHARD THOMPSON (BOTTOM); FRANS LANTING, MINDEN PICTURES

Put-upon Raptor Fights to Survive

It attacks seabirds and seals, feeds on their remains, and snatches untended eggs. Now the striated caracara of the Falkland Islands is itself under siege: Farmers consider the large raptor a pest, sheep eat the tussock grass in which it nests, and a growing international fishery in the South Atlantic is reducing the food supply of local birds.

That is the conclusion of Ian Strange, who has been studying the striated caracara—known locally as Johnny rook—for nearly three decades, most recently with support from the National Geographic Society.

The bird is swift and mobile on its feet but doesn't like to fly far and shuns contact with salt water. It preys on albatrosses, cormorants, and gentoo penguins, usually striking in daylight but occasionally hunting under the cover of night. It pins down the live prey with its talons, applying a crushing grip. More than once a bird grabbed Strange's fingers with such force that his companions had to use both hands to loosen the talons.

Strange estimated 450 breeding pairs in 1963; the number now is 323. He recommends that the British administrators of the Falklands ban fishing around uninhabited Beauchêne Island, a reserve where Johnny rook has the best chance of surviving.

Top Rainfall Award Leaves Contestants All Wet

Raindrops keep falling on the head of anyone who takes a summer trip to Mawsynram, a hill town in northeast India. And falling. And falling. Two Indian meteorologists claim, and many U. S. specialists agree, that Mawsynram has ousted Hawaii's Waialeale as earth's wettest spot, measured by average annual rainfall. Mawsynram gets an average 467.44 inches of rain a year, compared with 459.99 for Waialeale. Cherrapunji, ten miles east of Mawsynram, claims third place, with 445.43 inches.

Differences in collection techniques, length of study, and accuracy of recording make the comparisons less precise than they seem; averages reported for Waialeale range from 432 to 486 inches a year. Other accounts cite Lloro in Colombia as the rainiest site.

Mawsynram's rainfall is seasonally intense, splashing down just 147 days a year. It takes 350 rainy days for Waialeale to reach soggy eminence.

Mystery Statue Surfaces on a Bronze Age Wreck

DONALD A. FREY

She's a beauty, this statuette of a young woman found in the wreckage of a Late Bronze Age ship off the Turkish coast. But who is she, and what was she doing on the vessel?

Divers under the direction of George F. Bass of the Institute of Nautical Archaeology, Texas A & M University, found the 6.4-inch statue—crafted of bronze and partly covered with gold foil—last fall in their ninth season excavating a 14th-century B.C. trading ship off Ulu Burun (NATIONAL GEOGRAPHIC, December 1987). Research has yielded only tantalizing clues to the figure's identity; she may be Canaanite.

"I cannot find any parallel to this figurine," Bass says. "Other seafarers at this time probably carried cult statues to protect themselves. If that's what this is, it would give us some key to the ship's nationality, which is important in reconstructing the maritime history of the period."

Villager's innovative sliding rear seat moves completely forward for maximum cargo space. For more Villager info call 1 800 446-8888.

MERCURY

ALL THIS AND THE QUALITY
OF A MERCURY

Geographica

On This Job, Only Muscle Power Allowed

Think you have a tough commute? Bernie Weisgerber and his crew of U. S. Forest Service historic preservation carpenters clambered into a truck at Hungry Horse, Montana, last summer and jostled over 72 miles of dirt road to a trailhead. They mounted horses and led pack mules another 32 miles to the Big Prairie ranger station in the Bob Marshall Wilderness area (GEOGRAPHIC, May 1985). Then they went to work: repairing the station's Depression-era bunkhouse—by hand.

To help keep wilderness areas pristine, Congress has barred the use of motors, including power tools, and the Forest Service must comply, even when repairing "historically significant" buildings.

Weisgerber and his team wielded only axes, hammers, handsaws, brace and bits, and wood chisels at Big Prairie. In three weeks the four men installed a new roof on the bunkhouse, added flashing, and replaced deteriorated logs.

"We're used to remote locations, but we usually take a generator with us," says Weisgerber. "We did this one as we're supposed to in wilderness areas, the traditional way."

BERNIE WEISGERBER, U. S. FOREST SERVICE

Life for Ancient Greeks: Short, Disease-ridden

Classical literature shows the ancient Greeks as healthy, vibrant citizens, competing in athletic contests, going to war, writing plays, and discussing philosophy. A new study of the bones of Greek colonists farming at Metaponto in southern Italy paints a far darker picture.

Although Metaponto was renowned for its doctors, infant and child mortality was high, and the average adult died at the age of 40. Almost four out of five colonists had malformed tooth enamel, indicating serious childhood disease. Many harbored organisms like those that today cause malaria or syphilis. Several of the skeletons had bone fractures, and most of them had healed without being set.

"The unset bones were really a shocker," says Joseph C. Carter, a University of Texas archaeologist who has been excavating the site since 1974. "What's interesting is the contrast between the reputation of the ancient Greeks and what we see reflected in their remains."

Carter's team found 320 burials, dating from 580 to 250 B.C., on the ten-acre site. Anthropologists Maciej and Renata Henneberg conducted one of the most thorough physical studies ever made of an ancient population.

The Greeks seem to have been aware of the quality of their medical care. A curse inscribed in one tomb vehemently denounced at least 15 local doctors.

LON E. LAUBER, OXFORD SCIENTIFIC FILMS

An Ice Age Survivor Roams the Arctic

This is a wonderful time to be a musk-ox. The shaggy, horned remnant of the Pleistocene epoch, nearly wiped out by hunting after guns came to the far north, has made a comeback.

On Banks Island in the Canadian Arctic, 19th-century Inuit hunters shot musk-oxen for their skins and meat. Now protected, the remaining musk-ox population has grown to more than 40,000, and authorities have allowed local Inuit to resume limited hunting.

In Alaska in the 1930s, biologists reintroduced musk-oxen from Greenland. "We now have thousands, more than when humans first came to Alaska," says David Klein of the University of Alaska, Fairbanks. Herds also roam in Siberia and northern Quebec.

In nature, however, nothing is forever. Experts caution that a series of wet winters, overgrazing of the legumes musk-oxen prefer, or an influx of hunters could reverse the situation once more.

—BORIS WEINTRAUB

National Geographic, May 1993

TOM SEAVER

Gardener, Baseball Hall-of-Famer

Gardening is an important part of my life. I'm often out in my garden by seven.

I love the smell in the air, the early morning light.

My wife Nancy gave me a bronze plaque.

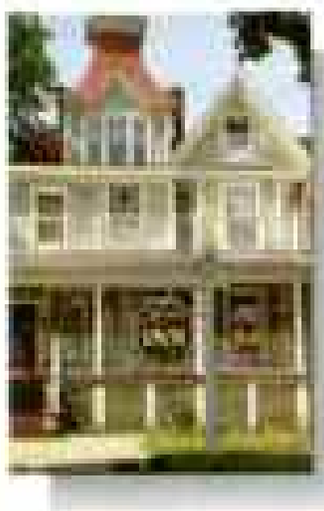
It says "He who plants a garden plants happiness." That's the way I feel.

I use Miracle-Gro to make everything in my garden look its best.

I learned that secret back when I was a rookie gardener.

You'll Come to Enjoy Our Point of View

Not far from the world you know lies a world on the ocean's edge formed by four distinct provinces and the mighty Atlantic.



From rugged, rocky cliffs to warm water sand dunes and from smoked salmon to blueberry cheesecake, each turn in the highway gives you a new taste of Atlantic Canada.

Along the way, sample our unique culture and famous hospitality. Catch a tour boat and follow the humpback whales. Snap the shutter on a shimmering iceberg in Newfoundland and Labrador. Go rafting on the crest of the world's highest tides or simply lay back on a sun drenched beach and let the sound of the surf whisk you away.

The elegant inns, world class hotels, the local cuisine, the festive nightlife, are all here, too, at attractive exchange rates.

But, it's the difference you'll take back home.

HUNDREDS OF VACATIONS TO CHOOSE FROM

FROM $227 TO $2192

U.S. per person double occupancy. $227 Package includes: 4 day golfing vacation, all accommodations, daily green fees, one of two facilities, 1 breakfast. Conditions apply. $2192 Package includes: 14 day walking adventure, all meals, all accommodations, ground and marine transportation, guide. Conditions apply. Prices based on 30% exchange rate. Rate may fluctuate.

NOVA SCOTIA · NEW BRUNSWICK · PRINCE EDWARD ISLAND · NEWFOUNDLAND AND LABRADOR

CALL TOLL FREE ☎ ASK FOR OPERATOR 27

1 800 565 2627

Write or Call for more information on Atlantic Canada's four provinces.
P.O. Box 3008, Scotia Square, Halifax, Nova Scotia, B3J 1S1

Atlantic Canada. A Coast Of Difference

A First from the Western Heritage Museum

Individually numbered by hand with 24 karat gold.

Plate shown smaller than actual size of 8" in diameter.

The Western Heritage Museum presents its first-ever collector plate created by award-winning artist Hermon Adams.

Steadfast against the wind and with the courage of a thousand years, he sits triumphantly astride his horse. Proud, confident, bold...a man of peace fighting a neverending battle with the elements.

"Spirit of the West Wind." Presented by the prestigious Western Heritage Museum and created by award-winning master of Native American art Hermon Adams. In the tradition of the most prized collectibles, this heirloom collector plate is crafted of fine porcelain and lavished with breathtaking color. It is hand-numbered and bordered in *24 karat gold.* And each imported plate bears the artist's signature mark on its reverse side.

Priced at just $29.50, this Limited Edition will be *closed forever* after just 45 firing days. Available *exclusively* from The Franklin Mint, Franklin Center, PA 19091-0001.

A Limited Edition Collector Plate. Hand-Numbered and Bordered in 24 Karat Gold.

The Franklin Mint
Franklin Center, PA 19091-0001

Please mail by May 31, 1993.

Please enter my order for Spirit of the West Wind by Hermon Adams. I need SEND NO MONEY NOW. I will be billed $29.50* when my plate is ready to be sent. *Limit: one plate per collector.*

*Plus my state sales tax and $2.95 for shipping and handling.

SIGNATURE _____
ALL ORDERS ARE SUBJECT TO ACCEPTANCE

MR/MRS/MISS _____
PLEASE PRINT CLEARLY

ADDRESS _____ APT. # _____

CITY/STATE/ZIP _____

TELEPHONE # (____) _____

 16150-BUNW-42

Satisfaction Guaranteed. If you wish to return any Franklin Mint purchase, you may do so within 30 days of your receipt of that purchase for replacement, credit or refund.

Forum

Dinosaurs

If you never publish another article, "Dinosaurs" (January 1993) will mark NATIONAL GEOGRAPHIC as simply fantastic! Being a geologist, I am often dismayed by popular accounts of geologic events, including the Yucatán Peninsula end-of-Mesozoic meteorite. You recognize it as just one of several things that may have ended the dinosaurs. In the 180 million years of the Mesozoic, there were probably many large meteorites, massive volcanic eruptions, profound earthquakes, and dramatic climatic and atmospheric changes. A single meteorite probably did not end the dinosaurs, though it could exact a terrible toll.

JAMES W. ROACH
Houston, Texas

The art is in a class by itself.

DUANE RAVER
Cary, North Carolina

Marion Brandvold of Bynum, Montana, deserves credit for discovering dinosaur nests and nestlings in North America. Owner of the rock shop where Jack Horner saw baby dinosaur bones in 1978, she led him to the nesting site. She and her family are developing a museum at Choteau, Montana.

KAY MCELROY
Greeley, Colorado

It seems obvious to me, as a mechanical engineer, that an efficient circulatory system is a prerequisite for large-bodied agile animals. Intense muscle work generates great amounts of heat that need to be dissipated by an effective cooling system.

BALT PEYER
Winterthur, Switzerland

In 1990 William Hammer of Augustana College in Illinois led colleagues who uncovered the first dinosaur found on the Antarctic mainland. The fossil, a new species of Jurassic carnosaur as yet unnamed, was found on the slope of Mount Kirkpatrick. When it was removed by helicopter, the largest specimen was nearly lost because Dr. Hammer grossly underestimated the weight of the rock matrix. Since then, as Hammer relates, whenever students have a problem in which an object's mass is critical, they are advised, "Go ask Hammer."

PAUL BRINKMAN
Frankfort, Illinois

The only significant aspect of dinosaur paleontology not mentioned in the article is that the science is in grave financial jeopardy worldwide. With the exception of the National Geographic Society and several others, few of the efforts to popularize dinosaurs represent science's insights accurately or provide financial support. Less than a million dollars is spent on dinosaur science annually, a failure that threatens one of the most vibrant and educationally significant disciplines.

DON LESSEM
The Dinosaur Society
New Bedford, Massachusetts

As I read the fascinating article, I watched my 12-year-old rose-breasted cockatoo playfully nibble at my finger. I wondered, was this descendant of *Sinornis* playing or, in her ancient wisdom, "stalking" me?

DON HART
Pembroke Pines, Florida

Dinosaur Map

I thoroughly enjoyed the map of North America as it was in the age of dinosaurs. I was familiar with the inland seas but had not seen a map of that time before. I was also struck with the exchange of position of Massachusetts and Connecticut. Was this due to continental drift?

DARREL A. NASH
Bowie, Maryland

Human error, not geologic forces, was at work. We regret the reversal and have corrected it for future printings.

Wyoming

This is a good article, but we are not all cowboys, sheepherders, or coal miners. Our population is as varied as in most states. Also note that Wyoming has more pronghorn antelope than people—more than 500,000, the largest concentration in the world. Mention should be made of trona, a naturally occurring carbonate of sodium used in detergents and baking soda. Wyoming has at least 95 percent of the world's supply.

REX S. ZOBELL
Cheyenne, Wyoming

Your article brought back memories of my Army basic training in December 1944 on the frozen shores of Lake Guernsey, north of Cheyenne. With temperatures about 40 below, grapefruit froze before we could eat it, and I nearly froze one night standing guard. But the scenery was magnificent; I have never seen such sunsets again. When the lake froze, it happened so fast we could see the long spears of ice racing across the surface. The people of Wheatland and Torrington were truly kind to a young soldier far from home.

ROBERT S. HAZLETT
Bristol, Rhode Island

The kids begged me to get her. They promised to brush, bathe, clean, feed and pick up after her. Of course, they don't. I do. It's like having one more kid in the house except Roxy sees a veterinarian instead of a pediatrician. And her vet insists I feed her Hill's® Science Diet.® He said just as humans have to eat the right foods to be healthy, dogs have to eat the foods that are right for them. And that's exactly what they get with Hill's Science Diet. He called it Nutrient Precision.™ So for Roxy, it's Hill's Science Diet because I want to do everything I can to keep *my* dog healthy. And if the kids still want a dog, they'll have to find one of their own.

VETERINARIAN RECOMMENDED
HILL'S
SCIENCE DIET.

A better life through nutrient precision.™

Hill's Science Diet is available exclusively at veterinary clinics and pet stores.

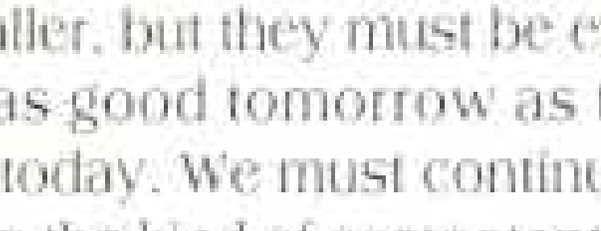
GROWING OPPORTUNITIES IN TOMORROW'S MILITARY

For years we have said, "The Armed Forces are a great place to start." Today's Armed Forces are still a smart option for young men and women to consider as they earn a high school diploma.

Tomorrow's military recruits will benefit from excellent training, increased educational opportunities, and greater responsibility.

Our Armed Forces may be smaller, but they must be every bit as good tomorrow as they are today. We must continue to have the kind of competent and thoroughly dedicated Armed Forces you have seen proudly at work...from the deserts of Iraq to the storm-stricken suburbs of Southern Florida and famine-devastated Somalia.

With the continued support of the American public, I believe they will be.



COLIN L. POWELL
CHAIRMAN, JOINT CHIEFS OF STAFF

Power of Money

Peter White's article was a masterpiece, condensing an immense subject into a succinct, fascinating study. The term *bancarotta* dates from medieval Italy, where moneylenders at commercial fairs were allocated their own benches for conducting financial affairs. When such a lender failed, his bench was broken, thus banca rotta, or "broken bench," came to mean "broken bank," or "bankrupt."

YASHA BERESINER
London, England

The Federal Reserve is not the central bank of the U. S. government. It is a group of private banks independent of the government.

ANNE T. FOLEY
Albany, New York

The Federal Reserve System is indeed the government's central bank; created by Congress, it issues currency, acts as the banker of the U. S. Treasury, regulates the nation's banks, and sets money and credit policies. The 12 regional Federal Reserve Banks combine public and private elements but are subject to supervision by the Fed's Board of Governors, appointed by the President and confirmed by the Senate.

For over a century the GEOGRAPHIC has provided thrills and chills as it relates dangerous exploits in faraway places, but never has it sent such a chill down my spine as with the quotation from a Federal Reserve official concerning limitations on federal creation of money: "No limit. Only the good judgment and the conscience of the responsible Federal Reserve people."

WALTER H. INGE
Atlanta, Georgia

The author states that "one day you may need neither cash nor a card for highway tolls; your car may get electronic tags, and as it passes a tollgate, it will be automatically identified. . . . The toll will later appear on your bank statement." This has been true in Italy since 1992. I have a small gadget called Telepass on my windshield, and when I drive in Italy, it works as you describe—without my slowing down. This is a meager consolation for Italian drivers, who have to pay tolls—perhaps the highest in the world—on practically all highways.

MARIO BALDASSARRINI
Lugano, Switzerland

Your informative article will be required reading for my undergraduate students in money and banking. It should be pointed out that the money measure of 3.5 trillion dollars you cite is for what economists and the Fed call M2 money, which includes many liquid assets that cannot be used directly in exchange. Your article deals primarily with medium-of-exchange money, that used to purchase goods and services and to pay off debt.

National Geographic, May 1993

If You Never Thought Of Your Child As The Military Type, Think Again.

Now is the perfect time to think about what the military has to offer.

Although the military is getting smaller, the Armed Forces still need to recruit almost 400,000 young men and women for Active and Reserve positions each year.

Education, training, and job experience are important parts of the plan to restructure today's Armed Forces. They are also exactly what tomorrow's employers will be seeking.

Today's military is one of the most sophisticated and technologically advanced organizations in the world.

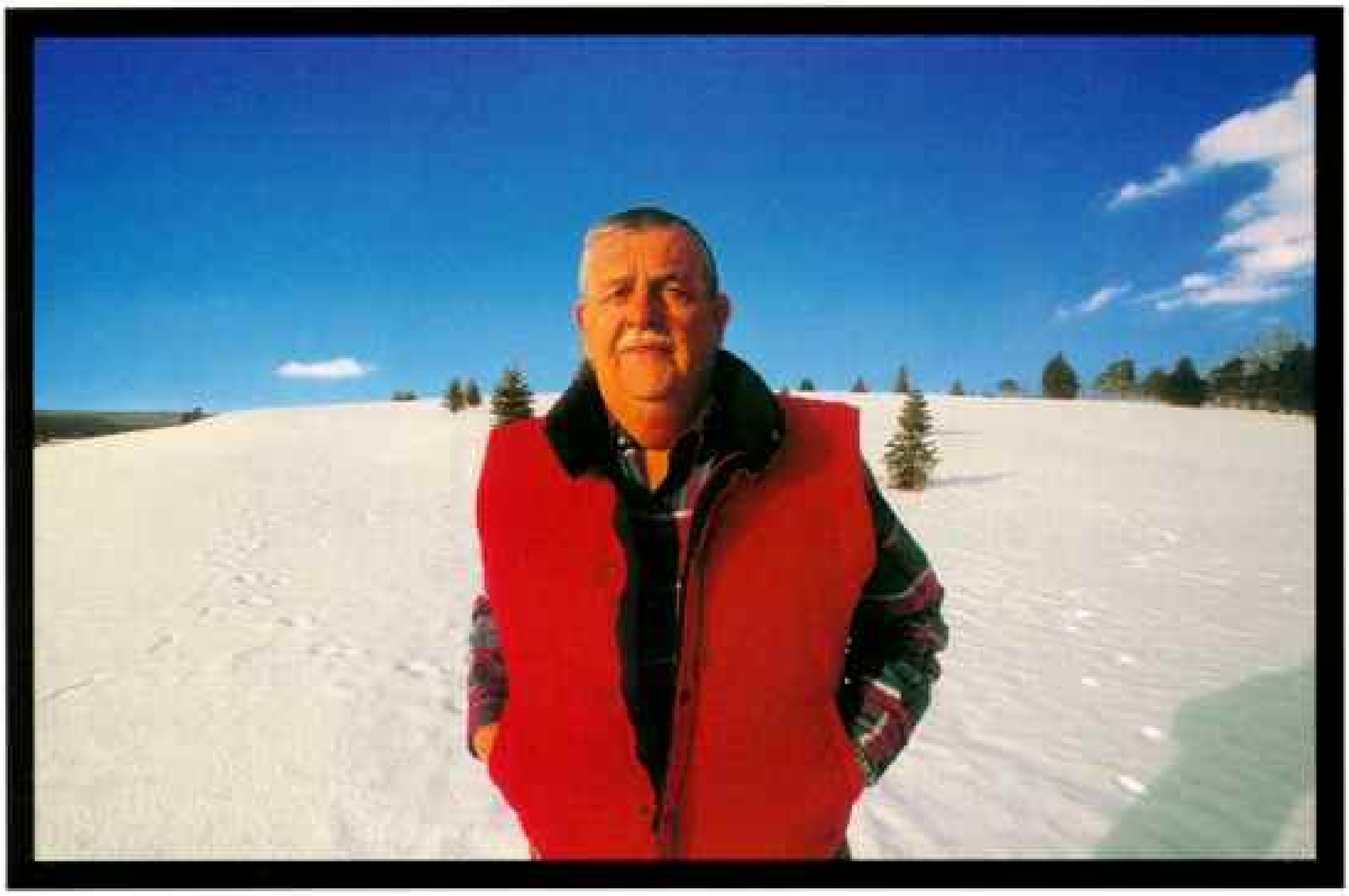
As in the past, the opportunities and rewards for joining the military will continue.

So, if you know a smart, ambitious high school graduate who's determined to make the most of the future, maybe he or she is the military type after all.

U.S. Armed Forces

ARMY ★ NAVY ★ AIR FORCE ★
MARINES ★ COAST GUARD ★

Mayor OSCAR WELSH won't hesitate to tell you THAT NUCLEAR ENERGY HELPS KEEP HIS TOWN *clean.*



Oscar Welsh is mayor of a small Pennsylvania town not far from Bald Eagle Mountain. He lives eight miles from a nuclear plant that started generating electricity about 10 years ago.

Mayor Welsh is a man who prefers to arrive at his own conclusions. "I don't see any reason to be afraid of nuclear energy," he says. "It's a clean, efficient way to generate electricity without polluting the air."

America has more than 100 nuclear plants. Because they don't burn anything to make electricity, they help protect our environment and preserve our natural resources for future generations. All while providing enough electricity for 65 million homes in the U.S.

No single energy source is the whole answer to America's energy needs. But, as Oscar Welsh will tell you, nuclear energy is part of the answer.

For more information, write to the U.S. Council for Energy Awareness, P.O. Box 66080, Dept. W, Washington, D.C. 20035.

NUCLEAR ENERGY MEANS CLEANER AIR

This medium-of-exchange money, called M1, is part of M2 and totals about one trillion dollars.

JOHN J. KLEIN
Professor of Economics, Georgia State University
Atlanta, Georgia

The story implies that people on food stamps are often improvident and/or crooked. I and my family are on food stamps, as is between 10 and 12 percent of the population. We are a cross section of Americans of all ages, races, and backgrounds. I am a 48-year-old mother of two young daughters, an ex-Navy Wave. I keep a well-stocked pantry and have collected aluminum cans to get money to pay utility bills. Food stamps are lifesavers, and I believe that our present economic woes would be much worse without this and other welfare programs.

JANE ELLEN DUBOIS
Greenville, Texas

Colca Canyon

Joe Kane's story on the Colca River of Peru is more than just a story about some unknown canyon. It's a story of thoughts and emotions that only a river runner can know—a story of going from the fear of dying to the exhilaration of living in seconds. A river trip has a way of scaring the hell out of you and still making you want to go back for more.

JOSEPH J. JERKOVICH
St. Cloud, Minnesota

Last year I trekked in awe through the Kali Gandaki Gorge, west of Annapurna in central Nepal. This 7,200-foot-high valley splits Annapurna I (26,500 feet) from Dhaulagiri (26,800 feet). The spectacular river gorge plunges approximately 19,300 feet, vastly deeper than Colca's 10,517 feet.

NORMA E. STAAF
Salmon, Idaho

Geographers say that "canyons" are steeper sided than "valleys," while "gorges" are generally parts of canyons or valleys. We consider the Kali Gandaki Gorge a valley, because the drop from the Annapurna I and Dhaulagiri summits to the river is broken by lower peaks. Thus the Colca is earth's deepest canyon, Kali Gandaki the deepest valley.

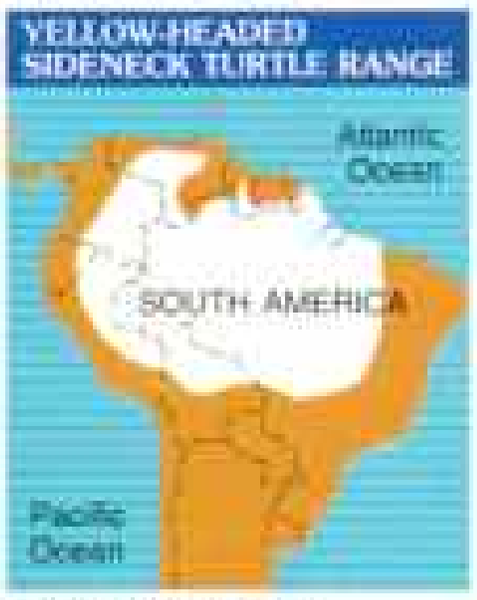
While I have never river-rafted, I am enthralled by the power of moving water. After reading Kane's article, I remembered receiving his book, *Running the Amazon*, which I had never found time to read. Now I have read it in one sitting, and it was every bit as intriguing as his experience on the Colca.

ERIC M. CHRISTIANSEN
Lakeland, Florida

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

Forum

WILDLIFE AS CANON SEES IT



Yellow-headed Sideneck Turtle
Genus: *Podocnemis*
Species: *unifilis*
Adult size: Length, females average 41 cm (males are smaller)
Adult weight: Approx. 8 kg
Habitat: Tropical lowlands of northern South America
Surviving number: Unknown
Photographed by André Bärtschi

Butterflies flutter above yellow-headed sideneck turtles basking peacefully on a river in Manu National Park, Peru. Only decades ago, the yellow-headed sideneck was one of the commonest turtles sold in U.S. pet shops. Though export has virtually stopped, increasing local demand for turtle meat and habitat loss are hastening the species' disappearance from many areas of the Amazon. To save endangered species, it is essential to protect their habitats and understand the vital role of each species within the earth's ecosystems. Color images, with their unique ability to reach people, can help promote a greater awareness and understanding of the yellow-headed sideneck turtle and our entire wildlife heritage.

NATURE

Watch "NATURE" on PBS, Sunday 8:00 p.m.
This program is funded, in part, by Canon U.S.A., Inc.

Canon

NATIONAL GEOGRAPHIC MAGAZINE

John Hudick, Ford Quality Surveillance Inspector

"Sometimes quality comes from tearing a car apart."

At Ford Motor Company, we randomly select vehicles from our assembly lines and tear them apart to check the quality of the welds. It's just one of the many ways we monitor the safety and structural integrity of all our vehicles. At Ford Motor Company, our greatest strength is quality.

Ford

Ford • Lincoln • Mercury • Ford Trucks

QUALITY IS JOB 1.℠ IT'S WORKING.

Buckle up—together we can save lives.

Always insist on genuine Ford Motor Company collision repair parts.

THE ALL-NEW TOYOTA COROLLA

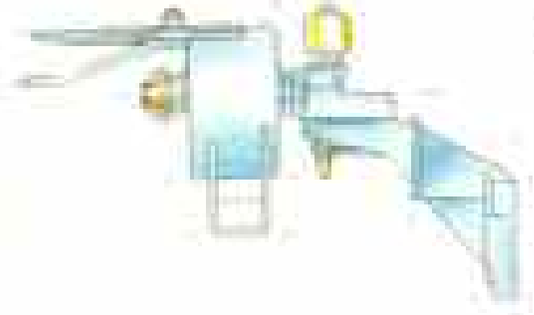
Introducing the brand-new car with the familiar name.

You don't tinker with an original, unless you're convinced you can make it better. That was the challenge we faced with the 1993 Toyota Corolla. We looked at interior space, and managed to find an additional 5.4 cubic feet. That equates to more front, rear, head and leg room. Next, we sought to make the Corolla quieter. So we employed a hydraulic engine mounting system and added vibration-dampening materials to reduce noise to extremely low levels. Of course, safety was a top priority. Which is why the new Corolla is constructed with high-strength steel, and comes with a driver-side air bag,* standard. Anti-lock Brakes are available as well. In fact, if you take a look at the new 1993 Toyota Corolla, what you'll see is a brand-new car. But you'll have the security of knowing it's still an original.

Corolla

Corolla has been satisfying drivers in America for over 25 years. And now more Corollas are built in America than ever before.

A driver-side air bag is standard equipment on all 1993 Corollas.*



This device is a liquid-filled engine mount, which reduces vibration and keeps engine noise to a minimum.

"I love what you do for me."

TOYOTA

*Always use your seatbelt. Driver side air bag is a supplemental restraint system. Buckle Up! Do it for those who love you. © 1993 Toyota Motor Sales, U.S.A., Inc.

The Van That Can.

Chevy Astro All-Wheel Drive.

The only mid-size van with 5250-lb. towing.* Standard 200-horsepower V6.

Available seating for eight. Available Dutch doors.

4-wheel anti-lock brakes (ABS) standard.

3-year/36,000-mile Bumper to Bumper Plus Warranty. No deductible.†

More than 98% of all Chevy trucks sold in the last 10 years are still on the road. Over the years, no other truck is that dependable, foreign or domestic.**

Chevrolet. The Most Dependable, Longest-Lasting Trucks.

LIKE A ROCK

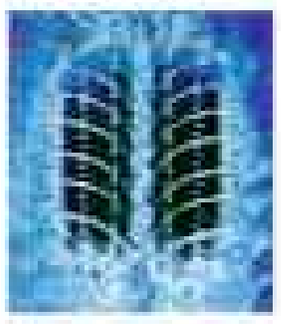
For a free product brochure call 1-800-950-2438.

*When properly equipped. Includes trailer, equipment, passengers and cargo. †See your Chevrolet dealer for terms of this limited warranty. **Based on half-ton truck company registration data 1982-1991. Excludes other GM products. Chevrolet, the Chevrolet Emblem and Astro are registered trademarks and Chevy is a trademark of the GM Corp. ©1993 GM Corp. All Rights Reserved. Buckle up, America!

ONE GALLON PER SECOND.

POURING BUCKETS? GOODYEAR AQUATRED® PUMPS UP TO A GALLON OF WATER AWAY AS YOU DRIVE.

The award-winning* Aquatred, with its deep-groove AquaChannel,™ moves up to one gallon of water away per second at highway speeds. This keeps more of the tire's tread area in contact with the road for superb wet traction, **ONLY FROM GOODYEAR.** For your nearest Goodyear retailer call 1-800-GOODYEAR.



*Which awards? *Popular Science*, 1991 Best of What's New. *Popular Mechanics*, 1992 Design & Engineering Award, *Fortune*, a 1992 "Product of the Year". Industrial Designers Society of America, Gold Industrial Design Excellence IDEA Award. *Discover*, Discover Award for Technological Innovation.

Aquatred features a 60,000-mile treadlife limited warranty. Ask your retailer for details.

THE BEST TIRES IN THE WORLD HAVE GOODYEAR WRITTEN ALL OVER THEM.

Experience Goodyear traction for your high-performance, passenger and multi-purpose vehicles.

EAGLE GS-C.
Dual tread zone for high-performance traction.

AQUATRED.
Deep-groove design for outstanding wet traction.

WRANGLER GS-A.
"Triple Traction" tread for all-surface traction.

GOODYEAR

On Television

NATIONAL ARCHIVES (BELOW LEFT); ODYSSEY CORPORATION

The Ghost Ships of Guadalcanal

November 1942: The naval battle to control Guadalcanal, a small volcanic island but a major strategic point in the South Pacific, lights the night skies. Exploding Japanese shells tear into the destroyer U.S.S. *Monssen*—sending her to the bottom.

May 1992: Robert Ballard, discoverer of *Titanic* and *Bismarck*, locates *Monssen*. Her 14,000-pound Number 2 gun had been blasted from its mounting and its steel shield ripped apart (top) one thunderous night in the six-month land, sea, and air battle that helped reverse the tide of war in the Pacific at a cost of some 38,000 lives.

Joined by survivors who give riveting eyewitness accounts, Ballard identifies more than a dozen of the 50 Allied and Japanese ships that went to the depths of Iron Bottom Sound. Sponsored by the Society in cooperation with the U. S. Navy, Ballard's expedition is the subject of "The Lost Fleet of Guadalcanal," produced by Robert Kenner.

To pay respects to fallen shipmates is "why I came back here," says Bert Doughty, a gunner on *Monssen* (above, at right, months before going down). He had nearly died with them. Wounded and unconscious, he was rescued at daybreak, shortly before the ship sank.

On finding wrecks like Japan's *Kirishima*, Ballard marvels that many "still wear camouflage, with torpedoes and depth charges at the ready. Here are horrific moments frozen in time."

"The Lost Fleet of Guadalcanal," May 23 on EXPLORER; also June selection of the National Geographic Video Club, U. S. and Canada (1-800-343-6610).

Geography Champions Vie for National Title

What continent is crossed by all lines of longitude? What fabric, first produced in China, gave its name to an ancient trade route across Asia? What is the only landlocked country in Southeast Asia? Such questions confront students of grades four through eight in the fifth annual National Geography Bee, sponsored by WORLD, the Society's magazine for children, and Amtrak.

The final round—in which ten students compete for the three top prizes—will be hosted by Alex Trebek of *Jeopardy!* The winners will be awarded college scholarships of $25,000, $15,000, and $10,000.

"These contestants can put an audience of well-educated adults to shame with the depth and breadth of their knowledge," says Society President and Chairman Gilbert M. Grosvenor.

By the way, the answers are Antarctica, silk, and Laos.

The National Geography Bee, presented by Maryland Public Television, airs on PBS, May 26, 8 p.m. ET.

See limited warranties, restrictions, and details at dealer. ©Optional equipment on Eagle Vision TD shown. For more information, call 1-800-JEEP-EAGLE. Buckle up for safety.

Dual air bag restraint system

Four-wheel anti-lock disc brakes

AT EAGLE, WE REALIZE THERE ARE TWO SIDES TO THE AIR BAG ISSUE.

Impact-absorbing crush zones

Speed-sensitive windshield wipers

8-way power front seats*

Sophisticated traction control*

Dual heated power mirrors

Luxurious leather-trimmed interior*

Advanced cab-forward design

214 horsepower 24-valve V6

A Division of the Chrysler Corporation.

EAGLE VISION. NOT INTENDED
FOR THE GENERAL PUBLIC.

Earth Almanac

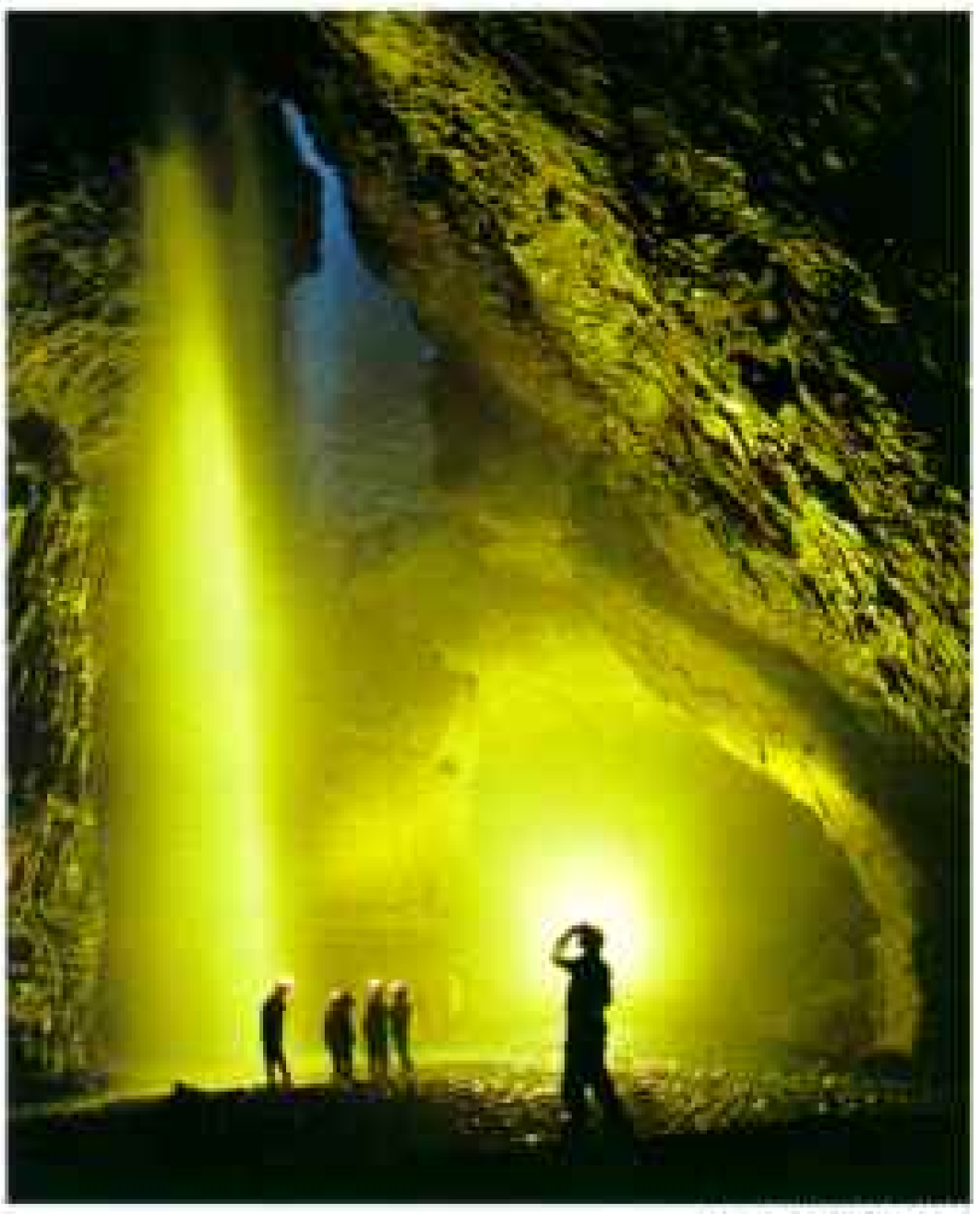
AL GIDDINGS, IMAGES UNLIMITED

More Ships May Crowd Glacier Bay's Whales

The sight of a humpback whale rewarded many of the record 216,000 visitors to Alaska's Glacier Bay National Park last year. The vast majority came by cruise ship, and cruise operators now are seeking from the National Park Service a 72 percent jump in the number of vessel visits allowed each season, from 107 to 184.

"The noise from the ships and its effect on the whales and Steller sea lions is a concern," says Kevin Apgar of the Park Service. "But we also worry about air pollution from ship stacks. At a glacier's face there is often an air inversion, and pollution can linger for hours. It detracts from a visitor's pristine experience."

The Park Service is also weighing restrictions on commercial fishing and a ban on the subsistence nets of Tlingit Indians, who have caught sockeye salmon in Glacier Bay for centuries. Commercial fishing, an old tradition there, has long been tolerated, contrary to regulations. But a lawsuit by conservationists may halt all such fishing in the park.



ANNIE GRIFFITHS BELT

Are British Cavers at Risk From Radon Gas?

The joys of "potholing"—as Britons call messing about in caves like Gaping Gill Hole—may mean hazardous exposure to radon for cavers who spend a great deal of time at their hobby. Radon, a gas created by the radioactive decay of radium, seeps naturally from rocks and soil and has been found to accumulate in basements. Long-term exposure to high concentrations can cause lung cancer.

A year-long survey of 40 British caves by University of Huddersfield geographers found an average radon level nearly 15 times higher than the maximum safe exposure recommended for homes by the British government. Ventilating fans have been installed in some caverns to disperse radon, and potholers are warned by caving associations to limit their time in certain caves.

In the U. S., Jeanne Gurnee, president of the National Speleological Society, says, "We have conducted radon studies, as has the National Park Service. The studies have found no problem in caves with natural ventilation, unless a person spends extended periods of time down under."

National Geographic, May 1993

TO PROVE THE NEW JENN-AIR WALL OVENS HAVE LARGER INTERIORS, WE CONSULTED THIS PANEL OF EXPERTS.

There's big news at Jenn-Air. Because our new wall ovens now offer you the largest interior cooking space of any 24" and 27" combined radiant/convection ovens.

These Jenn-Air wall ovens offer fast, even, three-rack baking and fit cooking and baking pans that some other ovens can't. Turkeys, rib roasts and other oversized items are no problem in our ovens, which are up to 25 percent larger than some other wall ovens.

The new Jenn-Air wall ovens — with more room and greater baking flexibility, you don't need an expert to tell you that anyone who owns one is one smart cookie. For a brochure showing the Jenn-Air line and the name of your nearest dealer call 1-800-JENN-AIR.

JENN-AIR

THE SIGN OF A GREAT COOK®.

Earth Almanac

PHIL SCHERMEISTER

Tunnels—Low Road to Safety for Florida Bears

Bad news for bears. Florida's State Road 46 near Orlando has claimed 15 of the more than 300 bears killed on Florida highways since 1976. Only 1,000 to 1,500 Florida black bears, a threatened subspecies, survive.

But near a warning sign (above), officials plan to build an eight-foot-tall culvert under the two-lane road. They believe that fences on both sides of the road running a mile in both directions from the culvert will funnel bears into it.

"We're going to radio collar bears there to monitor their movement," says Terry Gilbert, a biologist with Florida's Game and Fresh Water Fish Commission. "I'm hoping this bypass is going to work and that we can build more." Although the tunnel and roadwork may add up to half a million dollars, that's only a fourth of the cost of each underpass built on four-lane Alligator Alley (Interstate 75) to protect the Florida panther and other species.

Rare Ghost Deer Rely on Army's Tight Security

Off-limits to most hunters, an unusual white variety of white-tailed deer has lived in the fenced 11,000-acre Seneca Army Depot in central New York since around 1950. After the herd was fenced, a recessive gene that causes whiteness began to assert itself. About 150 of these "ghost deer" roam with some 300 normally colored deer.

Tight security on the post, which stores ordnance, has prevented unchecked hunting of the animals. Rumors that the depot would be closed disturbed two Utica College biologists, William K. Chapman and Alan E. Bessette, who recently studied the deer. But although operations have been cut back, the post apparently will stay open. "That fence needs to remain standing," says Chapman.

Wanted in Canada: A Burrowing Owl-napper

Pressured by predators and by the loss of undisturbed prairie for nesting, burrowing owls in Saskatchewan suffered another blow last year. After nest boxes had been set up to give shelter to the little owls, a thief dug up the boxes and made off with 30 to 40 chicks.

"It was like they vanished into

GORDON LANGSBURY, BRUCE COLEMAN

ether," says Paul James, a curator at the Saskatchewan Museum of Natural History. Some boxes were put out by Girl Guides—Canada's Girl Scouts—and some by farmers who had agreed not to cultivate fields that had owls. Meanwhile red foxes, which feed on chicks, are on the rise, while coyotes, which prey on foxes, are declining. The province's burrowing owls total 1,000 pairs, down from 2,000 a decade ago.

—JOHN L. ELIOT

WILLIAM K. CHAPMAN

National Geographic, May 1993

THE 90TH ANNIVERSARY LESABRE

Leave the sticker on, and show everyone how smart you are.

Or take it off, and let them think you paid thousands more.

Value. It's spelled out right there in black and white, at the bottom of the sticker. The price of the 90th Anniversary Buick LeSabre.*

If you need more proof of LeSabre's incredible value, consider that LeSabre has the highest resale value in its class.** Then look at the sticker again.

You'll see that this car comes equipped with a long list of standard equipment, including: • 3800 V6 engine • air conditioning • power driver seat and antenna • driver air bag • ABS brakes • power windows and door locks • AM-FM stereo cassette • DynaRide® suspension • PASS-Key® theft-deterrent system • special 90th Anniversary badging.

The 90th Anniversary LeSabre is our anniversary gift to you. So drive one home. Oh, about the sticker—go ahead, take it off. Keep them guessing. For more information, see your Buick dealer today or call 1-800-4A-BUICK.

BUICK 90TH ANNIVERSARY

*MSRP includes dealer prep and destination charge. Tax and license are additional. **Information from IntelliChoice, Inc.'s 1997 The Complete Car Cost Guide.

If arthritis isn't so serious, why is it costing America over 35 billion dollars a year?

One in seven Americans has arthritis. And it often strikes them in their peak earning years. Every day, thousands of wage-earners are forced to leave their jobs. They can no longer cope with the pain and crippling of arthritis.

And that costs.

It costs in medical and disability payments, lost wages, lost taxes and lost time in the work place. Over 45 million working days are lost each year because of it.

The Arthritis Foundation is the only voluntary health organization fighting arthritis on every front. We sponsor research, self-help programs, and professional and public education.

But we can't do it alone.

Support the Arthritis Foundation. Contact your local chapter or call 1-800-283-7800.

ARTHRITIS FOUNDATION®

Your Source for Help and Hope®

Just look for something that helps your picnic while it helps your planet.

Just take a look at plastic. • You know how plastic keeps food fresh. But look at what plastic does for the earth.

Plastic geotextile fabrics literally help save the earth by protecting beachfront land from erosion and encouraging plant growth. • Plastic saves water. Plastic liners keep water from leaking out of old water mains. • And over 650 *million* pounds of plastic packaging was recycled last year into everything from new plastic bottles to plastic "lumber" for picnic tables.

How To Save The Planet And The Picnic At The Same Time.

• To learn more about plastic and the earth, call 1-800-777-9500 Ext. 54, and the American Plastics Council will send you a free booklet. • And just think. On your next picnic, that plastic packaging is helping to save a lot more than just your lunch.

American Plastics Council

TAKE ANOTHER LOOK AT PLASTIC.