



NATIONAL GEOGRAPHIC

JULY 1992

America's Third Coast

By Douglas Bennett Lee Photographs by Joel Sartore



Arching along the Gulf of Mexico from the Everglades to the Rio Grande, 1,600 miles of U. S. coastline juxtaposes fragile salt marsh and heavy industry, condominiums and empty beaches.

Mountain Lions

By Maurice G. Hornocker Photographs by Jim Dutcher and George F. Mobley



These elusive cats once ranged across the U.S. Decimated by overhunting and vanishing habitat, only 30 to 50 remain in the East. But in the West, mountain lions are making a comeback.

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Albania Opens the Door

By Dusko Doder Photographs by Nicole Bengiveno



Europe's poorest country has emerged from nearly five decades of forced isolation under a repressive dictatorship. Now it must struggle to catch up.

Pillar of Life

Text and photographs by George Grall



As a magnet draws filings, a wharf piling in the Chesapeake Bay attracts a bizarre multitude of marine organisms—from sea horses to shipworms.

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The Spell of the Trobriand Islands

By Paul Theroux Photographs by Peter Essick



Living in apparent bliss, the Trobrianders of Papua New Guinea deflect the outside world with mocking indifference. But how long will the magic last?

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COVER: Cradled by a powerful paw, a mountain lion cub in the Idaho Rockies submits to wash time.

Photograph by Jim Dutcher.

Cover printed on recycled-content paper.

America's Third Coast

By DOUGLAS BENNETT LEE
Photographs by
JOEL SARTORE



From Florida to Texas, decades of development have awakened both locals and newcomers to the urgency of safeguarding the natural wealth and beauty of the Gulf of Mexico's crescent rim. Theatrical mermaids at Weeki Wachee Spring and miles and miles of beaches are gems of Florida's Gulf Coast, among the fastest growing regions in the nation.





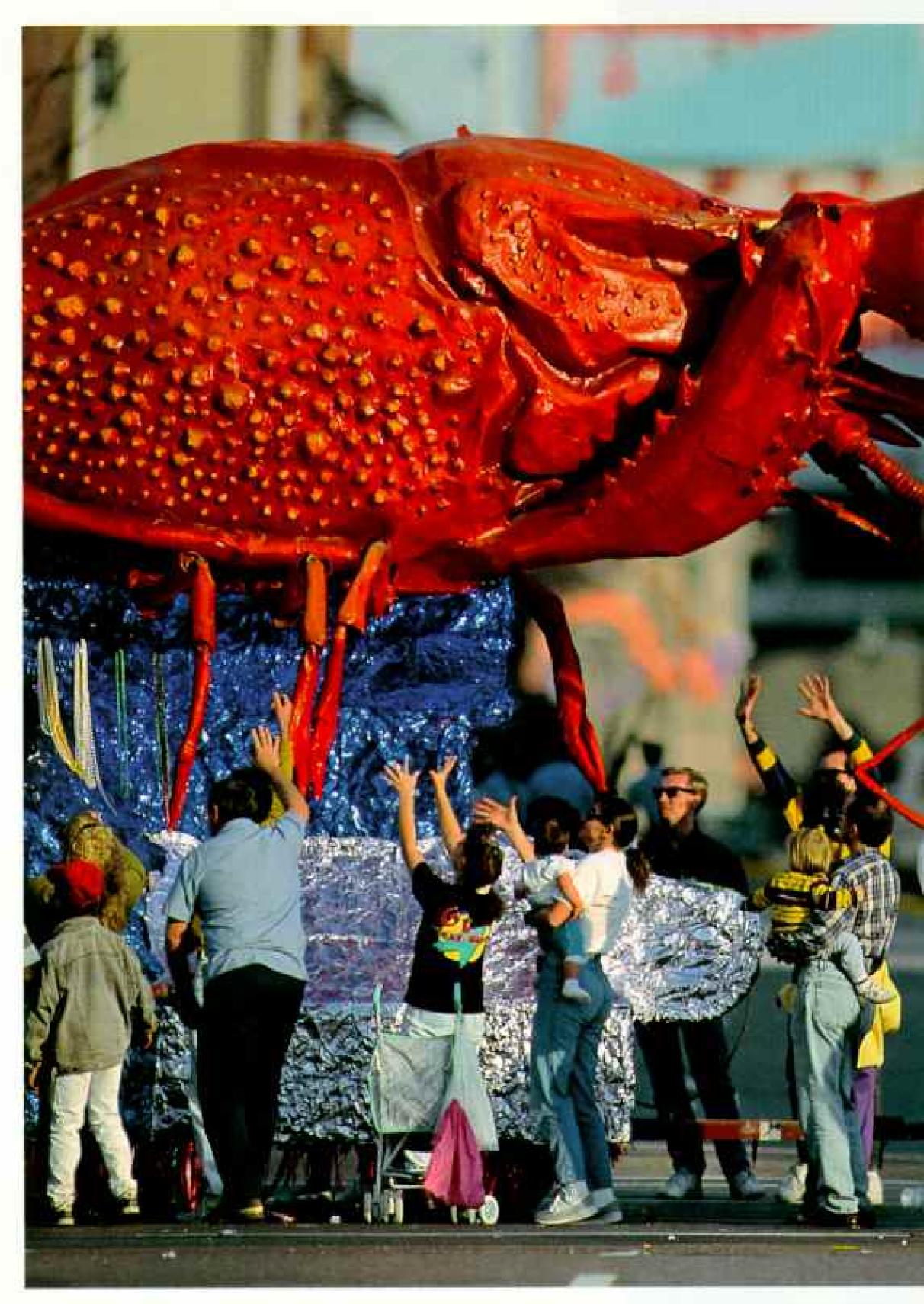




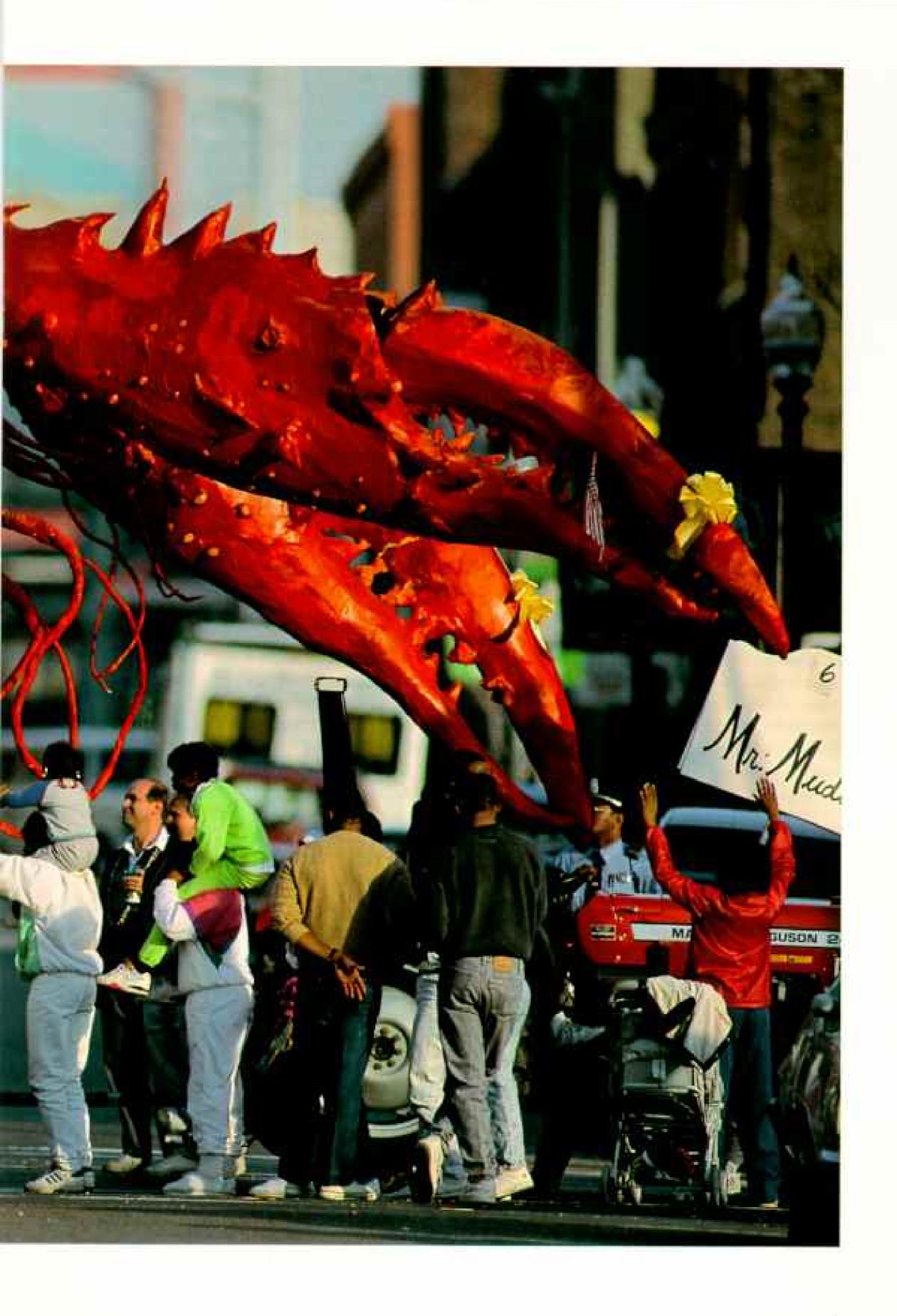


Wintering white pelicans sail over a barrier island fringing Louisiana salt marsh. Migrating with storms and currents, these shifting islands protect the nation's most extensive coastal marshes. The building of levees and canals, however, has sped destruction of wetlands by land subsidence, erosion, and saltwater intrusion.

"What, me worry?" is the spring-break mood on Texas' South Padre Island, where beach-front evangelism competes with the philosophy of endless partying.



"Mudbug madness" describes Louisianans' taste for crawfish and talent for taking good times seriously. Revelry reaches apotheosis at New Orleans' Mardi Gras, when parades own the streets and spirits blithe and bottled come uncorked.



NLAND from the Gulf of Mexico's languid, lapping waters, beyond Mississippi's blinding white coastline and across its serpentine bayous, a dark edge of trees marks the beginning of the great southern pine forest. On my uncle's farm near the fringe of that forest I spent every summer of my youth milking cows and traipsing the woods, as near to heaven as a barefoot boy can be.

In the hour before sunrise a mist breathed from sleeping fields scented with animals and hay. Thunderheads laced with snakes' tongues of lightning rose over the Gulf to the south and emerged from the dawn, blue and scarlet and eggshell white, huge stalking gods that spoke to me of horizons of the sea.

One morning of my 13th summer, in 1966, a new cloud rose over the trees: a thin, billowing mushroom of steam sent skyward by Saturn V rocket engines at the National Aeronautics and Space Administration's test site, newly constructed in coastal Mississippi to help send man to the moon.

NASA's arrival spelled the end of 150year-old Logtown, which lay within a safety zone cleared of habitation. Twenty-five years later Roy Baxter drives me through vinehung woods where the hamlet once stood. Mossy live oaks mark the abandoned site of the house where he was born and lived his first 47 years.

"But I'm not bitter in any shape or form,"
he says. "We didn't want 'em. We were getting along fine without 'em. But when NASA
came, it was the biggest thing that ever happened here."

He is silent for a while as we ride the sandy roads. "Nobody wanted to move, though. Some of the older people couldn't stand the shock. They died within six months."

At the John C. Stennis Space Center three monolithic structures of steel and concrete stand as out of place as teleported pyramids in the flat, wooded swampland. Inside the B-1 stand, NASA technicians are preparing a space shuttle main engine for testing. I think of a day long ago when I asked my great-uncle Heber, born before the century turned,

Former staff writer Doug Lee covered subjects ranging from Arctic wildlife to Africa's Okavango Delta during his 14-year career with the Geo-GRAPHIC. He now lives on Maryland's Eastern Shore. This is photojournalist Joel Sartore's first assignment for the magazine.

what he thought of the then recent moon landing. He gave me a look of pity.

"You believe that stuff, boy?" he asked.

"You believe men went to the moon? TO THE MOON?" He shook his head, a skeptical son of the Confederacy. "No, boy. No man ever went to the moon. The gov'mint took pictures in a big tank of water to make everybody think they did. Ain't no telling what they did with all that money."

At the test structure a thin hiss of steam swells until, with a chest-palpitating roar, the engine ignites . . . and stops, leaving a silence as loud as the thunder it replaces. A malfunction has shut the test down abruptly.

Uncle Heber would have nodded.

For better and for worse, the old world of the Gulf Coast has been joined with the new South, sometimes in warm embrace, sometimes in jarring collision.

The "third coast" of America long remained a realm of wetlands and unpeopled barrier islands punctuated by a handful of dozing cities. Change began with the discovery of oil in southeastern Texas in 1901, accelerated with the encroachment of military bases and industries in World War II, and in recent decades mushroomed with the Sunbelt's growing fortunes.

Houston has grown into the nation's fourth most populous city. And the cities of Tampa and St. Petersburg anchor Florida's booming Sun Coast.

Around the Gulf, favored foods range from Florida stone crab claws to Texas barbecue and Mexican tortillas. In between, there are the beloved catfish, red beans and rice, gumbo, and crawfish étouffée. Languages may be Southernese or media-speak American, Spanish, French, or Vietnamese. Yet everyone I met was at heart a Gulf Coaster, sharing the shores and waters, riches and problems of life on the littoral of earth's ninth largest sea.

Halfway around the 1,600 miles of crescent

Destined for deep water, part of a Louisianabuilt oil-drilling-and-production platform rides a barge toward the Gulf. Offshore drilling in the Gulf began 60 years ago, fueling an energy industry that became synonymous with the fortunes of Louisiana and Texas. Recent drillingindustry doldrums have stunted local economies.



Coastline from the Everglades to the Rio Grande, the great cyclopean eye of Lake Pontchartrain washes the rim of New Orleans. Here I started travels that took me westward to Texas and the Mexican border.

Marching ranks of condominiums fill the narrow spit that is Sand Key, Florida. Here in the state's most crowded county, which includes the Clearwater-St. Petersburg urban agglomeration, 3,055 residents share each square mile. then eastward across the Gulf to Florida, where I followed the curving shoreline north and west to close the circle.

Unruffled by the drumbeat of time, New Orleans prefers its own music as it goes about

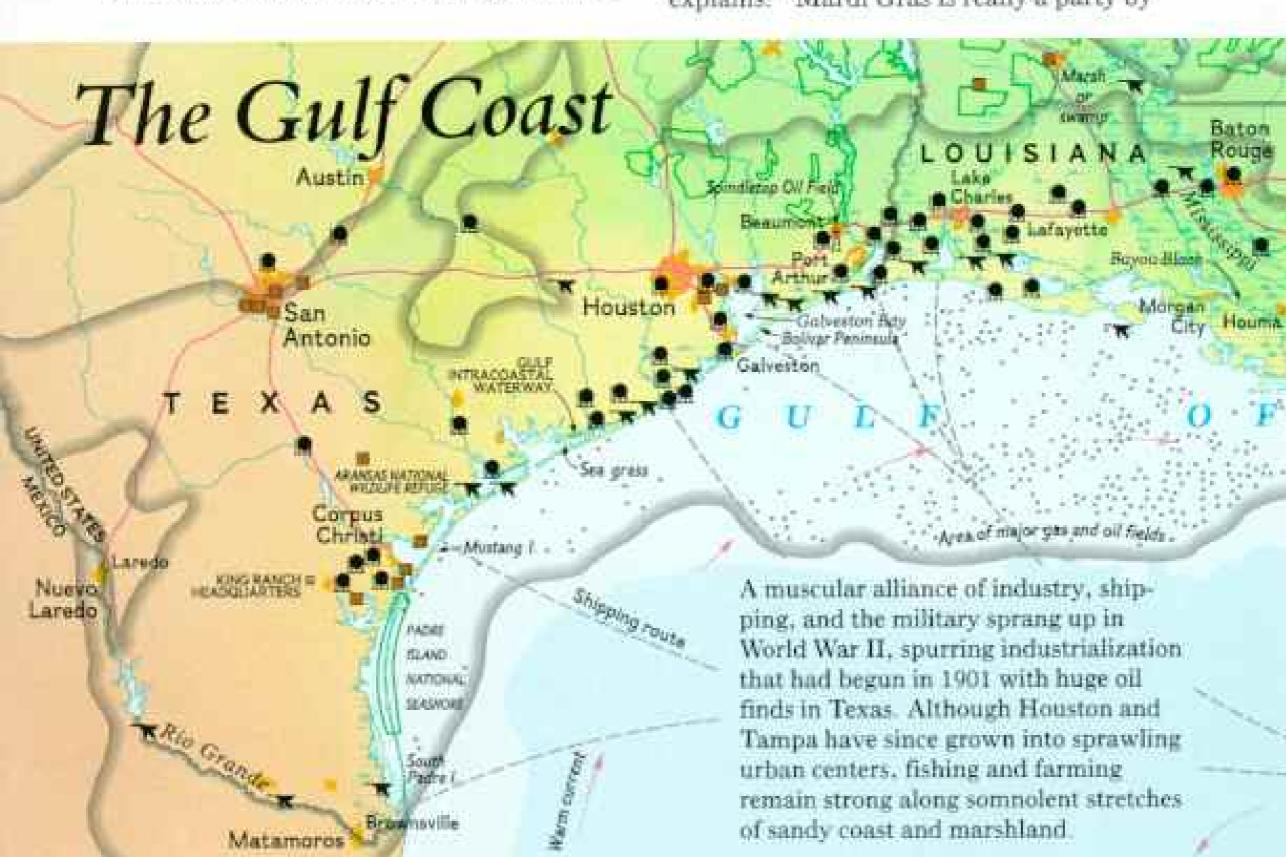
> its time-honored trades: transshipping goods from the Mississippi's vast drainage and playing host to whoever may come to eat, drink, dance, sin, and be forgiven.

> "That's the secret of Mardi Gras," says New Orleanian Benjamin Goliwas. "Whatever you want to do, whoever you want to be, you can. Then at midnight of the last day it's over. You go to Mass, confess, and begin Lent."

On Fat Tuesday, the last day of Carnival, the crowd on Bourbon Street moves in a slow human boil. A young woman wearing a cat's tail and whiskers and little else rides the

shoulders of a G-stringed man on Rollerblades. A vampire looks as though he really might live on human blood.

"New Orleans doesn't much care what the rest of the world thinks of it," Benjamin explains. "Mardi Gras is really a party by



New Orleanians for themselves, but the world is invited."

The gaudy Mardi Gras parades—Rex, starring the King of Carnival; Comus, the oldest group; Zulu, a mostly black parade—

are staged by "krewes." Most are exclusive clubs that reflect a self-engrossed city obsessed with lineage.

"Comus you have to be born into," says Benjamin, himself a product of the genteel, uptown Garden District, where we stroll brick sidewalks in the dreaming quiet of a balmy February afternoon. Tulips and azaleas bloom behind filigree wrought-iron gates. Benjamin tells me of family fortunes made in cotton, coffee, and shipping.

"New Orleans claims its own," he says. "I lived away, but like many others who stray, I found my way home."

The famed French Quarter,
with its layered Gallic and Spanish ambience,
Caribbean hues, African intonations, and
Deep South setting, throws a web of seedy
allure that has captured poets, artists, musicians, lovers, and drunks. Charlie Smith is
several of these. By the river levee in Jackson

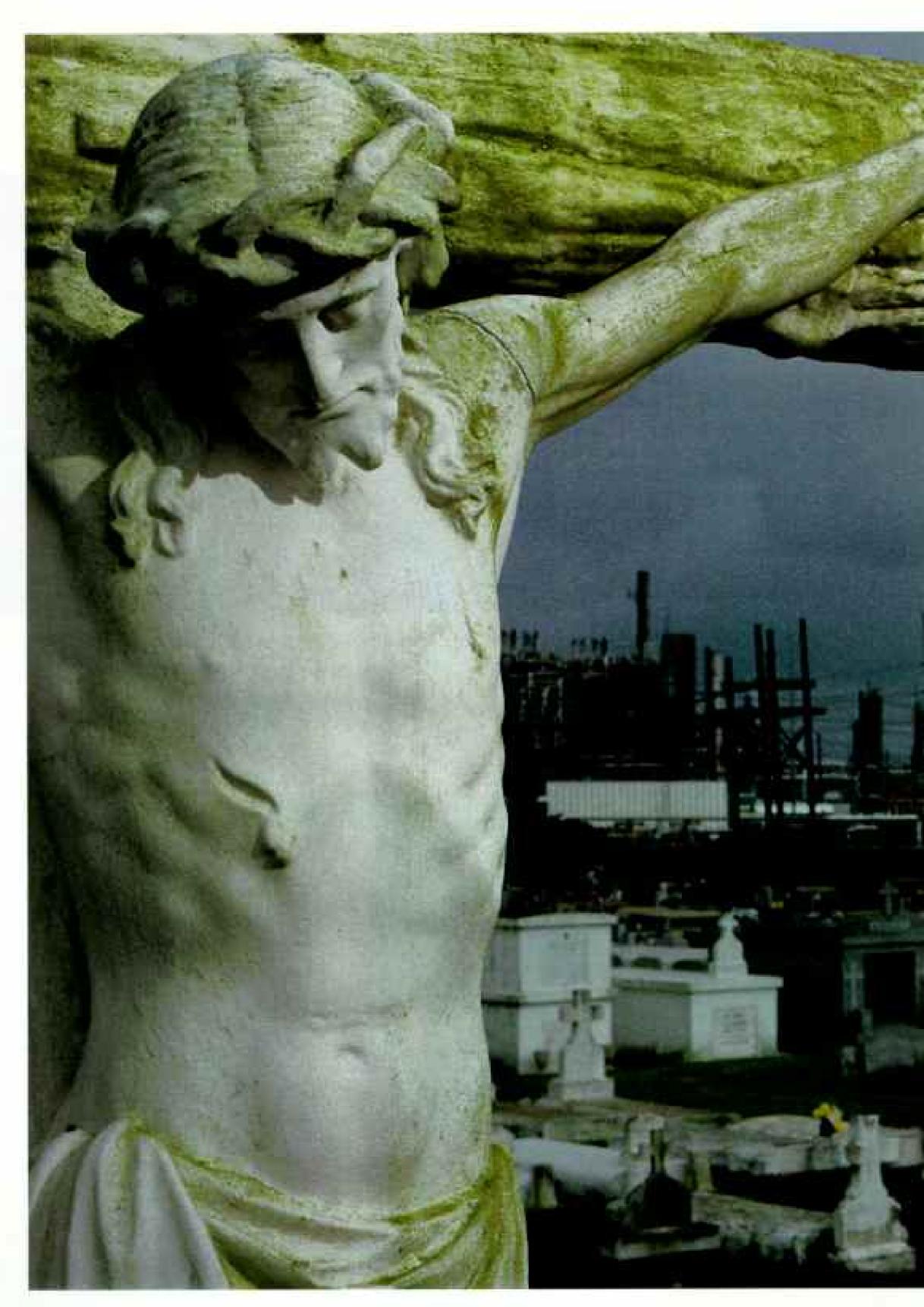
Square he writes and sells poems, and talks about the French Quarter's powerful spell.

"It's a Mardi Gras mentality year-round," he says. "New Orleans is the only Mediterranean city in America."

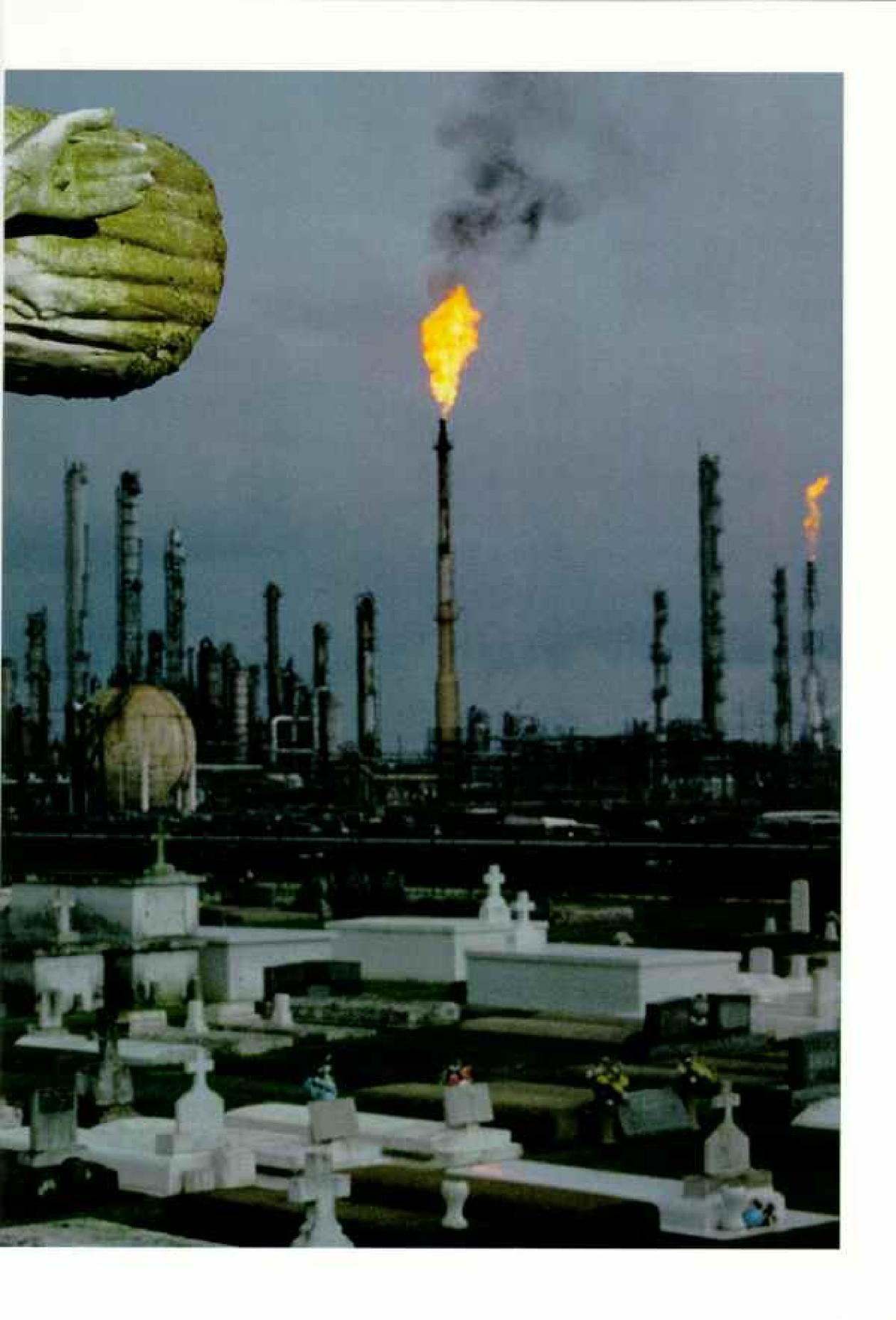


Chisel teeth are a nutria's chief tool for feeding on the roots of marsh plants. Accidentally released from private lands in Louisiana in a 1940 hurricane, the South American rodents can denude patches of marsh, which quickly erode.





Holy Rosary Cemetery shares common ground with the petrochemical plants massed upriver from New Orleans to Baton Rouge. High rates of malignancies among residents have tagged the region Cancer Alley.



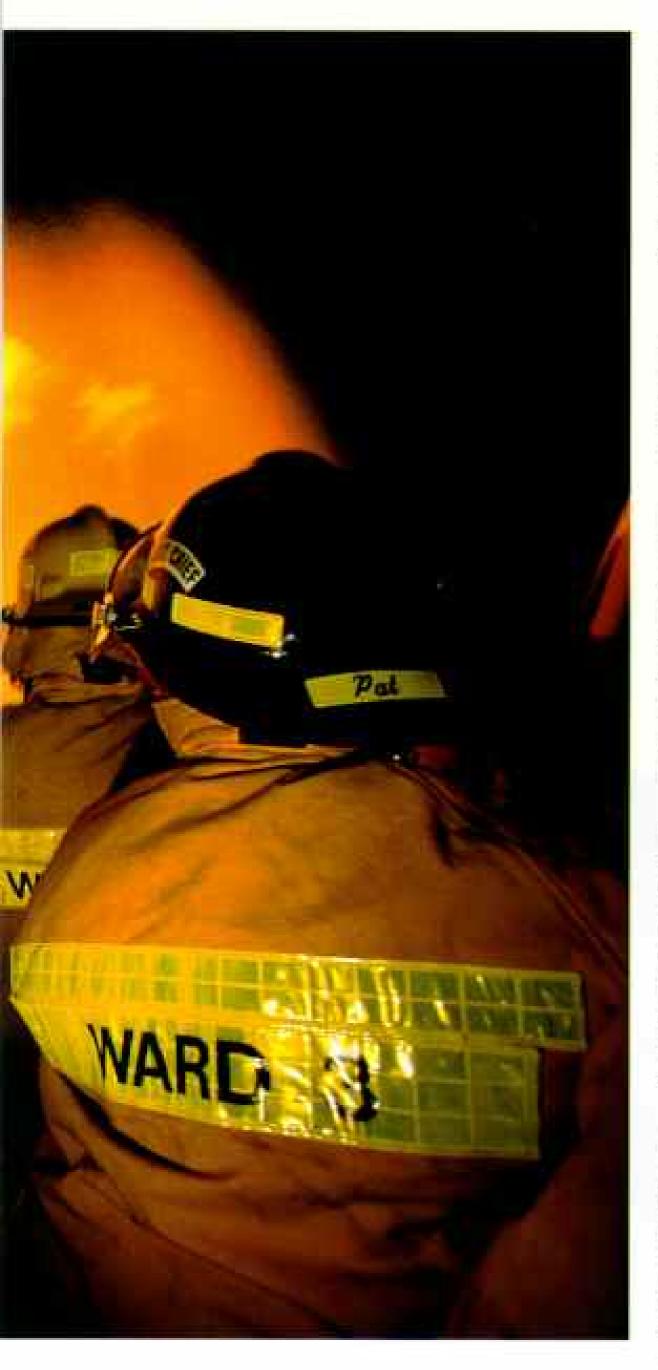


Charlie sports a sign that reads: "Couplet Culprit... Rhyme Crime... Lyrical Larcenist... Poetic License Violator." Wearing a black beret atop his ponytail, Charlie has wise eyes and a face wrinkled by hard living. He moved to the Quarter from Baton Rouge after kicking alcohol and cocaine addiction that ended his 20-year career as a legislative lobbyist. Here he set up shop on the sidewalk, a French Quarter tradition for artists and performers, but police harassed him because he had no permit, which the city

"When it came into court, the judge said,
"Now where's this man who's been selling
chickens?" The prosecutor said, "Excuse me,
Judge, he wasn't selling chickens. He was
selling poetry." And the judge said, "Poetry? I
thought you said poultry! Case dismissed!"

"Only in New Orleans," Charlie says.

New Orleans is in fact an island, surrounded by swamp, the Mississippi River,
and Lake Pontchartrain. Ringed with levees,
much of the city lies below sea level. A direct



hit by a bad hurricane is a nightmare possibility. Fortunately, miles of marshland buffer the city. Tragically, the marshes are vanishing, under the forces of nature and man.

New Orleans, shafts of sun play tag with scudding windrows of cloud. Seen from the air, wetlands scroll away to every horizon, golden grasses inset with silver channels like God's calligraphy. As wide as 40 miles north to south, Fire-resistant armor and cones of spray shield trainees from the skin-searing heat of flaming gas in a night exercise at Louisiana State University's Firemen Training Program. Students include fire-fighting professionals and employees of refineries and petrochemical plants who might be on the front line of industrial crises.

Louisiana's coastal marshes amount to 40 percent of the nation's total. The marshes serve as nurseries for two-thirds of the Gulf's marine fisheries' catch.

Broad ponds and lakes lie below us. "That was all marsh not long ago," naturalist Bob Thomas shouts over wind and engine. "The Corps of Engineers says 25 square miles are lost each year." Gray forests of bald cypress trees stand like legions of the dead, killed by saltwater intrusion. White pelicans bob on the water, and egrets drift above it like thistles. Roseate spoonbills rise from their reflections, gorgeous as tropical flowers.

"We're losing the base of the system, the vegetation," says Bob, director of the Louisiana Nature and Science Center in New Orleans. These marshes are built by sediments deposited by annual Mississippi floods. But levees built to contain the floods and maintain shipping channels have cut the wetlands off from new sediments. The pumping of oil may hasten subsidence; open water replaces what was once healthy marsh.

Canals for navigation and oil and gas production also allow salt water to penetrate once fresh areas. As the biologically rich mixing zone of salt and fresh water moves inland, vegetation dies. Only massive reintroduction of silty river water into sickened marshes can reverse their decline. Present and planned freshwater diversion projects may help, but no real cure is apparent.

"I don't believe Americans realize how much of their daily life is tied to a healthy coastal marsh," Bob muses. "Salt marsh traps detritus. That's energy for plankton. The plankton is eaten by fish—menhaden for instance, which are processed into chicken feed. So I tell people, 'When you eat chicken, you're benefiting from coastal marsh.'"

The traditional bountifulness and sheer success of Gulf fisheries has actually made life more difficult for many of fishing's rubber-booted, plain-talking practitioners. On the night before the opening of Mississippi's shrimping season, a solid necklace of lights strings across the horizon of Mississippi Sound. Days later the fleet heads for Alabama, discouraged by the mean pickings of a bad season.

Heavy rains had hurt the spawning season, but blame for the poor season could also lie with the number of Gulf shrimpers, which has increased fourfold in the past three decades. As many as 20,000 boats put out from Louisiana alone. Meanwhile, because of cheap imported aquafarmed shrimp, dock-side prices have risen little. Yet shrimpers' costs have grown steadily.

Cornered by economics, commercial fishermen also feel hemmed in by new state and federal regulations, imposed in response to declines of red snapper, king mackerel, and red drum (popular as pepper-coated, flashseared "blackened redfish"). Regulations also help protect sea turtles and marine mammals. Shrimpers' ire has focused on the



In communion with haute couture, patrons partake of tea at the elegant Ritz-Carlton in Naples. The five-star hotel is a social magnet in the south Florida city, where beach mansions and jet-setters hold sway.

No single cultural or economic mold can fit all the Gulf Coast's multivisaged profiles. A worshiper is among the faithful at Mobile's Stone Street Baptist Church, founded by free blacks in the early 1800s. required use of nets with trapdoor-like openings that allow sea turtles to escape—"turtle excluder devices," known as TEDs.

"There's no way you can put a hole in your net and not decrease your catch," says Stan Brown as we chug over smooth night waters off Florida. "In 15 years I've caught 50 or 60 turtles, and only one or two died. The TED is not going to have near as much effect on turtle populations as the destruction of their nesting grounds or polluting the water." Studies, however, show nets to be the main cause of human-induced turtle deaths.

With a college degree in business, Stan once shrimped full-time but now does it to supplement his living as a building contractor. "Commercial fishermen feel like an endangered species. I tell you how you know the industry is dying: You don't have young people following their dads."

Stan's nine-year-old son, Josh, scampers about the deck as first mate. When the nets grind aboard, fish and shrimp spill across the

> wet decks. Two dozen species of juvenile fish flop among the shrimp: sharks, stingrays, tropical fish whose colors soon fade in death—the "bycatch."

Federal studies show an average of ten pounds of bycatch per pound of shrimp caught in the Gulf, and extremes of a hundred pounds. Experiments are under way to deliver a variant on the TED that will allow much more of the bycatch to escape. "That'll just be more holes in the net," Stan groans. "People who say these things will work don't shrimp for a living."

The moon rises as our work falls into a steady, peaceful

rhythm. It is after midnight when we turn toward distant lights. We have a hundred pounds of shrimp, enough to break even. But Stan's shrimping is not only about money.

"It's easy to see what there is to enjoy."
He looks toward Josh, asleep in the pilothouse. "He's lived around the water since he was little bitty, doing things most kids hardly ever dream of. At three years old he could bait his own fishhook—I remember him fishing on the dock without a stitch of clothes."

"But I don't want him to be a shrimper.

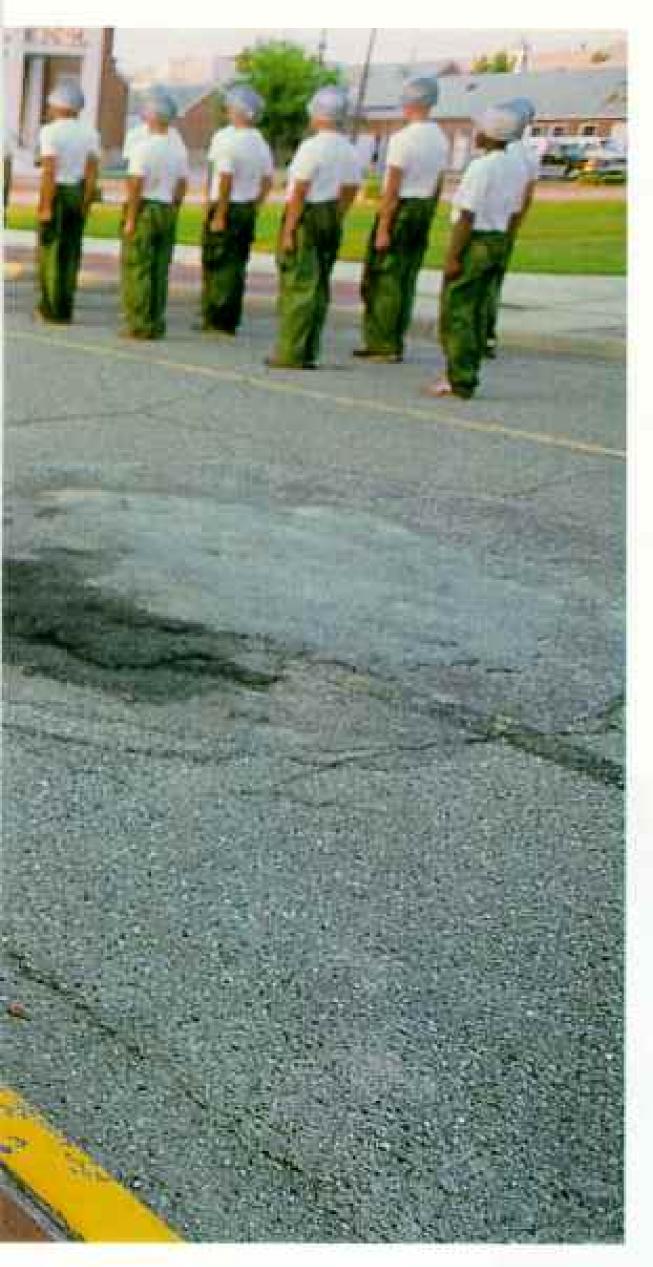




"Yes, Sir! Comfortable, Sir!"
An errant "poopie" responds
to a drill instructor's sarcasm
while his classmates stand in
frozen attention at Pensacola
Naval Air Station. Here generations of aspiring aviators
have been initiated with weeks
of grueling training.

In back-bayou Louisiana, a wrong turn forces an amphibious landing in a hyacinthclogged canal.





He'll never be able to feed his family."

Growing demand on limited fishery stocks has had social repercussions: Both turf and racism have sparked so-called shrimp wars between newcomers from Southeast Asia and established fishermen. There's been gunfire, and fatalities.

"The first years when Vietnamese arrived here, everything seemed OK," says Thomas Vu in his insurance office in Biloxi, Mississippi. A sure-spoken man who worked with South Vietnam's Ministry of Information, Thomas settled in Biloxi in 1983 after an odyssey that began in Saigon in 1975 on the roof of the American Embassy. "When we started to build up businesses, we had the conflict with the local fishermen. Many of them think Vietnamese take their jobs."

Today the newcomers' grit and industriousness have secured them a presence from Texas to Mississippi visible in Vietnamese street signs, stores, churches.

wave of newcomers since the first Spanish missions to Florida in the late 1600s. French colonists settled near present-day Mobile in 1699. French Acadians ousted from Canada by the British settled in Louisiana in the late 1700s; today they're known as Cajuns.

American settlers floated down the Mississippi River and trekked from the Carolinas to Florida, Alabama, and Mississippi. Africans were brought aboard slave ships. Irish and Italians came to work the docks and markets of New Orleans. Cubans moved to Tampa to make cigars. Mexicans owned Texas.

In 1901 fortune seekers descended for the greatest free-for-all the coast has ever seen, when Pattillo Higgins and Capt. Anthony F. Lucas struck oil at a hill called Spindletop, near Beaumont, Texas.

With the air of an abandoned battlefield, the Spindletop field is a testament to the rapacious days of the birth of "big oil." Small pumps work slowly, arms rising and dipping like bowing birds sipping the last few barrels of producible oil. Scrap metal lies amid stagnant ponds and oil-blackened creeks. The hill—actually the top of a subterranean salt dome—is now a sunken pond.

"I love that smell of crude oil," oilman G. P. "Pete" Cokinos says, breathing deep. "When I was a kid, you could smell it all over Beaumont." Now 75, Pete remembers when wooden derricks were thick around Spindletop. He wears a Houston Astros cap and a jacket advertising Red Adair, fighter of oil-well fires, and drives his '74 Pontiac at high speed.

"The first well was right over here." Pete leads me to a small, oil-misted puddle. "This is where it began. It made this country great, created the machine age."

The find initiated a drilling boom that spread to Louisiana and inland to Oklahoma, one that has waned but never ended. Spindletop spawned Gulf Oil and Texaco. Houston was transformed from a railhead cow town into the undisputed oil capital of the world.

"I'm motivated by the idea of drilling a hole in the ground and producing energy," Pete says. "I'm attracted to success. You have to have bravado; it takes guts to put your nickel down and roll the dice.

"Some men want to go around the world, some want to go to the moon, and some want to drill oil wells; that's the way I feel about it.

"And it's a chance for instant riches." He grins wickedly. "This business is not just about romance."

Yet there is indeed a certain romance on a floating semisubmersible oil rig such as the Ocean America, 85 miles out in the Gulf of Mexico. The rig is owned and manned by the Diamond M-ODECO Corporation of Houston and leased by Chevron. Twenty-four hours a day lights burn and the rig screeches and throbs, biting through ocean floor that begins half a mile below us. The drilling industry first stepped into the Gulf in 1933, eventually creating on the continental shelf the most



A short swim is a big leap for the many thousands of illegal immigrants who cross the Rio Grande into Texas. Near a bridge in Brownsville, swimmers don dry clothes before attempting to melt into city crowds. Most are too savvy to leave on wet underwear, which soaks through trousers and marks them for the Border Patrol. Detainees (opposite) await processing by members of the thinly stretched patrol. They will be sent back to Mexico—over the bridge. extensively developed offshore fields in the world. Now Chevron and others are extending the search to the continental slope in ever deeper waters.

"Your average cost of a project out here is a billion dollars," says Chevron's representative on the rig, T. Wayne Brewster. "The bonanza is that fields are bigger. The inshore fields are petering out. This is the United States' energy future."

More than 20,000 wells have been drilled in Louisiana waters alone; altogether more than 3,800 structures have been placed on the Gulf's outer continental shelf. Generations of Gulf Coasters have left farms, swamps, and factories to make better wages offshore. Low oil prices in the mid-1980s sent the drilling industry into a tailspin, battering the economies of Texas and Louisiana. These days those who have jobs appreciate them, as 33-year-old Ray Brister makes clear when he walks me around the Ocean America.

"You're on the Cadillac rig in the Gulf of

Mexico," he says, leading me through a well-equipped workout room, a sauna, and a spacious bunk room. Ray clearly loves the mystique of the work. On the derrick floor a mudsplattered crew is "tripping pipe," retrieving and uncoupling it with massive pneumatic tongs and elbow grease.

"Look at this!" Ray says.

"Multimillion dollars' worth of equipment, and five guys running it. It's a macho job, and I love it, know what I mean? I love the stereotype: I'm a Texan, I'm a petroleum engineer, my job is oil."

Offshore industry is undeniably cleaner today than in the

past. "Things have changed," one worker told me. "When I started, the night crew dumped the trash overboard. Now you don't throw even a coffee cup."

Yet a whole complex of environmental ills clouds the Gulf Coast and the lives of its inhabitants, ranging from urban runoff and sewage, marine garbage, and oil spills to the unwanted—and until now largely ignored—side effects of sharing air and water with the nation's largest concentration of refineries and petrochemical plants.

More than 130 such plants line the Mississippi River between New Orleans and Baton Rouge. They are a mainstay of the region's revenues and employment. They are also known as Cancer Alley.

ana is one of the most polluted states in the nation," says Robert Wiygul of the Sierra Club Legal Defense Fund's New Orleans office. "Eighty percent of its water is fine, even beautiful. But the 20 percent that's bad is horrible. The state's cancer mortality rates are among the highest in the nation. Industry says it's because of life-style. Environmental groups say toxic discharges play a major role."

Many Gulf Coast communities face the same problem: dependence on industries whose by-products are potentially lethal. Galveston Bay, largest estuary in Texas, is second in the nation for seafood landings, producing two-thirds of Texas' oysters. It

also receives more than half Texas' wastewater.

"Half the chemical production capacity and a third of the refining capacity in the United States are located around Galveston Bay," says Linda Shead, director of the Galveston Bay Foundation, as we stand knee-deep in bathtubwarm water near a salt marsh. "What's amazing is that with all the insults it absorbs, the bay still produces."

The foundation members run an astonishing political gamut from the Sierra Club to the Houston Chamber of Commerce, all of which are in agreement on the goal—if not always

the means—of protecting the bay's health.

Eddie Seidensticker, with the U. S. Soil Conservation Service, helps lead volunteer efforts to replant damaged marsh grasses. "We've got environmental groups out here working alongside Exxon employees. You can throw up your hands and say, 'It's destroyed.' But no, this is still a very productive estuary, and it's worth saving."

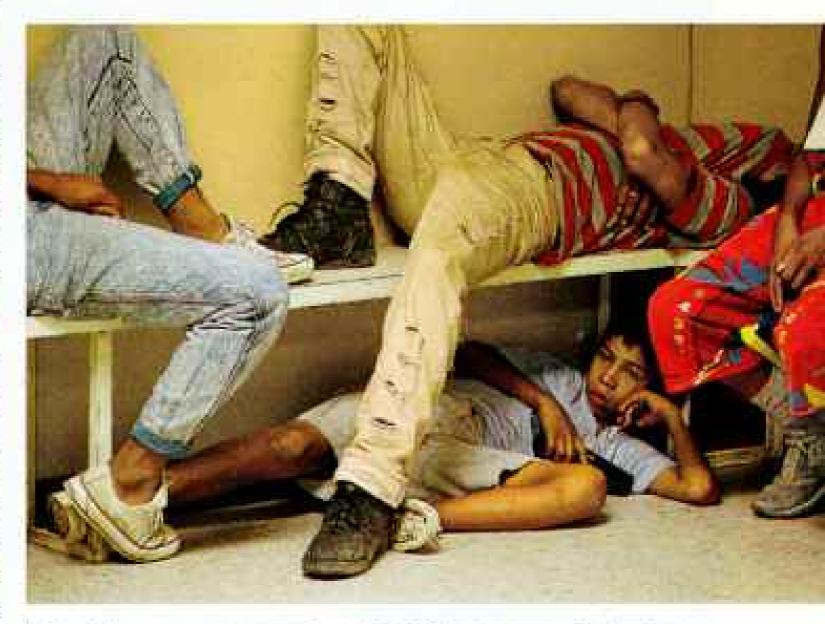
Upstream, industries line the banks of the nation's third busiest port, and stenches envelop us—some acid, some cloying, all foul. Yet Linda is, in the end, hopeful. Texas Governor Ann Richards has championed environmental quality, and new standards for toxic wastes are being formulated.

"Five years ago you never would have heard a Texas official use the word 'estuary,' "Linda says. "Now it's almost a household word."

Her face beams: "We're trying to turn Galveston Bay into Houston's front door instead of its back exit."

Linda's optimism is something that goes with calling oneself a Texan. Houstonians' optimism was put to the test in the mid1980s, when the oil-production slump put the city and state into recession. Yet the city has recovered, through refining and petrochemical strength and by diversifying into aerospace, biotechnology, and computers.

Unlike New Orleans, Houston cares what the world thinks of it. A nouveau riche world-energy capital, the city is also a national center of medicine and education



and a regional Gulf Coast power in business and the arts.

Southwest of Houston's last suburbs, the roads straighten and the towns come few and far between, a Dairy Queen on the outskirts of every one. I knew I was truly in Texas when the first jackrabbit made a broken-field dash across my path, and hawks perched on the posts of mile-long fences, and wildflowers carpeted the roadside. My foot grew heavier on the gas pedal as the two-lane blacktop arrowed through the flat coastal farmland,

Vietnamese teenagers make pocket money in Louisiana by "cooning" for oysters, finding them with hands and feet. Arriving on the bottom of the economic ladder in the 1970s and '80s, Southeast Asian refugees took the toughest jobs, many in fisheries. Despite backlash from some residents, they now are established as Gulf Coasters.

A joyride off a boat's bow ends a perfect outing for a boy loafing away a day on a canal near Bayou Black.





skirted bays, and crossed inlets on weathered concrete bridges. The pine forests were gone now; oceans of plowed earth surrounded farmstead islands, their signature live oaks bent by the constant wind. At a solitary cross-roads I turned to reenter the marsh.

For many of my early years I hunted in the Texas marsh. One indelible memory is of rank upon rank of snow geese flying out of the dawn as they came from Louisiana's rice fields after an ice storm. They settled in their tens of thousands, more geese than I had thought the world held, and their cries of alarm when hunters opened fire sounded like the voice of a city dying in conflagration, and the birds rose and fled in a cloud that filled the sky.

Three of every four migrating water birds



in North America visit the Gulf's winter wetlands, accompanied by hunters. One species will not be hunted again: the whooping cranes that fly from Canada to winter at Aransas National Wildlife Refuge.

Standing better than four feet high, the birds fell to hunters and fled human intrusion into the marshes until, in 1941, only 16 of this flock remained in the wild. Protection and management have nursed their numbers back to about 130. Still, they face an ever present danger from a sort of industrial migratory path, the Gulf Intracoastal Waterway.

"We're literally 15 seconds from disaster here," says refuge manager Brent Giezentanner. "There's billions of dollars' worth of cargo coming through the refuge every year, much of it hazardous material. It's not a question of if we'll have a spill, it's a question of when."

N EVERY STATE, I found an evolution in attitudes, a dawning realization that the most bountiful of resources are not infinite. The Gulf of Mexico Program, a state and federal effort led by the Environmental Protection Agency, is promoting 1992 as the "Year of the Gulf," and the Gulf as "America's Sea" (not forgetting Cuba's and Mexico's Gulf coastlines). Nearly enclosed, this vast basin connects with the larger world ocean only through the Yucatan Channel and the Straits of Florida, where the Gulf Stream begins. Floating trash seldom leaves the Gulf.

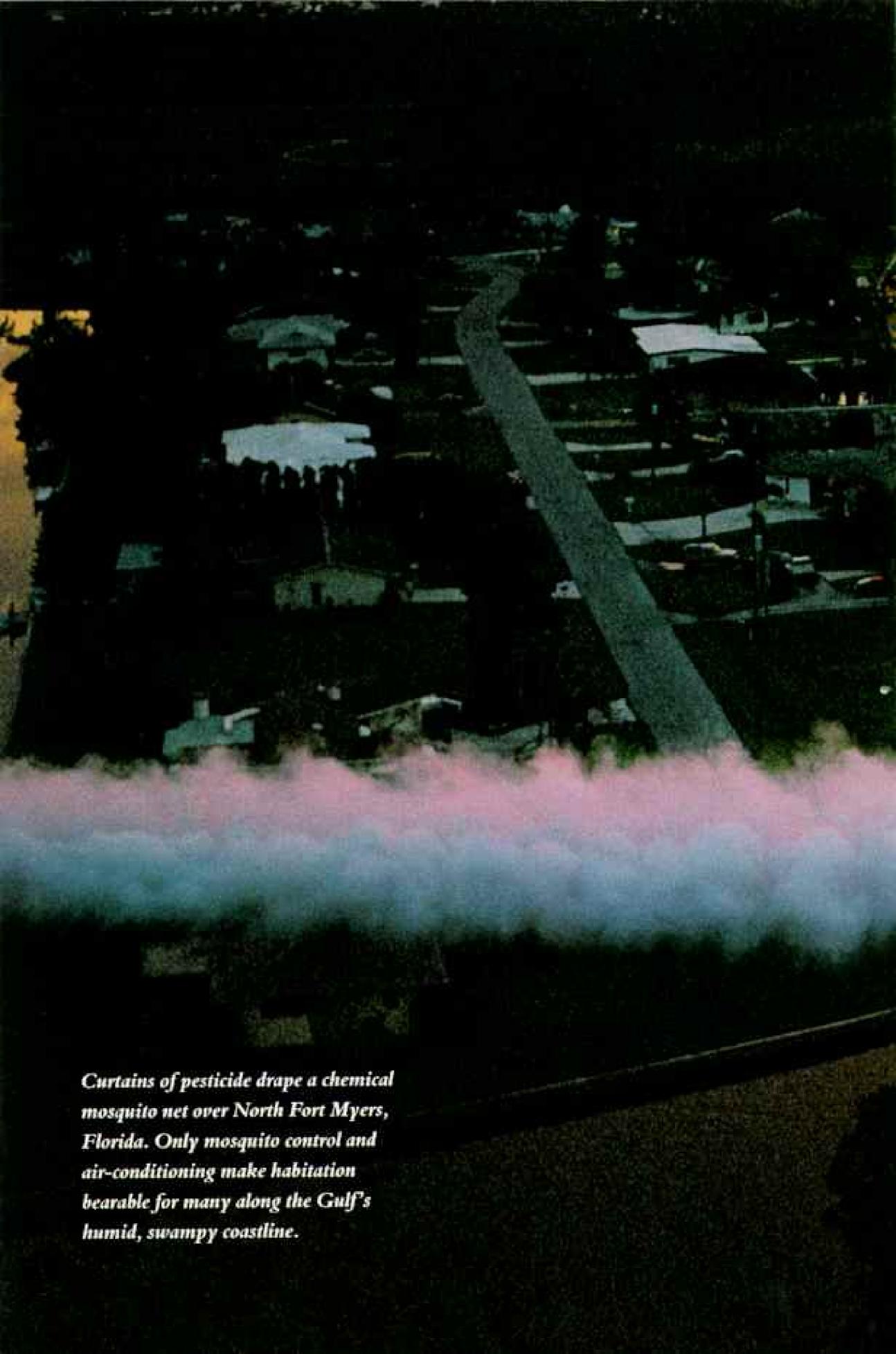
Gina Barron in Galveston runs the Texas Marine Mammal Stranding Network, whose concerns include toxin levels in the animals. "Dolphins eat the same kinds of things we eat," Gina says, "so what's happening to them could be happening to us."

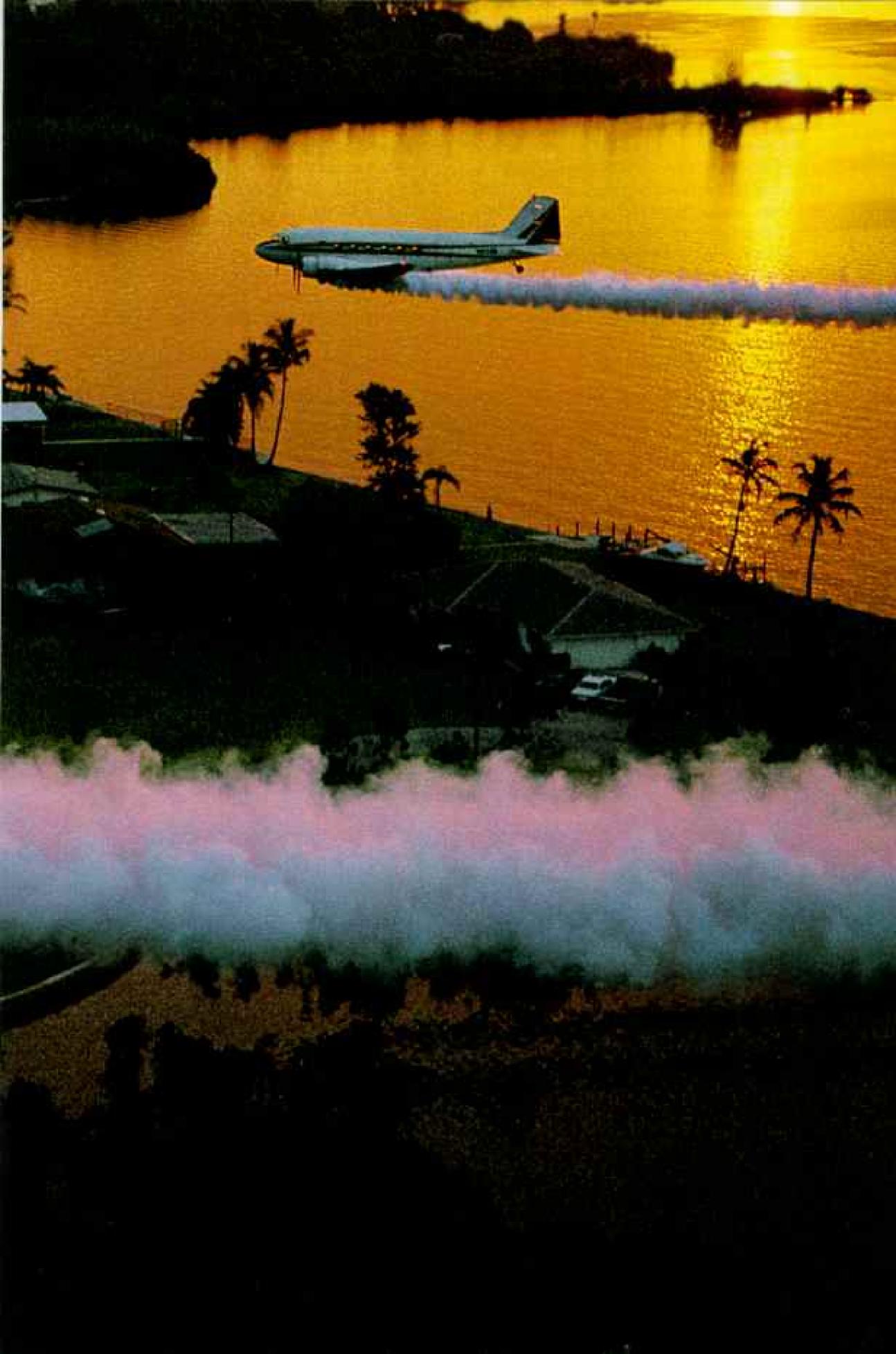
In a lab in Galveston, dolphins in various stages of decomposition lie on dissecting tables, ghastly under harsh light. Gina shows me plastic bags that have clogged the stomachs of dolphins, whales, and sea turtles.

"Basically these animals starved to death.

People think about dolphins as wonderful, free, majestic, living in this expansive ocean.

That's not the way it is. These animals are swimming in garbage and feeding on it, and it's killing them. A lot of people think they'd like to be a dolphin. I wouldn't." None too soon, an international agreement endorsed by the U. S. last year bans virtually all shipgenerated trash dumping in the Gulf.





Texas beaches offer a sweep and emptiness rarely found on the U. S. Gulf Coast: Padre Island National Seashore runs for 68 undeveloped miles, most of it accessible only by four-wheel drive—a haven of solitude. Mustang Island at its north end is not so empty. Condos there house "winter Texans," inlanders who have discovered the coast's low cost of living and some of the nation's last reasonably priced seaside real estate.

Across the bay Corpus Christi wears a prosperous face of smart new hotels along its curving waterfront: The city has remade itself from a drab port into a draw for tourism and conventions. Refineries twinkle in the night on its outskirts. Not far south on the coast road a sign warns, "Next Gas 50 Miles." I soon entered the King Ranch, the largest privately owned ranch in the continental United States, and a kingdom unto itself.

A retired ranch manager, Leonard Stiles, drove me to remote corners seldom seen by human eyes. Yet, startlingly, as we neared the highway, we spied two figures in the brush, walking north. "Those are illegals," Leonard said. "They follow power lines and drink at windmills."

In Brownsville, I watch from the bank of



Congealed tallow, spilled in careless loading, cakes the Houston Ship Channel at the top of Galveston Bay. Animal fat is one of the less toxic substances to find its way into Texas' leading estuary for seafood production. Around the Gulf, pollution from shipping, industrial effluent, and urban runoff taints some of the nation's richest marine nursery grounds.

the Rio Grande as illegal immigrants swim into the U. S. beneath the Gateway Bridge, while officials process legal entrants over their heads. Changing into dry clothes, swimmers quickly blend into the city crowds.

Meanwhile, on nearby South Padre Island, a condo-and-hotel Oz that has sprung from the sand in the past 20 years, fresh-faced college students on spring break tap beer kegs and play volleyball on the beach. A short walk from where I stand, over Brownsville's Gateway Bridge, the Third World begins. due east to the other end of the U. S. Gulf Coast—to Florida. Here the modern world abruptly ends at the Everglades' Ten Thousand Islands. The Glades have a history of lawlessness begun by pirates, picked up with gusto by plume hunters and Prohibition-era rumrunners, and carried on today by drug smugglers.

Still, crime is not the region's big problem: It's that too many people would like to live here. Studies indicate that coastal Florida—both Gulf and Atlantic—will lead the nation in population growth into the next century. Already more than a quarter of a million single-family houses exist between Sarasota and Marco Island, and 900,000 people live in the area. Yet 700,000 lots remain to be built upon; population could double by the middle of the next century.

To Kevin Erwin, an ecologist and native Floridian, these unbuilt lots are time bombs. "Massive subdivisions were laid out before we had the environmental considerations

now taken into account. Acres
of natural habitat have been
dredged and scored with roads:
The next decade will be critical
as these areas populate. The
question is, by 2050 will we
have functioning natural systems or mere slivers of green?"

Inland from the coastal interstate, old Cracker Florida lives along back roads where country stores advertise smoked mullet and boiled peanuts, and stacks of fat watermelons stand by crushed-shell crossroads. Scant miles away an empire of extravagance is beaded along choice waterfront real estate that looks toward the setting sun.

Where Boca Grande pass meets the sea, between Fort Myers and Sarasota, shiny-scaled giants roll in the pass, flashing in the sun. Tarpon hold a mystique unequaled by any other inshore game fish, and I felt it when tarpon twice took my hook with a pull like a nuclear sub. Both fish got away, but I wasn't disappointed at connecting for a few long minutes with a primal force.

Almost all tarpon fishing is catch-andrelease, and my guide, 24-year-old Ed Walker, approves. "A biologist told me that a 175-pound tarpon is around 50 years old. That fish has been swimming around since World War II. I'll never kill another tarpon; it'd be like killing your grandmother."

Ed's expertise costs \$300 a day, but the fishing is free at a defunct bridge near St. Petersburg that is billed as the world's longest fishing pier. Country music played, fireworks flared, and beer cans popped on a damp July night.

"This is the poor man's paradise," a young shipyard worker named Joe told me as toddler Joey wandered by, tethered by the ankle to a tarpaulin tent erected on the concrete where the family was camped for the weekend. "This is the last free fun you can have. The thing is, in Florida the pay is low. You can't afford to pay to do anything, so you go fishing."

Downtown Tampa looks anything but poverty-stricken: A flight above it reveals docks and shipyards, railroads, skyscrapers, and factories. A banking and business center, it long ago outstripped sibling St. Petersburg,



Doing dirty work for an important cause, Gina Barron of the Texas Marine Mammal Stranding Network documents dead bottlenose dolphins. Necropsies, including tissue analysis, may help determine why the animals died and yield clues about marine pollution. Some of the dolphins, whales, and sea turtles Barron finds have starved after swallowing floating plastic.



whose tastes run to beach and tennis. St.

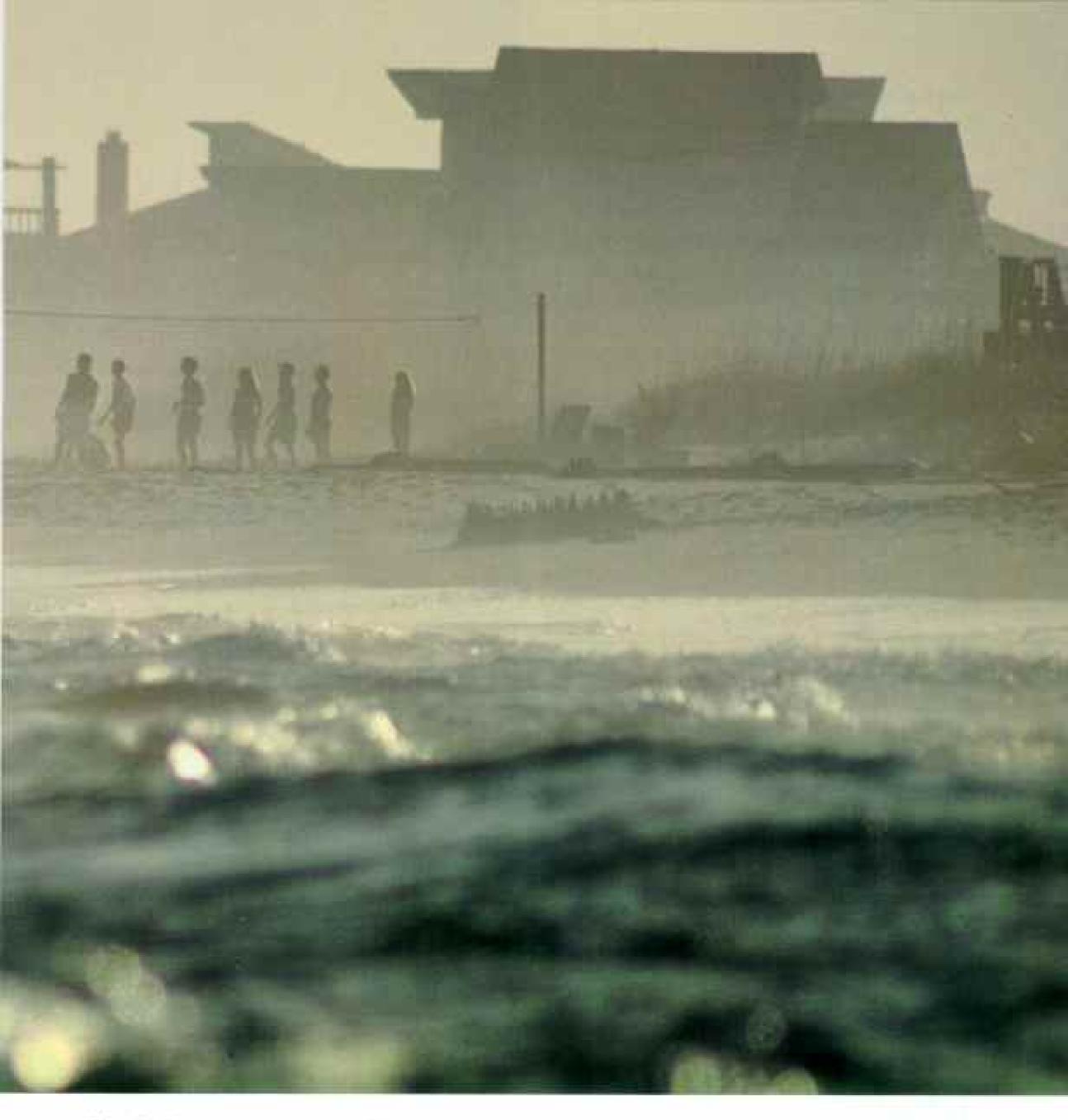
Pete's true glory is embodied for me by the

Don CeSar resort hotel, a recently renovated
pink stucco confection where parasailers float
from boat-drawn parachutes and the air is
thick with scents of cocoa butter and Chanel
No. 5 and perhaps a lingering trace of the gin
slings doubtless consumed by Zelda and F.
Scott Fitzgerald in the hotel's heyday.

Elephants, antelope, and Cape buffalo graze in Tampa's Busch Gardens. Tourist Florida has always featured a never-neverland appeal. At Homosassa Springs State Wildlife Park, 60 miles up the coast, manatees fan around park ranger Betsy Dearth in a springwater enclosure during public programs. But tourism is secondary to the park's main purpose: rehabilitating injured manatees and when possible returning members of the endangered species to the wild.

These unlikeliest looking of mammals weigh as much as a ton and a half, with strange, bristling mouths and undersized flippers on sausage-like bodies. Yet I found myself mesmerized by the grace of the sea cows when I was allowed to snorkel among them.

"They have no natural enemies, only man," Betsy tells me. "Canal floodgates crush them, propellers cut them, and swimmers and divers harass them." About 2,000



West Indian manatees live in Florida waters. In 1991 fatalities exceeded 170—more than the population can sustain and survive.

Waterway speed limits and restricted zones to protect manatees irk some boaters, but I believe their minds would change if they could meet a sea cow face-to-face. Born in captivity, 500-pound "Betsy" wriggled as she swam past, pup-like in her agility, and turned to nibble at my wet suit. Her elders glided below like slabs of seafloor.

"You like to be an optimist and say it's going to work out," the human Betsy said. "The manatees were here first. We ought to be willing to share the water with them." A thin and ephemeral strand separates the Gulf of Mexico from condos and houses in Gulf Shores, Alabama, near the mouth of Mobile Bay. In 1979 Hurricane Frederic's tides spilled across the finger of sand on which the city stands. Yet public hunger for seaside living has since turned the former village into a hot spot along the Deep South riviera.

Mardi Gras bacchants hit fever pitch at the Endymion Extravaganza in New Orleans' Superdome. The city's exalted pursuit of pleasure stems from Mediterranean and Caribbean roots nourished in the coast's multicultural soil. A French legacy that arrived with the region's early colonists runs from Alabama to Texas. In Biloxi, Mississippi, the king and queen of the Shrimp Festival preside over a Cajun-style fais-dodo, or country-dance.



lit shopping center marks the edge of the west coast's sprawling shoreline development; beyond lie some 200 miles of wilderness coast interrupted only by a few resort villages and fishing hamlets. Much of the area was owned by timber companies, the premier local industry. In 1986 the Nature Conservancy bought 70 miles of untouched coastal wetlands and resold them to the state at cost, joining them to state and federal refuges to ensure a wild future for an astounding length of coastline.

Birds hoot and cackle like the sound track to a Tarzan movie on Snake Key in Cedar Keys National Wildlife Refuge. From end to end the island's trees are festooned with

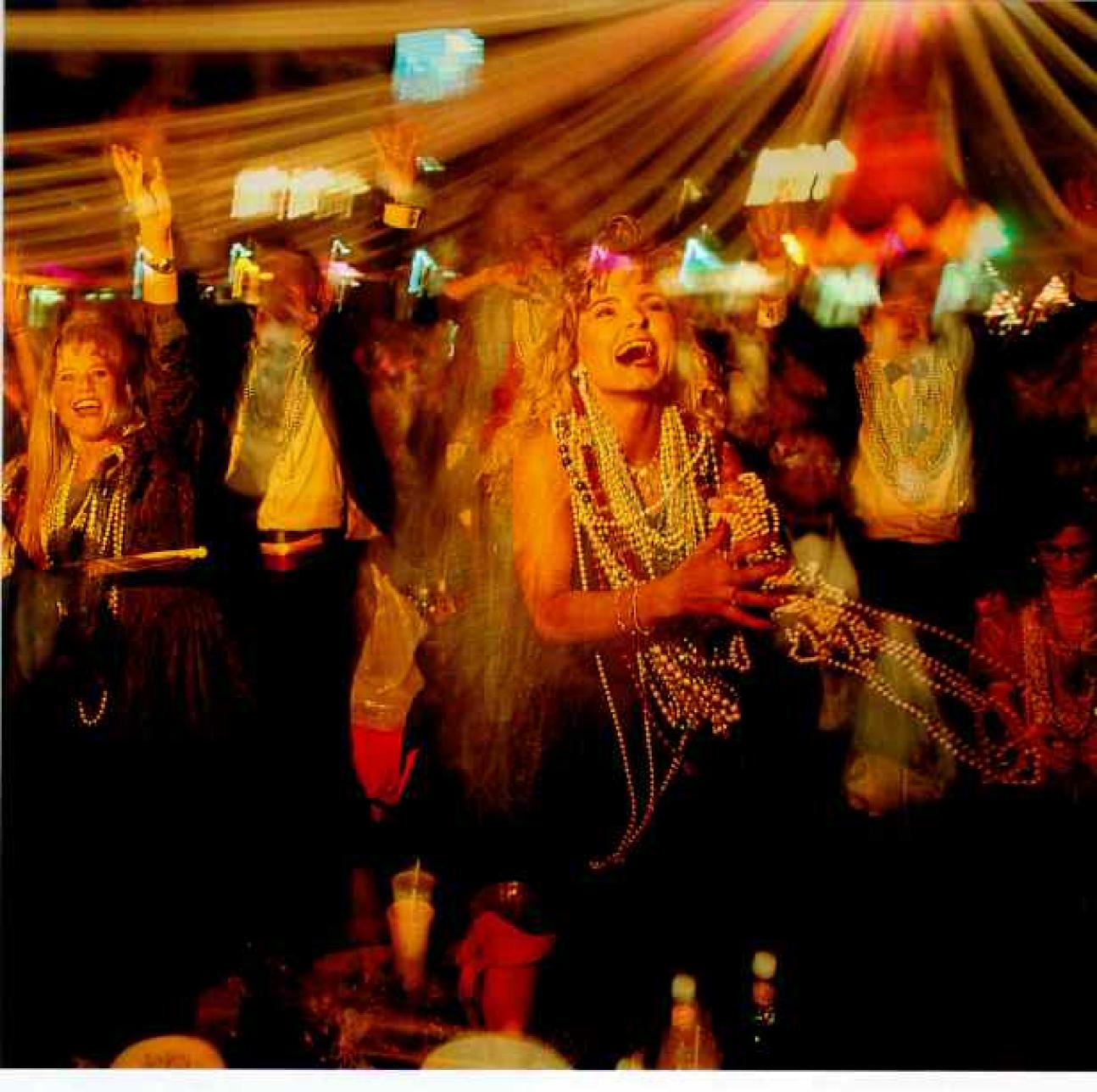


nesting pelicans and white ibis like ripe fruit in the dark foliage.

"This is the Florida of myth and legend," says marine biologist Anne Rudloe. "It still exists. This island is alive!"

In the gentle elbow of the Florida Bend, pine forest sweeps down to marsh and water. Vast beds of sea grasses along the shallow shore create a habitat comparable in fecundity to marsh. The grasses thrive, warmed by the clear Loop Current that swings through the northeastern Gulf before exiting at the Straits of Florida as the Gulf Stream.

"If you want to see the diversity of life on the planet, grass beds are a good place to come," Anne says as we snorkel shallow submarine forests where sea horses drift through



glades carpeted with life-encrusted mussels and conch shells.

The bend has been blessed with isolation: Its sandy soils supported little agriculture, and offshore sandbars made navigation dangerous. "So it was hard to get here, and there was no reason to come," Anne says happily.

"Native Americans have the concept of sacred places," she adds. "This is a sacred place for me."

Strip development like southwest Florida's resumes near Panama City, a working port and laid-back resort town, and continues intermittently along the Panhandle's sugar-sand beaches to the state's border. Here gracious homes for officers and green drill fields bordered by oaks and crepe myrtles bestow

an aura of gentility to Pensacola Naval Air Station. But life is anything but gentle for aviation officer candidates on Black Wednesday, when the newest class in a 45-year-long chain of aspiring aviators undergoes an introduction to 14 weeks of initial training. At 5 a.m. the barracks' quiet is rived with drumbeaten trash-can lids as senior candidates and instructors rouse the "poopies."

They rush from rooms where they have slept fully clothed, awaiting this moment. I see young faces vacant with terror, slack-jawed with shock and shattered slumber. One-third of the men and women—some already in the Navy, others newly volunteered civilians—will wash out in the upcoming weeks.

"When I say 'Move,' I mean go so fast I can't see where your body is," shouts the squad's Marine Corps drill instructor. A short, spare man, he seems to tower over his charges as they perform push-ups on the lino-leum before rushing to the "Rose Garden," a sandlot bordered by a few ironic flowers where calisthenics take on new meanings of suffering.

"For the next four months it's going to be you and me," the drill instructor bellows. "So don't go thinking about your dadgone sweetheart back home. I'm going to be your dadgone boyfriend, dadgone husband, dadgone wife and girlfriend. And you will do exactly what I say. Do I make myself clear?"

HE CANDIDATES' private hell illsuits the tranquil setting of the
Gulf Coast. On a night when the
full moon rose from the sea over
Scorpius's tail, the world seemed held in mystic equilibrium as no breath of air moved, no
wave rippled. Orange lightning writhed on
the horizon; frogs sang in the woods, and a
whippoorwill called across the marsh. This is
indeed a soft coast, a coast of pastels and starlight, and its gentle beauty makes it all the
harder to accept the unimaginable violence of
the hurricanes that sweep out of the sea to
alter land and lives.

An average of two hurricanes make landfall yearly between the Florida Keys and the
Mexican border. One of my earliest memories
is from June 1957, when the eye of Hurricane
Audrey brought a 15-foot wall of water that
pushed deep into Cameron Parish, Louisiana.
A few miles away in my grandparents' house
in Port Arthur, Texas, the frame bungalow
trembled with wind, vibrated and fluted and
moaned, while a roaring across the rooftop as
of a demented god reduced my elders to
shouts as they wondered whether we had
waited too late to evacuate.

Audrey's worst anger missed us, or we might not have seen another dawn—my mother lost friends in Cameron that night, and others of her friends lost family. One schoolmate held her aged father in her arms while she fought water moccasins in the treetop where she clung. Sometime in the night, he died of heart failure. Stories of suffering and death and bravery and endurance can be unearthed almost anywhere around the Gulf where empty lots and bare pilings

remember communities that never recovered.

My first-ever visit to Mobile was in September 1979, the morning after Hurricane Frederic had mauled the treasured live oaks and piled the streets with the jetsam of roofs and broken windows. Today no sign of the trauma remains, although a mention of Frederic brings an awed remembrance from anyone who lived through it.

Some changes are not visible but are more significant than any storm. A reorganization of city government in 1985 brought black citizens into Mobile's power structure for the first time.

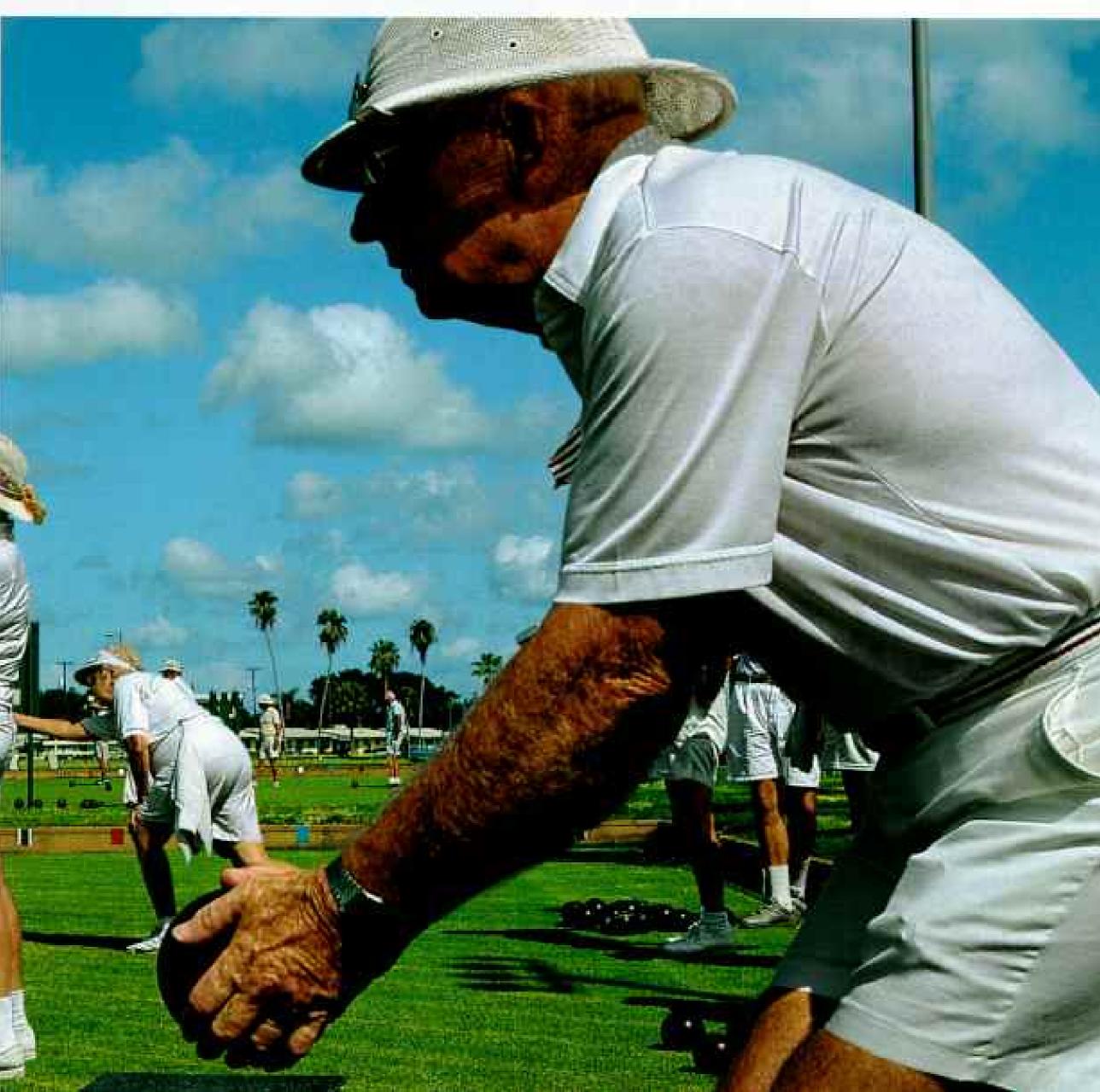
"Blacks make up 40 percent of the population here," says Anthony Carter, a black man who started Mobile's first affirmative action program in 1978. "The overt prejudice





The sporting life wears well past middle age at the lawn bowling club in Florida's Sun City Center, a retirement community where the median age is 72 and yearly income is more than \$45,000. Florida's coast has been a retirement draw for a century; that here has now spread to Texas.

Once the sport of millionaires, tarpon fishing promises a \$165,000 purse at Boca Grande's tournament, where volunteers try to revive and release tarpon at dockside.



Who's afraid of a ten-foot gator? Not five-yearold Jonathan Cunningham, who accompanies his father on hunts near their home in Morgan City, Louisiana. A family friend killed this one. From condominiums to stilt shacks, Gulf Coasters are never very far from their natural inheritance of waters and wetlands, and the fecund Gulf that sustains them.

that existed prior to the change in the form of government, when people would come out and make overt racial statements, is gone; you never know who's going to be sitting on the city council, taking bids on contracts. By and large, Mobile today is a very pluralistic city.

"Black leaders in Mobile have been educators, teachers, and preachers," Anthony tells me. "Now businesspeople must get involved. What black folks really want, when you think of it, is part of the economic pie."

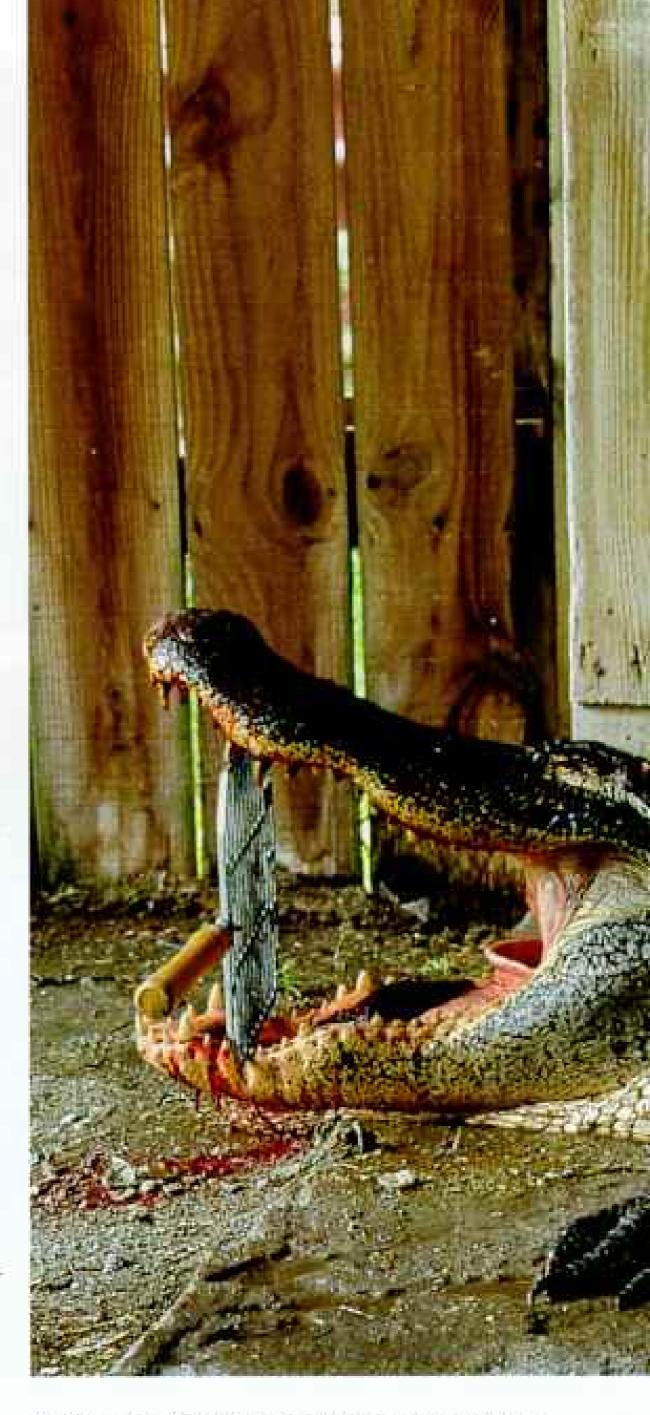
ald skein of barrier islands that drapes along Mississippi's coast and ends off Louisiana's tattered brocade of marsh.

Among them is Mississippi's Horn Island, a wilderness component of the Gulf Islands National Seashore. Reachable only by boat, the island preserves a tangle of salt-tolerant trees and creepers little changed in nature since the coast was created.

The island served as inspiration and solace for artist Walter Anderson, who sailed or rowed the 12 offshore miles from his home in Ocean Springs, Mississippi, at every opportunity his troubled life allowed.

Anderson struggled with mental illness all his years, and from the struggle came piercing insights into the natural dimension he entered on Horn Island. Now gaining national recognition for his work, Anderson, who died in 1965, sketched and painted everything Horn Island has to offer, from its bonsai-like, wind-stunted trees to the creatures of its beach, woods, waters, and air. He kept a log of its animals and moods, living simply and probing deeply into the intertwined destinies of man and animals and planet.

Bald eagles raised a fledgling on Horn Island last year, the first breeding the birds have achieved in Mississippi for 50 years.



Red wolves have been bred there for release in other parts of the Southeast, and two pairs have been set free on the island. Raccoons, once the bane of campers, have reverted to their natural wariness since the wolves arrived, seldom straying onto the beach from the refuge of the trees.

I camped on Horn Island with my brother, Steve, who has made his home on Louisiana's coast, near our family roots. We built a fire in the intertidal zone where the waves would wash away our traces, and waded the



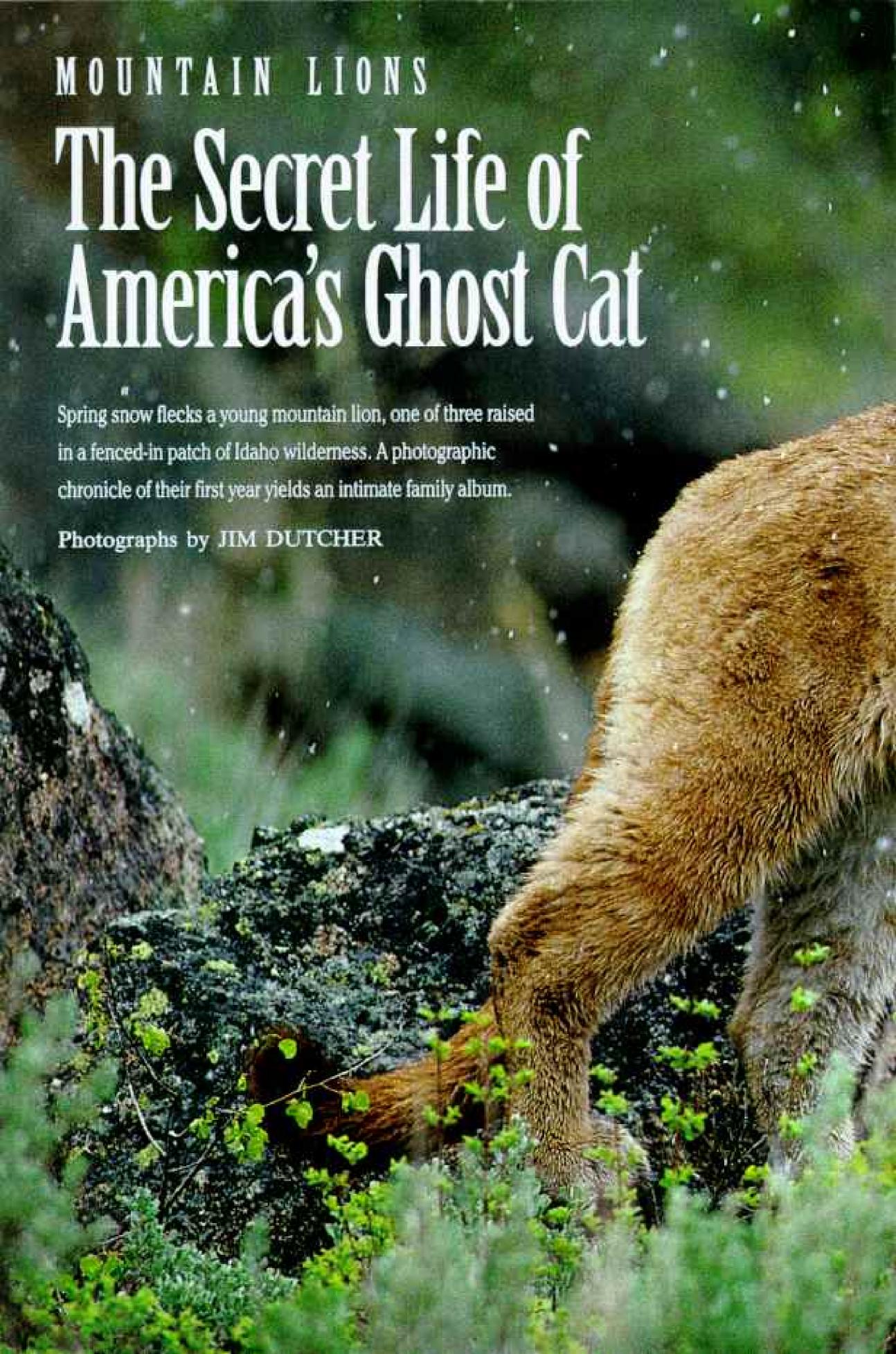
shallows, gigging flounder. We set our tent where the breeze blew through all night long, clean and cleansing from the Gulf.

At dawn, ramparts of cloud stood off the island, glowering and shining in the sun's first rays. A stack of frigatebirds hovered on an invisible current, and I remembered a line Anderson wrote: "Birds are holes in heaven through which man may pass."

Steve and I walked the seaward shore at first light, picking among the flotsam of civilization washed up on the beach, looking out to a green horizon unblemished in its purity.

"Look down," Steve said, stopping still.

At our feet a line of clawed tracks ran down the tide line. We followed them over dunes, around horseshoe-crab shells and buoys and bottles, found where they stopped by a lagoon to investigate an alligator's crawl, then meandered through driftwood and came close by our tent. The wolf had passed us untroubled while we slept in the night breeze—all natives returned to the sandy soil of home.







he mountain lion is everywhere, and nowhere. Its wanderings marked by prints and kills, the cat remains maddeningly elusive. Even its name defies confinement: Generations of hunters have dubbed it cougar, panther, puma, painter, catamount, and more. Unlike lions and tigers, the mountain lion cannot roar, but it can purr. That silence-punctuated only occasionally by a how! that can sound like a woman's scream - adds to the cougar's mystique. A pregnant female named Catrina, from the Boise zoo, provided a chance to observe the animal at length in its natural habitat. Idaho filmmaker Jim Dutcher (below) and leading mountain lion expert Maurice Hornocker released Catrina into an enclosure encompassing five acres of rugged hillside, sagebrush flats, a stream, and an aspen grove. There Catrina (left, at right) bore her kittens.







eatness never counts when sevenweek-old kittens devour dinner (below), but a bath is always within paw's reach (right). Blue eyes first open at ten days and soon turn amber; spotted markings disappear in months. This family lived



briefly in the enclosure, isolated from
Catrina. A tiny snarl (following pages)
illustrates an observation Hornocker
made of Catrina's litter: "They were
tame for their first two months, then,
suddenly, they were wild animals."









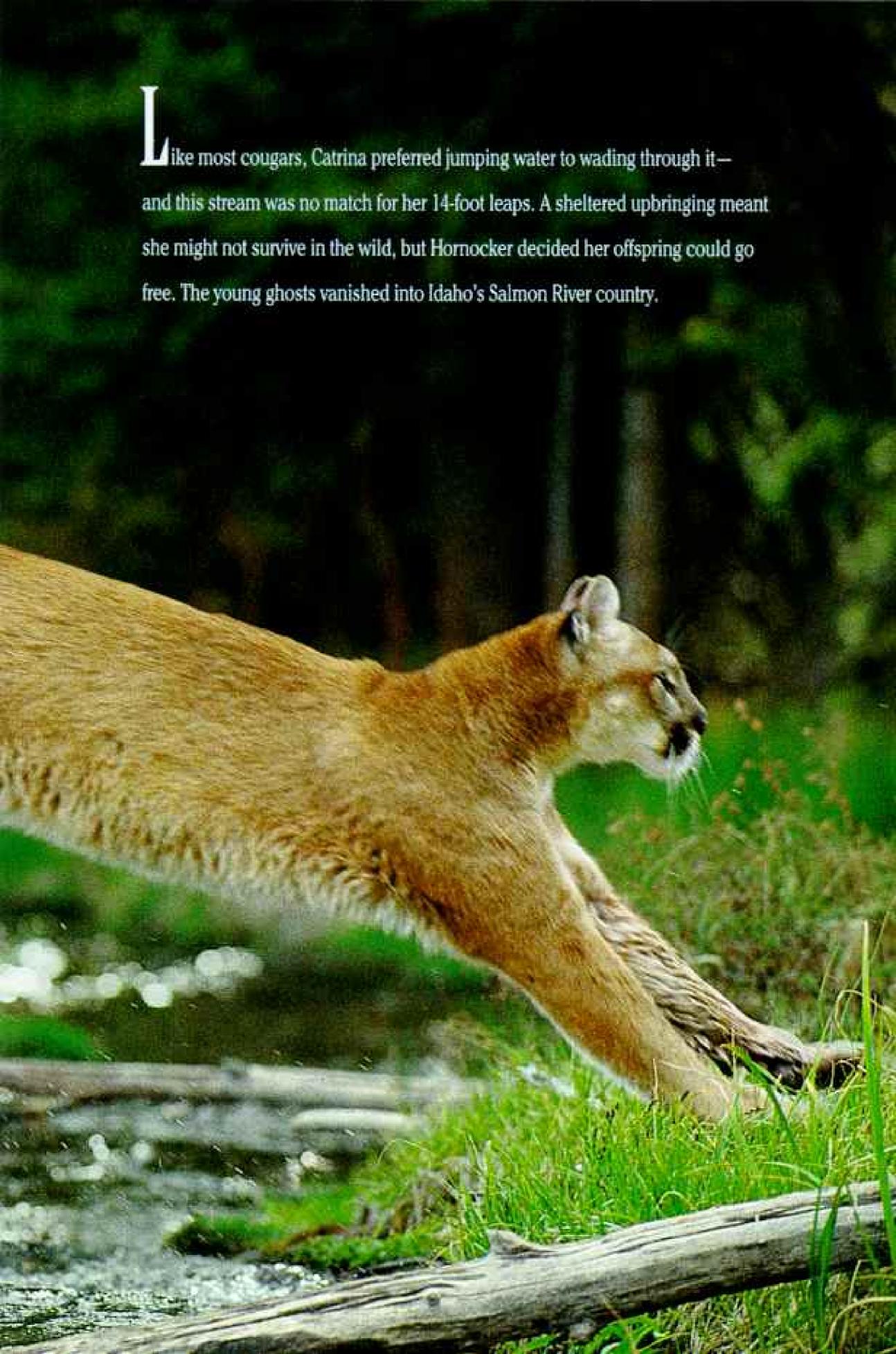


Thildren at play, mother at work: Catrina leaps on a year-old kitten—now nearly her own size—her jaws landing squarely on its back, where mountain lions often seize their prey. In another lion lesson she pins a kitten to the ground (right). Raised in captivity, Catrina amazed Hornocker with her hunting skills: "Her genetics overrode her experience." When a 150-pound elk calf was released in the enclosure, photographer Dutcher recalls, "She knew exactly what to do."









Learning to Live With Mountain Lions

By MAURICE G. HORNOCKER

Photographs by GEORGE F. MOBLEY NATIONAL GEOGRAPHIC PHOTOGRAPHIER



Drugged, tagged, and prodded for blood, a seven-month-old mountain lion gets intensive care from researchers in Yellowstone
National Park. He will be freed wearing a radio collar, one of 28 local cougars whose behavior is monitored as part of the author's research project. The cats prey mainly on elk, which are abundant in the area. Dedicated researcher Greg Felzien (above, at right, and opposite) was following a cat in February when he was killed by an avalanche.

OMETHING WAS WATCHING ME. I stopped. Not a leaf moved, not a bird called. Then, less than a hundred feet away in the aspens, I saw him. Just his face, eyes like amber, whiskers bristling in the late afternoon sun.

Felis concolor, cat of one color, the ghost of North America. Also known as cougar, panther, puma, painter, catamount, or, most commonly, the mountain lion. It was 1965. I was just beginning my life's work of trying to understand these secretive and elusive cats. That effort had not been going well.

A few years earlier, after five years of grizzly bear research with wildlife biologist John Craighead and his brother, Frank, I had sought a project of my own. John encouraged me to tackle something tough.

Mountain lions seemed not only challenging but also romantic.

Once they prowled the entire continent. But after centuries of ruthless extermination, they had been confined to a few wild spots.

In the early 1960s mountain lions were still considered vermin. Farmers, ranchers, and hunters were trying to rid the world of these great cats. And we knew almost nothing about them.

Many colleagues discouraged me. Hunters told me that lions



ranged across hundreds of miles. Friends said I would never be able to keep track of the animals.

Moreover, most mountain lions live in rugged high country. They are best tracked in snow. That meant living in tents in winter, tracking with dogs in often intense cold, then treeing, tranquilizing, and marking. But I was optimistic. By capturing and recapturing, and each time making painstaking observations, I hoped to build a fund of information about these mysterious animals.

I began in January 1963, marking 14 lions within a hundred miles of Missoula, Montana. But by spring most of those 14 had been shot by hunters. So I moved next season as far from civilization as I could get in the lower 48 states, to the Idaho Primitive Area, a roadless wilderness in the Salmon River country.

I hired Wilbur Wiles, the best professional cougar tracker in Idaho. Still, that first winter we couldn't find enough lions for a valid study. I was beginning to think maybe my colleagues were right. A meaningful study of mountain lions might be impossible. I decided to expand the study area, and in the summer of 1965 I backpacked into the wilderness to scout new terrain.

At the mouth of a small canyon, I noticed a series of fresh scrapes - piles of



leaves, soil, and twigs that male lions scratch together to mark their territory. I forced my way through the underbrush up the narrow canyon and suddenly broke into a beautiful mountain meadow ringed by aspen groves. It was then that I felt those eyes.

I don't know how long we stared at each other. I was transfixed, mesmerized by the moment. Every other lion I had seen had been treed, snarling at the dogs below, or helplessly drugged by the tranquilizers we use to safely tag them. Eventually, this lion broke our gaze, turned his head slowly, and with majestic grace leaped into full view. Then he was gone.

I can still see his eyes. I've often thought he was a good omen. He was indeed a turning point: The next winter's work went extremely well.

OR TEN YEARS our team covered thousands of miles in Idaho tracking lions.

Our findings, the first scientific documentation of how a mountain lion population lives, laid to rest two of the myths long used to justify eradicating the big cats.

First, we proved that mountain lions will never overrun the countryside. These animals are very territorial and limit their own numbers. The size of a mountain lion's territory is determined by the food supply. Only so many cats can live in a given area.

Second, our research debunked the idea that lions are a danger to big-game herds. Lions kill deer and elk routinely, but most of their prey are very young or very old, not of breeding age. In fact, during our study, deer and elk populations actually increased, while the number of lions remained stable. Food supply, hunting, and weather, we discovered, determine deer and elk numbers.

MAURICE G. HORNOCKER is founder-director of the Idaho-based Hornocker Wildlife Research Institute, a nonprofit research-and-education foundation. He reported on his first years of research in "Stalking the Mountain Lion—to Save Him" in the November 1969 NATIONAL GEOGRAPHIC.



Today every state with lions except Texas regulates the killing of the animal. Consequently, lions have made an amazing comeback, repopulating former habitats in the West and sometimes startling humans who have moved into those areas.

Mountain lions are indeed back. The question is: Can we make room for them? That means understanding them still better so we can develop appropriate management programs. It also means understanding the often emotional issues of the people who will live with them.

"Lord of stealthy murder, facing his doom with a heart both craven and cruel." So wrote Theodore Roosevelt about mountain lions
at the beginning of this century. His attitude was the prevalent one
among European settlers of North America, who saw the lion as a competitor
for deer and other game and as a danger to their livestock. Bounties were

paid for panther skins. Courthouse records from Centre County, Pennsylvania, show that one local hunter killed 64 lions between 1820 and 1845. During those 25 years an estimated 600 cats were killed in that county alone.

Indiscriminate killing of wildlife, along with massive habitat destruction,

Mountain Lions 55

A RESEARCH

PROJECT

IN PART

SUPPORTED

wiped out lions in the East outside Florida. Deer too were decimated. Pennsylvania, for example, was forced to import 50 white-tailed deer from Michigan in 1906 to repopulate the forests. Ironically, Pennsylvania, like much of the East, is now overrun with deer, but no one has documented the presence of their top predator, the panther, since the turn of the century.

Mexico in 1984, when the Department of Game and Fish invited me to conduct a tenyear research project on the cats.

I hired an experienced husband-and-wife biologist team, Ken Logan and Linda Sweanor, to lead the study. We selected the San Andres Mountains, an 80-mile-long range in the Chihuahuan Desert, for our mountain lion laboratory. Isolated on the edge of the White Sands Missile Range, these mountains have been protected from outside influences for the past 47 years.

We spent the first five years, from 1985 to 1990, studying basic lion ecology in the 750-square-mile area. Then, after determining the population dynamics were stable, we decided to simulate a catastrophe by relocating 13 of the 20 resident lions in one-third of the study area to another part of the state. The lions in the other sections were left undisturbed.

The purpose is twofold. First, we want to document the rebuilding of the remaining lion population. How long will it take? How will behavior be affected? Where will the new lions come from? Just as important, we need to know how the transplanted lions react to their new location. This will help us determine how feasible it is to relocate problem lions rather than kill them.

Second, we want to document how the removal of such a major predator from the San Andres

ecosystem affects the cougar's main prey, the resident mule deer.

Unlike my early days in Idaho, we now have the benefit of sophisticated radiotracking devices. We can capture an animal using harmless foot snares, radio collar it, and then track its movements remotely until the battery needs replacing in about two years. Since 1985, working with veteran trapper Frank Smith, we have marked 148 animals. We found that the study area supports only 30 adult resident lions at any one time. The others have died or grown up and moved on.

We need to keep in touch with each animal at least once a week, and frequently more often. Because the study area is so huge, we travel the back roads with four-wheel-drive vehicles equipped with radio receivers and fly the territory in a plane with an antenna on each wing. We can pick up an individual's transmitter from as far as 60 miles away. Locations are recorded on a contour map, to be analyzed later with a computer.

We have made thousands of radiotelemetry observations. For instance, we can tell when a male and female are mating. Lions are solitary animals, and there's no other reason for two to get together for several days. We therefore know the







Touchy business, researcher
Ken Logan jabs a female with
a tranquilizer needle in New
Mexico's San Andres Mountains. In 1990 the author
(above, at right, and left,
leading the way with a captured cougar) and his team
began moving 13 lions to an
area 300 miles away. He hopes
to reintroduce cougars to
former habitats.

fathers of most kittens—and even when they were conceived. We've also learned that at any one time there are 15 to 30 dependent kittens in the study area.

We can observe not only birth but also death—often from fighting. Our radio collars emit a different, mortality signal when lions remain motionless for six hours. Thus, when two males come together, we assume they are fighting. When one is killed, the mortality signal comes on, and we know which did the killing.

We've never actually witnessed a fight, but, because the winner usually lays up to recuperate for a few days afterward, we have often captured the victor. Our most infamous fighter was number 22, a big male I nicknamed Atilla because of his extreme aggression. We would locate him near a resident female, and the next day her mortality signal would go off. During our study he killed three females. Some of the victims' skulls had been crushed and had tooth-puncture wounds.

Eventually, Atilla met his match. He was killed by another big resident male within that lion's territory. When we examined Atilla's skull, we found he had been severely injured early in life. Had that head injury affected his behavior?



Led to a kitten by its radio-collared mother, New Mexico researchers Ken Logan and Linda Sweanor tag one ear, tattoo the other, and make sure it returns to mother with a clean face. Gloves and a sack help keep human scents off the kitten. Aggression, we discovered, is a major difference between the lions of New Mexico and those of Idaho. In Idaho both males and females lived peaceably, seldom fighting. In the San Andres, fighting—often to the death—is common. San Andres males also kill females and kittens.

Why the difference? In the desert, food is limited, and natural selection may favor a more aggressive cat. In Idaho, where food is abundant, aggression is not as necessary.

The two populations also differ in birthing dates and weaning ages of kittens. In New Mexico, kittens are born year-round and are usually on their own by the time they reach 14 months. In Idaho, most kittens are born in spring and stay with their mothers for 18 to 20 months. We speculate that in the relatively peaceful Idaho environment kittens benefit from a longer period of learning from their mothers. They must learn to kill elk, which requires great skill.

In 1990 we began simulating the catastrophe in the San Andres. With cooperation from ranchers in northern New Mexico we had relocated 13 lions, 11 adults and two subadults, by June 1991. What would happen when we released a sizable number of socially related lions into another area? Would they settle down?

One young male, number 88, headed south, roaming widely, then disappeared. Four months later, while making her weekly tracking flight over the San Andres Mountains, Linda heard an unexpected signal—from number 88. Somehow he had found his way home across a distance of 300 air miles.

We continue to monitor the transplanted cats. Four of them have settled in, including one female that bred right away with a local lion and gave birth to five kittens. Two transplants were killed by resident males, and two others died from injuries sustained from hunting mule deer or elk. The rest are wandering.

We have learned that reestablishing a big carnivore in a new area is not easy; several releases are probably necessary. Unquestionably there will one day be attempts to reintroduce mountain lions into parts of the East. Our studies will help them succeed.

lowstone. When the park was established in 1872, it hosted not only mountain lions and grizzlies but also wolves and coyotes. When I worked with the Craigheads, however, the mountain lion had virtually disappeared. In the early 1900s it was federal policy to kill large predators to protect game in the park.

By the 1970s lions had returned in numbers to the Yellowstone area just north of the park. I was determined to find out if they were back in the park itself.

In January 1986, with the blessing of park officials, my longtime associate Gary Koehler set out for the backcountry on skis and snowshoes and soon found tracks of three or more individuals. Skiing around a rocky outcrop, he came across a fresh elk carcass. He realized a lion was probably nearby, so he barked like a dog

to spook the animal, which then bounded up a tree. Gary often used this trick to get a closer look at a lion.

I had many questions about these new lions in Yellowstone. How were they affecting the abundant elk population? How would that abundance affect the cougars? Would there be more mountain lions? Would their territories be smaller? Would their litter sizes increase?

With support from the National Geographic Society, the National Wildlife Federation, the Richard King Mellon Foundation, and others, we have begun to answer those questions.

Our team is led by biologist Kerry Murphy, a graduate student under my direction. Collecting data in the wilderness is not possible without dedicated researchers, and the dangers can sometimes lead to tragedy. Last winter a young colleague, Greg Felzien, was killed by an avalanche while tracking a mountain lion through the snow. LETTE CONTROLLED TO THE CONTRO

California demonstrators won a state ban on mountain lion hunting in 1990. Today some 5,000 cougars may roam the state, and encounters with humans are on the rise. In March a nine-year-old boy was mauled in a state park near 5anta Barbara.

We now estimate that the northern

Yellowstone region holds 18 resident adults. Despite the area's vast size, it has just 300 square miles of suitable winter range for cats. The cougars behave much like the Idaho cats. The major differences are that, as in New Mexico, kittens leave the mother earlier and much fighting occurs.

I think territorial instability causes the fighting. Hunters north of the park often kill male cougars straying beyond its borders. Other mountain lions then move into a victim's territory and fight like new cats on a city block. In remote Idaho there was far less hunting pressure, and territories weren't continually up for grabs.

We can't explain why Yellowstone kittens leave their mothers earlier. In Idaho we thought kittens benefited by learning from their mothers how to kill elk, but elk are a big part of the diet in Yellowstone too.

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ILLING AN ELK demonstrates the lions' extraordinary predatory skills. While no one has witnessed the occurrence, Greg came close. He was tracking a big Yellowstone male in order to replace his radio collar and came across the huge carcass of a recently killed bull elk lying flat on its back. Its neck had been broken and its antiers driven nine inches into the ground by its fall. An animal weighing 150 pounds had destroyed one weighing 800.

Following the tracks in the snow, Greg saw how the lion had approached unseen and leaped on the bull. The startled animal bolted forward with the lion grasping and twisting the bull's massive neck muscles. The forward thrust, combined with the lion's exquisitely timed twisting, was probably what caused the bull's neck to break.

The most adept large carnivore in this country, the mountain lion evolved as a lone killer. In contrast, wolves hunt in packs when attacking a big elk. Bears, which mostly eat vegetation, are incompetent compared with lions.

Most carnivores are generalists, able to get by on varied diets. Coyotes will eat watermelons and grapes as well as meat. Lions, however, are specialized killing machines. Their teeth, claws, speed, and clusiveness are designed to bring down fresh meat. They prefer to kill their own food, rarely eating carrion. They are at the apex of the food chain, and thus they reflect the general health of the ecosystem.

We've learned that in Yellowstone packs of coyotes will usurp a lion's kill. So will bears. In parts of Montana, wolves are also displacing lions at their kills. In fact, one of our main concerns is to determine how wolves and mountain lions will coexist. There is no information on this, and lions inhabit every region of the West where officials are considering reintroducing wolves.

As mountain lion numbers increase, their coexistence with humans becomes a more urgent issue. In places such as the foothills of the Rocky Mountains outside Boulder, Colorado, people have moved into the lion's historic home. Certain individual lions show little fear of humans, and while most Boulder residents appreciate the presence of such a beautiful and mysterious animal, they are also concerned about the safety of their children and pets.

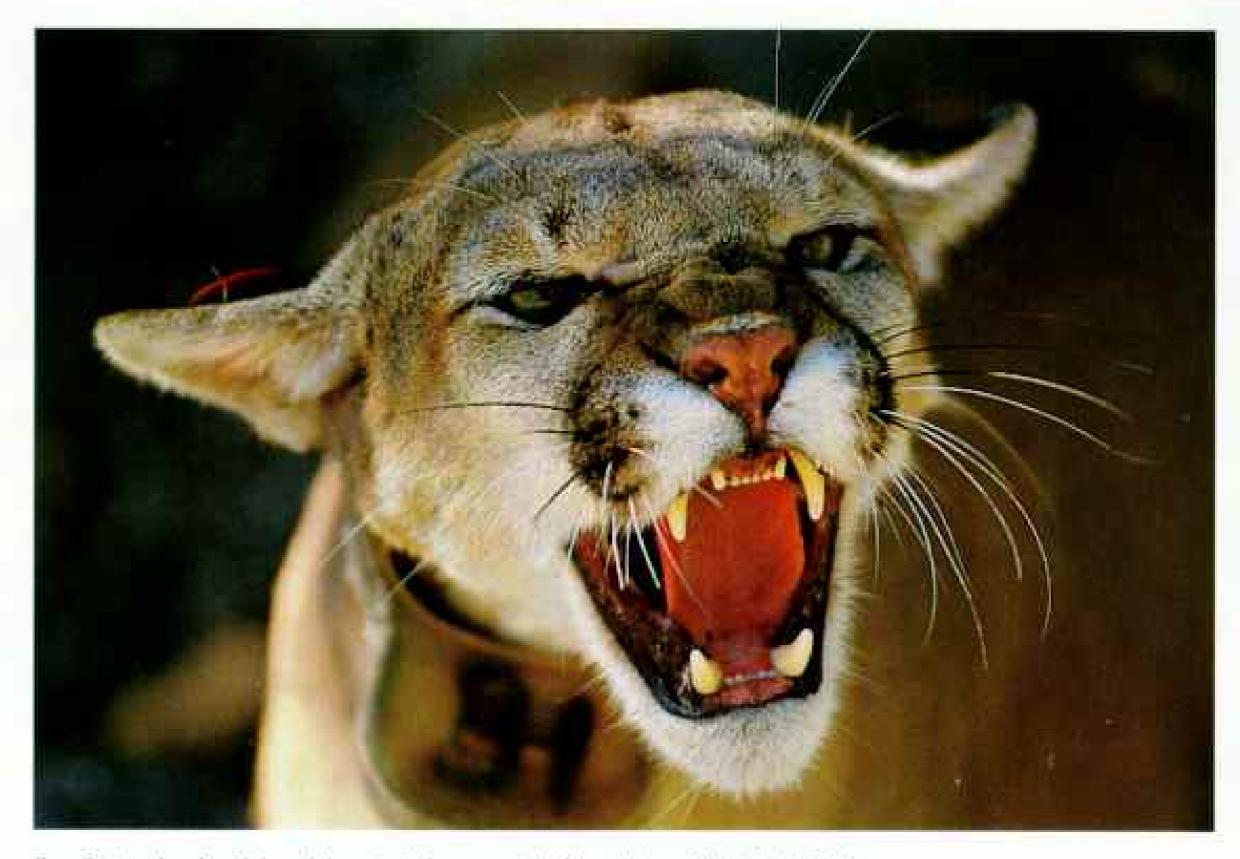
Occasionally lions—usually young and inexperienced—attack humans. California biologist Paul Beier has examined records of unprovoked attacks in the United States and Canada between 1890 and 1990. Of the 53 documented attacks nine were fatal. By comparison he notes that about 40 people a year die from bee stings and some 80 from lightning strikes in the United States.

Thirty of the 53 attacks on humans occurred in British Columbia. Twenty took place on Vancouver Island, where mountain lions have been hunted intensely since the island was settled. Vancouver lions are extremely aggressive. Perhaps the hunting pressure has genetically selected the most aggressive as survivors.

Mountain lions have created anxious moments recently in the United States, approaching people in Texas at Big Bend National Park, in northwestern Montana, and in California. And there have been tragedies. In 1989 a lion killed a five-year-old boy near Missoula. Two years later an 18-year-old Colorado man was killed while jogging on an abandoned logging road. Wildlife officials in the West now promote lion-safety guidelines, much as they do with bears. Visitors to lion habitat should carry a big stick and make noise as they hike to let the animal know they are approaching. Lions are intimidated by height, so if a cougar is sighted in the area, parents should put their children on their shoulders. If attacked, a person should not run, nor should he play dead. Stand firm, fight back, and yell—most people who have resisted an attack have successfully fought off the lion.

Despite their increasing and sometimes frightening presence, mountain lions have been winning greater protection. In 1990 in California, where perhaps as many as 5,000 lions range up and down the coastal mountains as well as the Sierra Nevada and southeastern deserts, voters handed lions a historic victory. A powerful coalition of environmentalists orchestrated the passage of Proposition 117, which bans sport hunting of lions. At a rally a young woman from the Mountain Lion Foundation told me, "We don't believe it is ethically or morally correct to kill such splendid animals just for trophies."

The new law does allow depredatory animals to be killed, however. It also mandates that the state spend 30 million dollars a year for the next 30 years to protect the habitat of lions, deer, and various endangered species. Even so, environmentalist leader Margaret Owings worries: "We should be doing more. There are so many people and only so much land."



Ears flattened and teeth bared threateningly, a mountain lion will most likely back off from a human—in a hundred years fewer than 60 attacks have been recorded in the U. S. and Canada. Cougars like this New Mexico cat can kill animals eight times their size.

Not everyone celebrated Proposition 117's victory. "We face real problems with increasing numbers of lions, and now it is difficult to do much about it," says Terry Mansfield, the biologist in charge of the state's lion programs. "With more people and more lions, encounters will increase. I believe that in certain situations we need to hunt lions to protect property and lives."

THE MOUNTAIN LION is also receiving extraordinary public support in Florida, where a subspecies, the Florida panther, has barely hung on in the pine forests and oak hammocks in and around the Big Cypress Swamp. Protected by state law since 1958, the panther was championed by a campaign of school-children and named the official state animal in 1982.

The Florida Department of Transportation, moreover, has spent millions of dollars building wildlife crossings beneath Alligator Alley, the stretch of

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The Florida panther's peril makes bleak reading on Route 29 in the Big Cypress Swamp (above), but rescue efforts may detour the road to extinction. Treed by dogs, a cat (left) will be tranquilized with darts and fall onto cushions. Researchers give medical care, change radio collars, and often collect sperm for an artificial insemination program. "On private lands the population appears stable," says state veterinarian Melody Roelke (below), cradling a panther's head during an examination. In the Everglades the last known female died in 1991.



Interstate 75 from Fort Lauderdale to Naples. Cutting through lion habitat, the road has been a threat to the 30 to 50 remaining adults. Automobiles have killed five panthers since the highway was built in the 1960s.

I drove Alligator Alley recently, getting out at each wildlife crossing to look for panther tracks. Fences funnel animals approaching the road into the underpasses. I saw many signs of raccoons, otters, deer, opossums, and alligators. But no lion tracks. There just aren't that many panthers left. Nevertheless, Florida biologists assured me the underpasses are working.

Inevitably a much greater threat to the panthers is the state's population growth. "A thousand people a day are moving to Florida," said state biologist Dave Maehr, who heads up panther research in southern Florida. " "Panthers can live fairly close to our developments if we don't destroy their habitat. But they can't live in subdivisions or orange groves."

Florida has also witnessed a controversy over captive breeding. Melody Roelke, the state's panther veterinarian since 1983, believes that individuals must be captured and bred in order to safeguard the wild population.

"The population is so low now and problems from inbreeding so dismal that any environmental glitch could wipe them out," she said. "Captive breeding is an insurance policy."

Others argue that it is just as dangerous to the subspecies—and ethically improper—to remove any animal from the wild.

After an intense political battle, the Florida Panther Interagency Committee approved a breeding program. In 1991 six kittens of known parentage were captured; kittens with different genetic traits will join them to build a breeding stock whose descendants will eventually be released. Someday, biologists hope to release panthers all across their original range. That takes in much of the Southeast.

BACK HOME IN IDAHO I flew to Running Creek Ranch, a wilderness research facility I had established along the Selway River, thanks to a generous donation of land from Edward and Binnie Houghton. With funding from the National Geographic Society I had built a naturalistic enclosure of nearly two acres. In it we had placed Catrina, a five-year-old lioness reared in the Boise zoo that had been studied in an earlier enclosure experiment (pages 38-51).

"Catrina had company the other morning," reported ranch manager Tony Wright. "She and a wild female were practically touching noses at the fence."

This was not the first wild cousin to visit. Tony had seen tracks of at least two wild males at the fence.

Our research plans called for Catrina to mate with another tame cat. We would then raise different litters under different conditions, taking one family from the enclosure before the kittens' eyes had opened. Conducting a series of experiments, we would test such behaviors as the kittens' response time to simulated prey, their attack modes on larger prey, and their responses to a human dummy. The goal is to learn which behaviors are innate and which are learned. Such research might help us understand, for instance, why some populations are more aggressive around humans.

I believe certain behaviors, such as aggression, are genetic. If so, we could change the behavior of wild populations by replacing more aggressive individuals with less aggressive ones, much as humans have done with domesticated animals. I also believe other behaviors, such as the killing of livestock, are learned. Lions kill sheep in some regions and not in others. We should be able to test this with one generation of captive offspring.

Our answers, unfortunately, will be delayed. Shortly after my return, Catrina

*David S. Maehr co-authored a report on the social ecology of the Florida panther that appeared in the autumn 1991 issue of RESEARCH & EXPLORATION, a quarterly publication of the National Geographic Society.



"The Florida panther doesn't exist," declares Frank Weed, 76, who breeds western cougars for sale on his south Florida spread. "There's no real difference between it and panthers from Montana." Geneticists disagree sharply—and another battle line is drawn over Teddy Roosevelt's "shy and elusive... bloodthirsty and ferocious" cat.

escaped her enclosure. Mistaken for a wild lion, she was killed by a hunter half a mile away. We will soon continue the research with a new female. The answers will be invaluable as mountain lions and humans increasingly confront each other on common ground.

Flying high over the Idaho wilderness recently, I looked down and thought: Mountain lions have room here, the right kind of room. If we maintain it as wilderness and give them half a chance, they will always be here.

I thought too of Catrina and recalled what D. H. Lawrence wrote, lamenting the death of a lion in the mountains of his beloved New Mexico:

And I think in this empty world there was room for me and a mountain lion.

And I think in the world beyond, how easily we might spare a million or two of humans

And never miss them.

Yet what a gap in the world, the missing white frost-face of that slim yellow mountain lion!

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Albania Opens

By DUSKO DODER
Photographs by
NICOLE
BENGIVENO

working bus is a prize to grab in Tirana, the poorest capital in Europe, where trips to find jobs or goods often lead nowhere. $Albanians\ still$ pay a heavy price for the 40 years Stalinist dictator Enver Hoxha kept their nation isolated from the world.



the Door



hile Hoxha's handpicked successor, Ramiz
Alia (right), presided over
the dissolution of communism in Albania, the next
generation—brandishing
national flags with the star
removed—demanded a
voice. "We used to have a
rabbit inside of us," said
an artist sick of repression,
"but now a big dog is barking all the time."





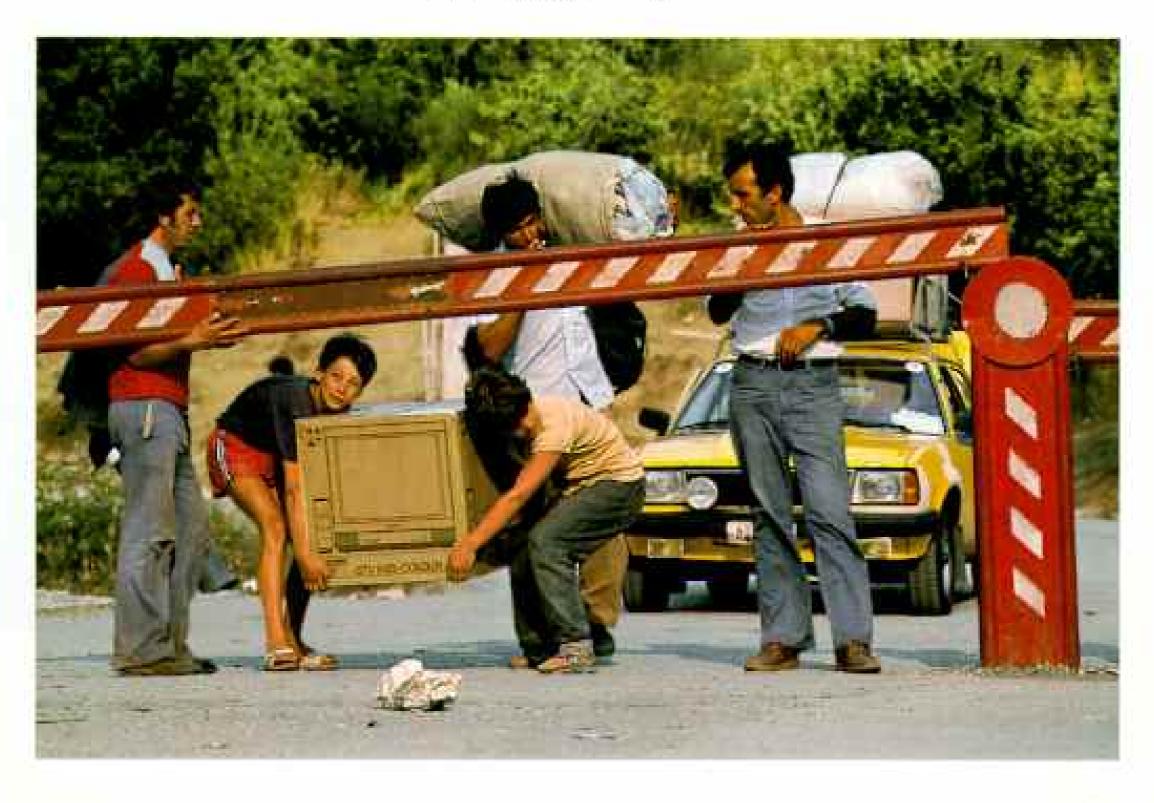






reedom equals escape for those besieging the Yugoslav Embassy for visas or swarming a ship in hopes of a passage to $Italy-or\ anywhere.$

To entrepreneurs, freedom equals goods from Greece, where they swap livestock for electronics and appliances.





Shopping for food is like stalking prey," says photographer Bengiveno. Shortages are chronic, and loaves from a state-run bread factory (right) are gone by afternoon. So when bread made with donated Turkish flour goes on sale, crowds clamor at a bakery that must keep its loaves behind barred doors.





onto a secluded country road, I followed the rusty signs, leaving a cloud of dust and the noisy world of Yugoslavia behind, heading into the austere land of Albania. With each mile the road grew bumpier and narrower. Centuries fell away.

I call it a road for convenience' sake. I wondered if it had been deliberately kept in poor repair to discourage invasion, a problem for Albania since the dawn of time. A few sticks of dynamite would have been sufficient to set boulders tumbling down to seal off the border.



The mountainous road from Sarandë to Vlorë follows the rugged Ionian coast. Below, a beach stretches for empty miles. Off-limits under the Hoxha regime, the undeveloped coast could become an asset for tourism.

It was New Year's Eve 1990. I approached Albania for the first time, with a mixture of uncertainty and trepidation. As a foreign correspondent, I had lived in several communist countries, and this one had the reputation of being the most repressive and paranoid of all.

A country slightly larger than Maryland, with a population of 3.4 million, Albania was just opening its borders to the outside world. Under Enver Hoxha, who ruled Albania like a feudal fiefdom from 1944 until his death in 1985, the country became a Stalinist time capsule, one of the world's cruelest dictatorships, where wives of disgraced party members were ordered to divorce their husbands, where beards were banned, where all foreign credits and business were forbidden, where religion was outlawed, and where criticizing food shortages could land you and your relatives in prison. Even tourists were unwelcome. As Hoxha put it: "Why should we turn our country into an inn with doors flung open to pigs and sows?"

I drove as far as no-man's-land, between Yugoslavia and the border station at Hani i Hotit, and halted the car. Somewhere here was the epicenter of my world. Behind me, in the Montenegrin mountains, was the boyhood home of my father; straight ahead and 20 miles south was the city of Shkodër, where my maternal grandparents once lived.

The air was damp, perfumed with the scent of Adriatic flowers. My serenity was broken by a group of bedraggled travelers from Yugoslavia. They were hauling bags and suitcases along a lifeless, single-track road toward rolls of barbed wire and grim-faced guards watching Albania's border. I stared at the travelers for a long time.

If my widowed paternal grandmother had not moved to St. Louis with her sons and daughters, I could well have been among those people lugging their suitcases to the border. But would I still be me? Was I one of them? This was to become my recurring fancy on my journey into Albania, which I would visit six times in 1991, just as the country was making its painful transition from communism and Hoxha's demented legacy.

The border guard rolled back an iron gate and smiled at me. He showed me where to park, then climbed the steps into the dingy customs station. I followed.

Another group of men and women was leaving—the first of a trickle of legal visitors to Yugoslavia, where they saw relatives from whom they had been cut off for more than four decades.

Wordlessly, a 30-something border guard leafed through my passport, lingering over each stamp as if it contained a secret code. When he was done, he passed my documents to another man, and then he shocked me by addressing me in flawless English.

"Come, let me buy you a drink while you're waiting for your passport." He had taught himself English by listening to foreignlanguage broadcasts on the radio, a crime punishable by prison under Hoxha.

The guard led me away, and we sipped sweet coffee and a sweet Albanian Riesling in another room. He insisted on paying, a native instinct for hospitality I was to encounter time and again. And he did not protest when I placed a carton of cigarettes on his desk. Within minutes of entering Albania, I discovered that even the most Orwellian of dictators had been unable to suppress human nature completely. There was hope here.

things, I sped along the road toward the capital, Tirana, regretting that I knew so little about my ancestors. I had never inquired why my mother's parents moved to Austria-Hungary, but undoubtedly they left for the same reason thousands of Albanians emigrate today, to search for a better life.

Mother's parents and four brothers had died by the time she was in her teens, and she never set foot in Albania. She had to submerge her identity after she married into a Serb family, and after the communists seized power, she had no further contact with Albania.

Even after Hoxha died and revolution swept communism from the rest of Eastern Europe in 1989, Albania remained a country apart, still stubbornly communist, a land that had wandered away from the known world and meant to stay that way. Hoxba's heir, Ramiz Alia, upheld the draconian tradition.

Only in 1990 did revolutionary waves begin spilling over into the Land of the Eagle, as the Albanians call their country. In July a crowd of 5,700 stormed foreign missions in Tirana, demanding that the government allow them to emigrate. In December students took to the streets calling for reforms; riots broke out; and the economy unraveled. The first alternative



Mountains claim all but the coastal plain, sheltering descendants of indigenous clans said by Roman historians to have been good fighters and good drinkers. Rome ruled Albania for more than five centuries. Despite two millennia of conquest the people remain 90 percent Shqiptarë, or ethnic Albanian. The language

comes from ancient Illyrian, the predominantly Muslim faith from 15th-century invasion.

AREA: 28,748 sq km (11,100 sq mi). POPULATION: 3,376,000. GOVERNMENT: Democratic. LITERACY: 85%. LIFE EXPECTANCY: 73 years.



party was formed, and some political prisoners were released. Alia's government was forced to stage multiparty elections; in March 1991 a pluralistic parliament was elected.

The Hoxha nightmare was finally ending. But I soon discovered that it would take years, perhaps generations, for Albania to catch up with the modern world. Driving through the countryside for nearly an hour, I saw no other cars. Now and then a Chinese-made truck, sheep-faced and indestructible, appeared in a swirl of dust ahead. Cows, pigs, ducks, and chickens—moving along the road with complete impartiality—slowed me down. So did wheelbarrows and oxcarts, which shared the road with peasants on foot and on donkey.

I saw three schoolchildren, no more than ten years old, standing by the road and stopped to pick them up. They wore a sort of school uniform, black dresses with red neckerchiefs. Unable to speak their language, I offered each of them a banana. They giggled nervously and declined to eat. I doubt if they had ever seen the fruit before. It was also my impression that they had never been inside a passenger car. They did not know how to sit, how to open the

Shut away no longer, former political prisoners seek redress for their outcast families.

Gjon Mark Ndou (right, in dark jacket) was jailed in a cramped cell for 25 years. For themselves and for the nation, says an Albanian intellectual, "they need to tell their stories." In May government workers removed the remains of Enver Hoxha from his regal tomb (below) for reburial in a public cemetery.







door. One of the girls just stared at me with her mouth open.

As soon as I stopped the car and opened the door to let them out, they scampered down the mountainside as if they had just escaped from a spaceship.

The towns I passed through had a gaunt, untidy look; the shops were shabby and virtually empty. In one store all I found was two sacks of potatoes, four moldy cabbages, and a few cans of fish.

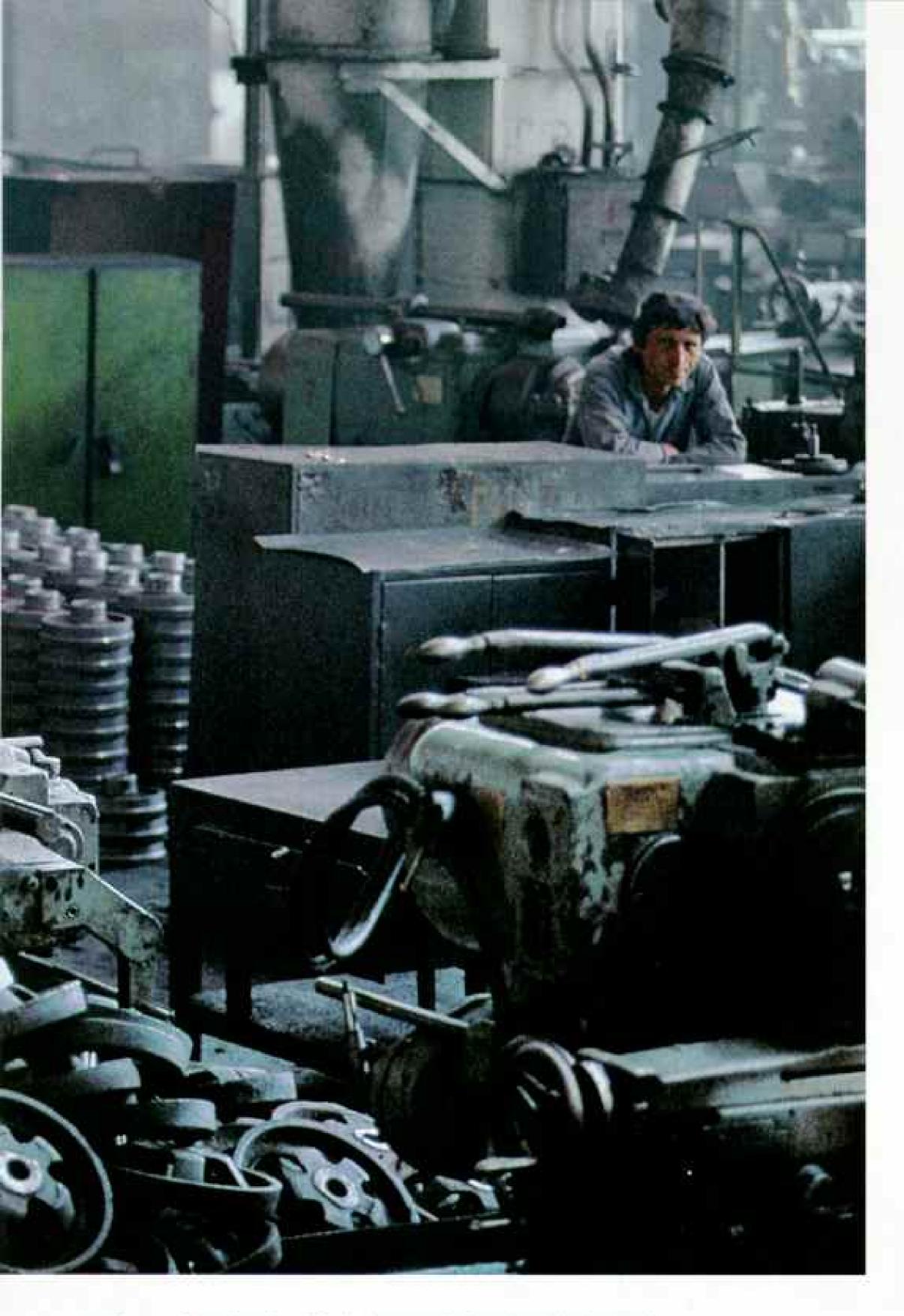
DUSKO DODER, winner of the Overseas Press Club award for his reporting from Moscow, is a freelance journalist based in Belgrade, Yugoslavia. His forthcoming book on Albania will be published by Times Books. NICOLE BENGIVENO is a staff photographer for the New York Duily News. This is her first story for the Geographic. The experience underlined how much Hoxha's socialist propaganda of progress was a piece of Balkan theater. Although the dictator had been dead for more than five years, his spirit lived on. In early 1991 Hoxha's statue still dominated every city and town, his visage touched up to look handsome, wise, caring, and fatherly.

I entered Tirana just as the capital city was waking from its long sleep. Amid the faded grandeur of the main squares and streets, hopeful people talked of little else but politics. Loggers, factory workers, students, and clerks stood in the middle of the street, chatting as if to make up for all the lost time.

Hundreds of them flocked daily to the offices of the new Democratic Party. This frigid perch—the villa that the communist



Tending Soviet- and Chinese-made machinery a generation old, a worker makes slow progress in a factory that converts scrap metal into tractor parts. The average weekly wage was only 250 leks—about five dollars—in early 1992, and unemployment approached 80 percent. Western economists



say that undoing decades of Stalinist central planning will take another ten years. Even initiative has to be learned. Officials at the University of Tirana want to invite U. S. economists to help train faculty members. But, says a vice-rector, "We really have no idea how to begin to make contacts."



A river of promenaders crests nightly in Tirana (right). With few telephones available, it's the traditional way to catch up with friends. New to traffic, farmers in Shkodër loaded down with cornstalk fodder can now freely market their own crops.

government had given the new party had no heat—was filled with earnest discussion about free speech, a foreign concept among people who for decades could not trust neighbors or friends with their inner thoughts. Workers came in to ask for help in organizing strikes, an alien notion in Hoxha's Albania.

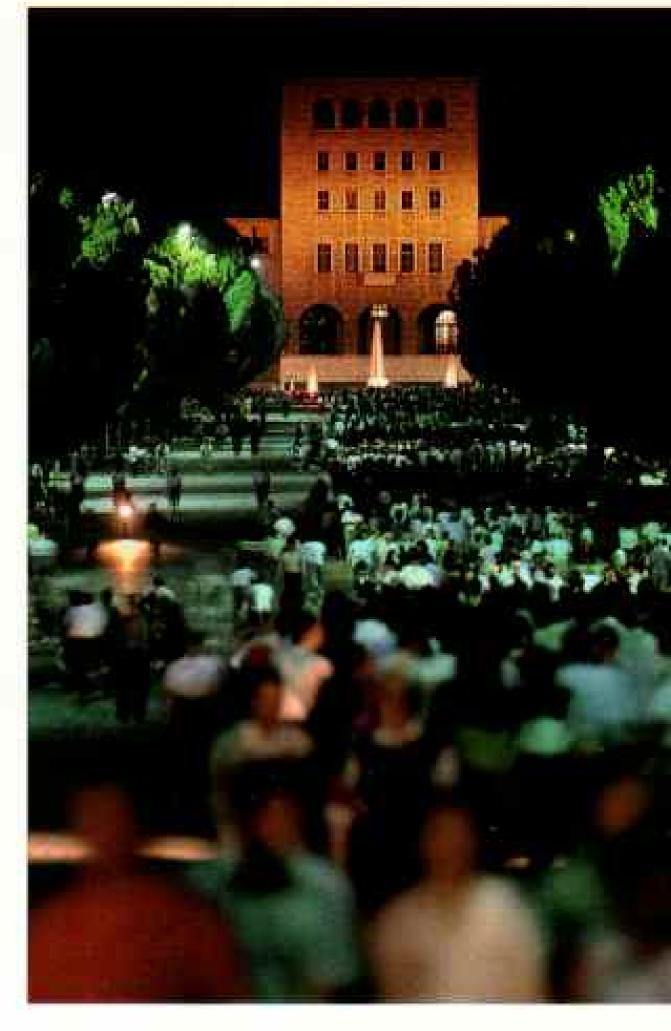
I was shivering in the office one day when a young activist named Arsem Kaustic walked in, clutched my arm, and would not let it go as he rattled on, with great indignation, about the communist thugs who were still at work in the countryside. They had tried to thwart his efforts to organize the Democratic Party in the small town of Laç. They had threatened to kill any reformers who ran for office. They knew no decency.

An old woman with faded blue eyes came in to tell me how Hoxha had enforced atheism. "He took my husband away more than 30 years ago because he was reading the Bible. My husband died in prison," she said, sobbing. "Most of the priests were killed, or they died in prison. We kept our faith locked in our hearts—you didn't dare discuss it with anybody."

She left. A group of men burst in and an emaciated figure in a brown cloth cap began shouting. He announced his name, Gjelosh Gega, and his status: "I'm a political prisoner! I have been released! I wanted to come and thank the Democratic Party!"

He smiled a smile of pure joy, revealing a solitary tooth. The others had been rammed out by a border guard, Gega told me, when he and a companion had tried to escape Albania six years before. Gega, then 20, had been sentenced to 18 years. He was lucky. The guards shot his companion dead.

This new generation, I learned, wanted to erase everything linked to Hoxha. "Just look at our neighbors. They have all done better," said Azem Hajdari, a stocky philosophy student from Tropojë who would later become a member of parliament. Within weeks of our meeting, Hajdari led students to topple Hoxha's statue in Tirana's central square, not far from a grotesque modern museum



stuffed with the trivia of the dictator's life.

"I want to turn that Hoxha museum into a giant disco," Gramoz Pashko, an economics professor and co-founder of the Democratic Party, confided.

Once Albanians felt free to speak, the transformation from communism moved swiftly. By February 1991 strikes were breaking out, and protesters at the University of Tirana were showered with confetti made from the writings of Enver Hoxha, whose words had once been treated with biblical reverence:

"Enver," the crowd shouted, "you are a thief! Where is our money?"

Albanian life, so word quickly spread that my mother's family had come from here. People came up to me, asking that I recite phrases and nursery rhymes from my childhood. Whenever I did, the response was the same—roars of laughter followed by an avalanche of words I could not understand. It was sufficient to guarantee acceptance, giving instant entry into a society that had spent decades perfecting its mistrust. They would smile at me as if to say, yes, he is foreign, but he is one of us. One of us. He has lived outside the prison, and maybe now we will too.

"Tell me honestly," said one man in his early 30s. "What does the outside world think of us? Are we really so backward? Are things really so terrible here? Compared with outside? Please tell me honestly." He huddled down against the cold in his black, worn coat, waiting for the answer.

It was hard to tell him that, yes, his country was very backward and very poor.

"And can we become a part of Europe; is the difference so great?" This question was from a woman. Sure, I told her, with time. I judged her to be about 40, but I could not be certain; her pretty face was marked with deep worry lines. They looked permanent.

My newfound friends included Bushy the waiter, always in a bow tie and always ready with a joke. ("I was named for President Bush," he said.) There was the telephone operator Raymonda, elegantly dressed because her husband, Sophocles, sometimes drove his truck up to Yugoslavia and came back with many valuable goods. And vivacious Flutra, planning a fall wedding. ("You and your wife are invited," she told me.)

These new friends helped me understand Albania. Bashkim, a Democratic Party activist, invited me to the first coal-miners strike, at the Valias mine outside Tirana. When I arrived in my Mercedes-Benz, the miners turned, cheering and whistling. They pointed at the car and flashed the V for victory sign.

"What on earth did you tell them?" I asked Bashkim later.

"I told them I dream of a day when this courtyard is filled with cars like yours, all driven by miners!"

But other activists had a more realistic grasp of Albania's fluttering economy. "God save us from having power," said my friend Gramoz Pashko, who could see that Albania had stopped working for the moment, poised between socialism and a market economy. "It will not be easy to change a system that was completely collectivized," he told me.

Not a single private café or shop brightened the grim Tirana streets as the winter of 1991 slipped toward spring. Indeed, peeking in the doors and windows of the capital's workshops, I often saw women hunched over their labor like figures out of Dickens, working sewing machines in the dark, pedaling furiously to keep the needles going.

In the follow-up to Albania's first multiparty elections, the country entered a new stage without properly marking the end of the old one. Key opposition figures, such as Sali Berisha and Gramoz Pashko, had themselves been members of the Communist Party just a few months earlier.

And even though the communists won 65 percent of the votes cast in the spring of 1991, the election foreshadowed the demise of communism in Albania. The opposition swept virtually every town and city. Only in the countryside did the communists win. Ramiz Alia was still president, but he seemed to know that he was a transitory figure who could do little more than provide a sense of stability, spanning the regimes of the past and the future.

uncomfortable about Albania's reputation as a weird and ghastly police state, and she seldom mentioned the place. But when she reached her 70s, a change occurred. Then she began to talk about her yearning to visit Shkodër, the city of her parents. In her imagination Shkodër became more attractive and exotic than any other place she had visited—the Great Wall of China, the Vatican, the Grand Canyon. Shkodër was in a category of its own, to be spoken of with a great deal of pride, a special flourish. She never made the trip.

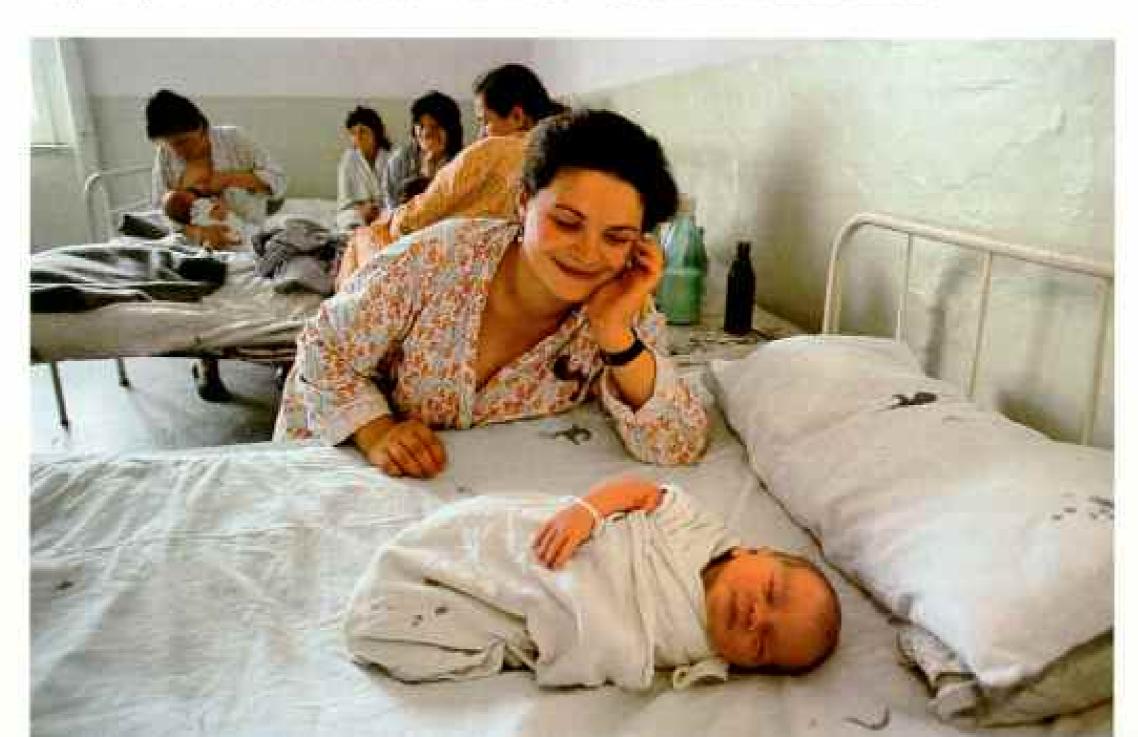
By the time I arrived there, in early April, the city was a mess. Protesters jammed the streets, arguing that communists had won elections in the countryside, where two-thirds of the people live, through intimidation.

Police opened fire, killing four young Democratic Party activists and injuring dozens of others. The crowd went wild and burned down the Communist Party headquarters. Black smoke coiled from the building as I drove into town, passing an armored vehicle, overturned and gutted.

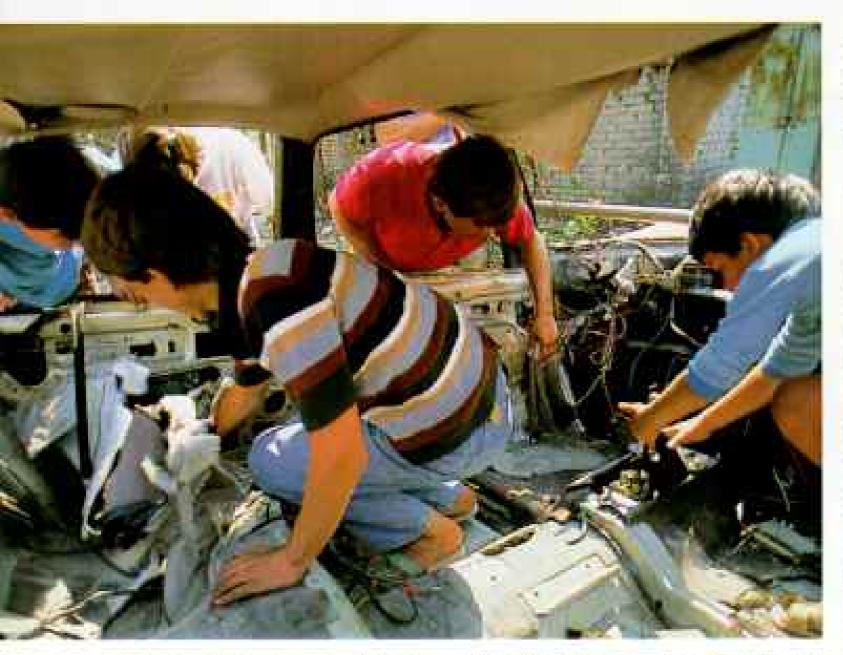
I liked Shkodër's defiant spirit, perhaps a remnant of the pride that made this city the capital of ancient Illyria, whose last king, Gentius, was defeated and taken prisoner by the Romans in 168 B.C. The city's history is the



"We are short of everything from bandages to heart valves," says a doctor in a Tirana emergency room, who treats a head injury as best he can. Scarce medicines come largely from European and U. S. donations. Feeding time seems sweet in the maternity ward, yet mortality rates remain high because of scarce equipment and inadequate nutrition for pregnant women. Each year desperate parents are forced to seek treatment for 70,000 malnourished children.



A bonanza for eager young hands, an abandoned car is stripped clean. These youngsters are the first in two generations to grow up with the trappings of Western pop culture. For them, T-shirts sent by émigré relatives are the rage. Meanwhile, their toys are where they find them—even an empty box (opposite).



torturous history of Albania. After Rome, Byzantium held sway here, followed by waves of conquest by Goths, Serbs, Bulgarians, Normans, Venetians, Ottoman Turks, Italians, and Germans.

One legacy of Ottoman rule is that Albania is Europe's only predominantly Muslim country. In 1967, when Hoxha declared Albania an atheist state, roughly 70 percent of the population was Muslim, 20 percent Albanian Orthodox, and 10 percent Roman Catholic. Hoxha's fierce attempts to eradicate all religions served to reinforce the religious tolerance that has existed for centuries.

I found the people of Shkodër to be hospitable and friendly. I struck up a conversation with Marash and Domenika Selmani and asked about my Grandfather Gjurchu.

"Never heard that name," said Marash, giving the same disheartening answer I had encountered all around town.

"Well, how about Kosmaçi?" I asked, trying the name of Mother's aunt.

"Of course!" Marash answered with a

smile. "The teacher Pjerin Kosmaçi in our school. We'll take you to him."

Following an alley, we came to a tiny row house on Skanderbeg Street. I saw nothing familiar in the face of Pjerin Kosmaçi, the teacher who lived there with his wife, their infant son, and Pjerin's mother.

Our host was wary. Coffee was brought out, platitudes spoken, and gradually a thawing and a disappointment.

> "I'm really not your cousin," Pjerin said finally. "I think your cousin may be Jack Kosmaçi, who lives near Durrës."

> Could I have Jack's telephone number?

The word "telephone" produced an outburst of convulsive laughter. My host, his 71-year-old mother, and my friends Marash and Domenika responded like actors in a television sitcom scene, repeating the word and laughing and rolling their eyes. The phone—of which there were only 6,000 in the entire country—was the symbol of highest privilege. None of those here. But

Pjerin offset my disappointment by scrawling Jack Kosmaçi's address on a piece of paper and handing it to me.

but first I was eager to meet Pjerin's neighbor and cousin, a Roman Catholic priest named Simon Jubani.

He was 65 and very frail from the 26 years he had spent in one of Albania's harshest jails. But Father Jubani was still capable of the fierceness that made him a national hero. Not long after his release in 1990, he confronted the government's ban on religion by leading dozens of townspeople to the local church. Guarded by young Shkodër men with knives, Father Jubani stood in the weeds among longneglected tombstones and began to intone Shkodër's first public Mass in more than two decades. By the time he finished, thousands of people, Muslims as well as Catholics, had packed the cemetery and spilled into the streets. The authorities backed down, and Father Jubani's church reopened.



He invited me into his office, where a framed photograph of his meeting with Pope John Paul II attested to his new status after the years of neglect. Father Jubani knew the future would be very trying.

"It is difficult to pass from a tribal state to a democracy," he told me. The transition would take time, but Albanians had already demonstrated their resilience. He reminded me that even Hoxha could not destroy religion any more than he had destroyed one of the strongest attributes of Albanian culture—besa, or the promised word.

"When Enver Hoxha came to power, besa was besa," Father Jubani recalled. "But Hoxha tried to replace it with corruption, lies, and ignorance."

Albanian will sooner kill his son than break his vow." As a child I had heard the phrase spoken with a solemnity beyond all others, and I had been taught to honor my word, no matter what. It is still burned in my brain and lives in my soul. Until World War II, Albania had been an essentially tribal, feudal society, glued together by the traditions of family and loyalty—and always besa.

In old Albania besa was not merely a moral code, which, in other societies, forms the foundation of virtue and ethics. Besa was a law that served for centuries as a regulator of daily life. It governed business transacted by individuals, by villages and clans, or even by districts. To break one's besa was not only the greatest disgrace but also subject to the most severe punishment—execution by one's peers.

An Albanian friend of mine named Chim Beqari, who helped me drive through the mountains and acted as interpreter, would often point out the ruins of homes of those who broke their besa, where foundation stones were scattered as required by the unwritten law. Albanians no longer punish one another that way, but it gradually dawned on me that many people were still reluctant to promise me anything, no matter how small, such as fixing a light in my hotel room, perhaps for fear of making a vow that could not be honored.

Driving from the rugged mountains toward the Adriatic coast, Chim and I finally came into Shijak, the village where I hoped to find Jack Kosmaçi. He might be my only living link to Albania. Carrying a bottle of French brandy and a box of good tea I had bought as gifts in a hardcurrency shop in Tirana, I crossed the village square to begin inquiries. One of the men there knew the family. "Ah, Kosmaçi the bricklayer," said the man, helpfully pointing across the square to his building.

Istumbled up the concrete stairs, each step a different height, and found Jack Kosmaçi's place. I studied him carefully for signs of the familiar. Had I seen those eyebrows, that slashing nose, in my family? He had a certain dignity, like the figures in old photographs on the walls of his apartment.

I examined a family portrait with 15 people. At the center was a military officer with a braid and decorations standing by an old man wearing baggy Turkish-style pantaloons and a vest with a big gold chain; two well-groomed young men stood by him in dinner jackets. The women were dressed in what must have been the latest Paris fashions.

While Chim explained my presence, Jack's eyes drifted from the interpreter to me, back again, then fixed on me. We knew. He nodded and smiled and shook hands again, this time harder. We rapidly established relationships. Jack's paternal grandmother was a Gjurchu, sister of my maternal grandfather. Jack was my cousin.

We talked all morning. Jack's tale gave a wholly new dimension to the horrors of Hoxha's era. I had driven past one of Albania's notorious prisons, a place called Burrel, but now it became a real place, as did another named Spaç. Members of our family had served time in both.

Jack recalled the day they took his father, Anton Kosmaçi. It was 1944, and the world was still at war, but the Germans had abandoned Albania. Tirana, where the Kosmaçis were living, was already in the hands of Enver Hoxha and the communists. Jack was 15.

The soldiers knocked on the door and asked for Anton. He embraced Jack's mother. He embraced Jack. There was no time for tears.

"Poor Mama," Jack recalled. "She knew. She asked me to follow Father, but to keep my distance." The walk to police headquarters took 15 minutes, no more, and every detail remains sharp in Jack's memory: The sound of the men's footsteps crunching on gravel, his father walking tall in a black overcoat with a thin fur collar, the boulevard lined with leafless old oaks and willows, the Lunës



Work or strike? Bulletins in the window of a Tirana office marked the birth of democracy, as general strikes in the spring of 1991 closed factories and mines. With all the equipment breakdowns and strikes, lamented then President Alia, "Nobody works any more."

flowing cold through town, his father turning to wave before he disappeared into the walled compound.

Anton was sentenced to 30 years imprisonment as an "enemy of the people," ten years for each month he had served as minister of justice in one of the successive governments during the Italian occupation. Broken by the years in prison, he was released in March 1964 under a general amnesty. All the neighbors knew him as an enemy of the people, and they treated him like a leper. He died just a few months later.

"How is it possible your mother doesn't know a thing about it? Didn't anyone ever tell her?" Jack asked me. He poured another tumbler of raki liquor for each of us and scrutinized me, as if my knowledge of his father's suffering might have eased the pain of all the lost years. What could I say to this sweet man with white hair? I never knew of his existence until that chance inquiry in Shkodër.

He understood. He gave me a smile and continued. "It wasn't enough that Hoxha put my father in prison. The family had to be hounded into shame." Jack's mother was sent to a labor camp in Tepelenë, his grandmother to a prison hospital outside Tirana. Jack's education stopped. The regime made him a bricklayer. The family's final exile was to the village of Shijak, where I found them.

Jack's two boys—Alexander and Blendi also suffered as the grandchildren of an enemy of the people. They were denied school beyond the eighth grade. Both became mechanics.

"I grieved, but that was how it had to be,"
Jack said. "We were all living in a big prison."
He paused for a minute or so. I saw a crack



Kavaja Street, 5 a.m. Dafina Prifti is first in line at the milk-distribution store in her Tirana neighborhood. The supply varies. Sometimes milk is rationed, and other times there is none. Sometimes there is only powdered milk (if it hasn't been stolen from foreign-aid shipments). The line may form



as early as midnight for the sunrise opening. Last summer, when co-op farmers were granted a small stake of land, many took to working only for themselves. Co-op yields dried up, and so did food on city shelves, spawning rationing and sporadic food riots.

"Jackie, Jackie," said his wife, Anna, who

had been sitting quietly. When he resumed, his voice changed timbre, the anger swelling.

On June 1, 1990, Albania's Children's Day, Alexander's two girls, age eight and nine, were to take part in a play for parents.

Jack recalled: "They rehearsed diligently.
The day before the show, a member of the Shijak party committee came to school and told
the director that Alexander's girls had to be
removed from the play."

Enemies of the people. Jack paused for a long time. "To punish five generations! Five generations! What was the crime deserving of such punishment? There was not one specific charge leveled against my father, not one!

"I have to tell you the real tragedy," he said, now almost in a whisper, as if he were letting me in on the very secret of life. "On the day my grandchildren were punished, my two boys vowed they would flee this land. Escape at any cost. How long are we to suffer? Even my grandchildren are not to be absolved?"

Both Alexander, 35, and Blendi, 21, made good their vows. They fled Albania in March 1991. "I'm not worried about Blendi," Jack told me. "He's young. He's in Italy. Albania has good relations with Italy. We can talk on the phone at my post office.

"But Alexander..." He sighed deeply. "I worry about him every day. He has a wife and two children still here. He is in a Yugoslav jail where they keep refugees. He wants to go to America or Canada or Australia. But nobody accepts Albanians these days."

I presented my gifts of brandy and tea to Jack and Anna and promised that I would try to help Alexander. My besa. Their eyes watered, and I realized that I had just given them the one thing they had secretly hoped for.

I threw an arm around Jack as we strode out into the bright daylight, like two cousins, followed by Anna, by Alexander's wife, Rita, and her daughters.

"Promise me you'll return," Jack said. I promised.

people resigned to their lot in life, but from time to time they took small pleasures unknown under Hoxha. "We are trying to enjoy ourselves and not think about tomorrow," said Namzo Guzin, a young farmer I met in the village of Borçë near

the Adriatic Sea. Some of Namzo's friends were getting married, and the whole community had turned out for an evening of fun.

"Tonight, we hope," said Namzo, 35.

"This is the first wedding I've attended. And this is the first glass I've raised to toast someone other than Enver and the party." Namzo and his sister joined the others who were furiously performing the Napoleoni, a wedding dance named for the gold coins that guests used to throw to young couples in the precommunist era. No gold was to be seen here.

The toastmaster proposed yet another drink, which resulted in a genuine uproar. "It was a toast for our people abroad," Namzo explained to me. "Almost everybody here has someone in Italy. The bridegroom's brother fled in March, my sister's husband in April."

Living in Albania will be increasingly difficult. As the last months of 1991 set in, people were desperate. Hoxha's legacy was broken, but so was discipline. Nobody was working. Indeed I met several mechanics from the former Enver Hoxha Textile Plant in Tirana who had not gone to work since March. Yet they still received 80 percent of their pay. The same arrangement applied to employees of the country's sole glass factory, which had stopped production in 1990 because it could no longer get raw materials. One thing led to another. With a shortage of windowpanes to keep out the cold, schools, factories, and offices had been forced to shut down. And for the offices and schools still open, there was often no heat, as coal production ran short.

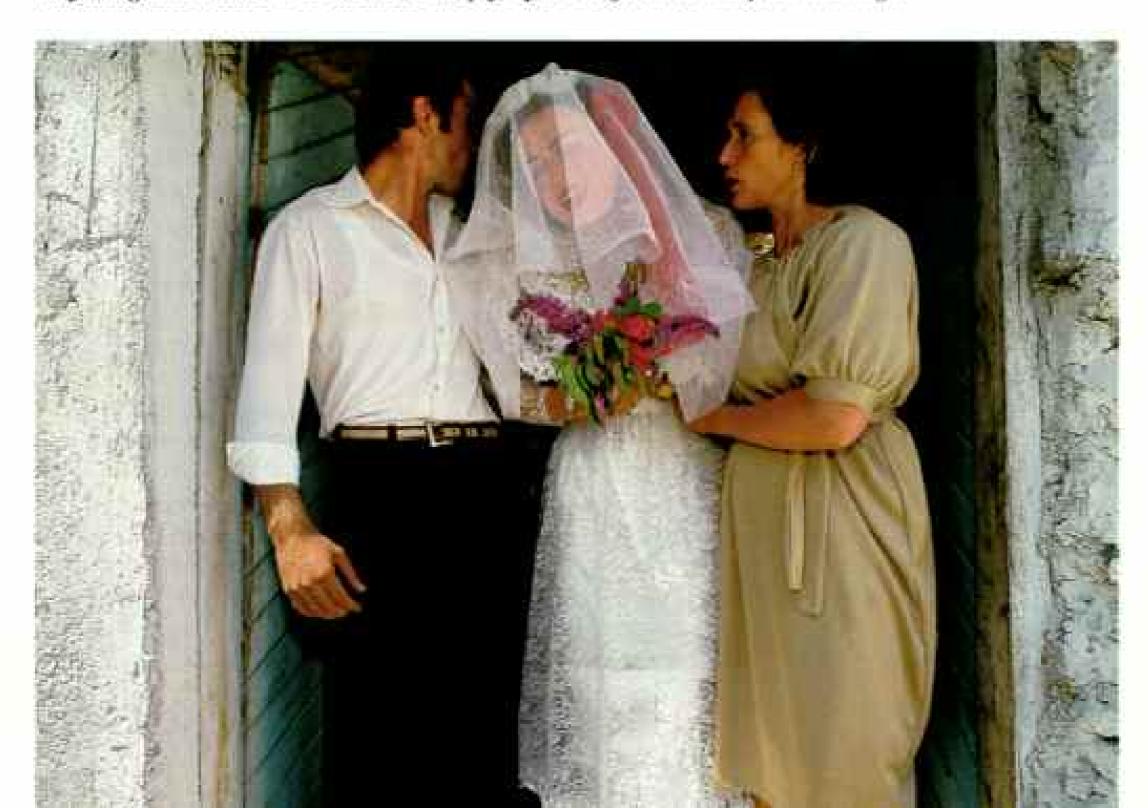
Food riots erupted in several communities. In Fushë-Arrëz, a timber town in the mountains, hungry protesters marched on the local food depot after rumors of an impending bread shortage. Twenty police were no match for a crowd of 2,000, which set the building on fire. More than 30 people died in the confrontation.

Albanian friends agreed that the food crisis was worse since the communists lost power. "Before, food distribution was kept going through fear," explained one man who had been a senior government official. Now, people in the countryside were hoarding food, which meant that city dwellers in Tirana had to line up in the middle of the night for scarce supplies of milk the next morning.

"Even when you line up this early, you are not guaranteed of getting any milk," an old woman told me. She needed it for her grandchildren.



The corn harvest will help see a farm family in the North Albanian Alps through the winter; their life is a backbreaking regimen shared by two-thirds of the population. Tradition dictates that bride Flutura Kadria, in a mountain village near Kukës, look distraught at leaving her family. Anything less would be an insult as they prepare to give her away in marriage.



Much of the countryside has been denuded for fuel, but in Fier some trees have escaped the woodcutter's ax, and now and then a man can still bring home a fat goose from the market. Such simple pleasures are all that most Albanians can yet hope for.

Travelers were advised to take food with them on trips around the country. A Greek diplomat driving from Athens to Tirana was stopped, robbed of everything, and allowed to proceed with only his shirt and undershorts.

These traumas merely intensified the political struggle in Tirana. Albania entered 1992 spinning out of control. The Democratic opposition forces demanded new elections in the spring and won 62 percent of the vote, giving them control of the new 140-seat parliament.

Ramiz Alia, the last holdover of the communist regime, resigned in April. He was replaced by Sali Berisha, a founder of the Democratic Party and a charismatic leader.

OST ALBANIANS KNOW what they want—a civilized society, a market economy, parliamentary rule, and respect for human rights.

The country is entering a painful transition that could last for several years. The challenges are clear—Albania has to overcome a defeatist psychology ingrained by years of repression, to pry loose the grip of the established bureaucracy in the countryside, to persuade young people (60 percent of the population is under the age of 25) to stay, to maintain religious tolerance, and above all to resuscitate a moribund economy.

There are a few signs of hope. Foreign investors are beginning to visit, seeing possibilities in Albania's scenic beaches, snow-cloaked mountains, and deposits of oil, chromium, and copper.

There are plans to develop the beautiful beaches along the Ionian Sea. But the coastal roads are scarce and in dreadful repair. Hoxha did not want this part of Albania populated, lest people would take it into their heads to swim to Corfu, visible in the distance. As I walked along one of the beaches, no other soul was in sight, but there were concrete bunkers and barbed-wire fences all around, Hoxha's ubiquitous signature. It would take massive investment to bring tourism to life here, but it could be done.

Driving back toward the capital from the



coastal town of Sarandë, I passed through a magnificent landscape dotted with olive trees and lemon groves. At Vuno, a tiny mountain village near the coast, I stopped to chat with a couple sitting on a terrace.

Could they visualize this place as a playground for rich tourists?

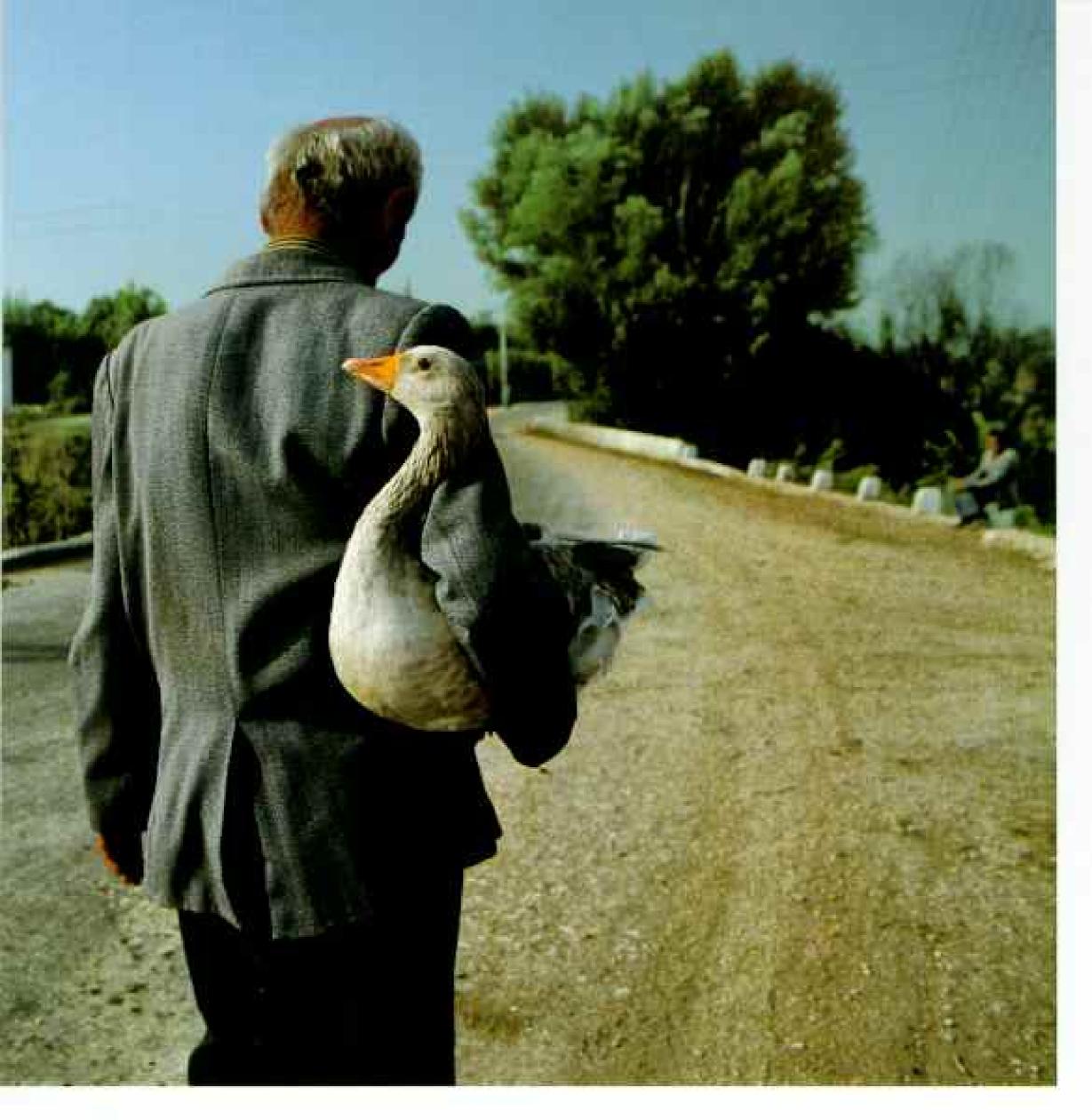
"Nothing is possible here," the woman told me, laughing.

"But things are changing," I said.

She laughed again and looked at me as if to say: "You do not understand."

Her husband shot me an interrogatory look.

"What has changed?" he asked. "Our two
sons are in Italy. Let them look for their fortunes, and let them come back in joy. That's
our way." They felt, in other words, that it
was still impossible for Albanians to succeed



in Albania. For them, good fortune was an import commodity, as it was for my cousin Jack Kosmaçi.

recalled my promise to Jack. Alexander was still held in a Yugoslav jail, where he and other Albanian refugees waited for a review of their status by the office of the United Nations High Commissioner for Refugees. When I phoned the U. S. Embassy, a consular official told me Alexander couldn't get asylum in America. "Why don't you try Australia? Or Canada?"

Canada agreed to take him, so I had the great pleasure of seeing Alexander released. I took him for a celebratory dinner.

Would be ever return to Albania?

"Never!" Alexander said. "I made a vow. The communists are still in power. Look at the leaders of the opposition—almost all of them former party members."

That was true, I agreed. Everybody who wanted to succeed in Albania had belonged to the party, at least formally. But communism was dead now, the secret police gone. So was the old Albania. The new Albania could be—had to be—different. The people would exorcise Hoxha's ghost and begin something new, I insisted. Alexander quietly stood his ground. Let him go, I thought, he has suffered enough.

He's off for a new life in Canada, where he will be joined by his wife and kids. When I told Cousin Jack about it, he seemed delighted by the good news but unsurprised.

Of course: I had given Jack my besa.

E



PILLAR OF LIFE

A man trapping minnows doesn't see it, but just below the surface a complex community thrives on a wharf piling in the Chesapeake Bay.

Text and photographs by GEORGE GRALL

tugboats tow barges into Cape Charles harbor on the southern end of Virginia's Eastern Shore. At the wharves where these tugs tie up, communities of marine plants and animals play out their lives on, in, or around wood pilings.

Boat hulls, bulkheads, jetties, even plants—virtually no surface is exempt from colonization by sessile organisms. High salinity at the mouth of the Chesapeake, combined with the seasonal temperature cycles, produces a greater variety of life there than elsewhere in the bay.

Plants and animals adapt to distinct vertical zones governed by tidal levels. Their diversity increases with water depth, but even above the high-tide line enough moisture is borne by wind and waves to support life.

During my eight years photographing aquatic life for the National Aquarium in



LIBINIA DURIA, 3 TIMES LIFE I

Baltimore, Maryland, I have wanted to know more about the life found around wharf pilings, where vertical habitat zones are most easily observed.

I scouted the area around Cape Charles and decided to begin my study at the harbor in mid-October when chilly weather suppresses organisms that help make the water cloudy.

Checking my scuba gear and underwater camera one last time, I ease off a barge for a closer look at a well-encrusted piling. I see patches of red beard sponge, an animal with projections that reach out like fingers from the surface of the piling. Other living things also cling to it: red seaweed, barnacles, oysters.

Even at its clearest the bay is too murky for my camera to do its job. And, in any case, I could not photograph at the site the microscopic plants and animals on which bay life ultimately depends, so I convert my motel room into a studio and aquarium.

I carefully collect specimens from the piling and place them in portable sectioned holding tanks. In this way I re-create in a homemade aquarium each scene I find in the bay.

A six-spined spider crab (center) camouflages itself with snippets of plants and animals. Branches of a plantlike hydroid plume the crab's carapace. Yet even this disguise expert cannot hide from my camera.

Pillar of Life 95

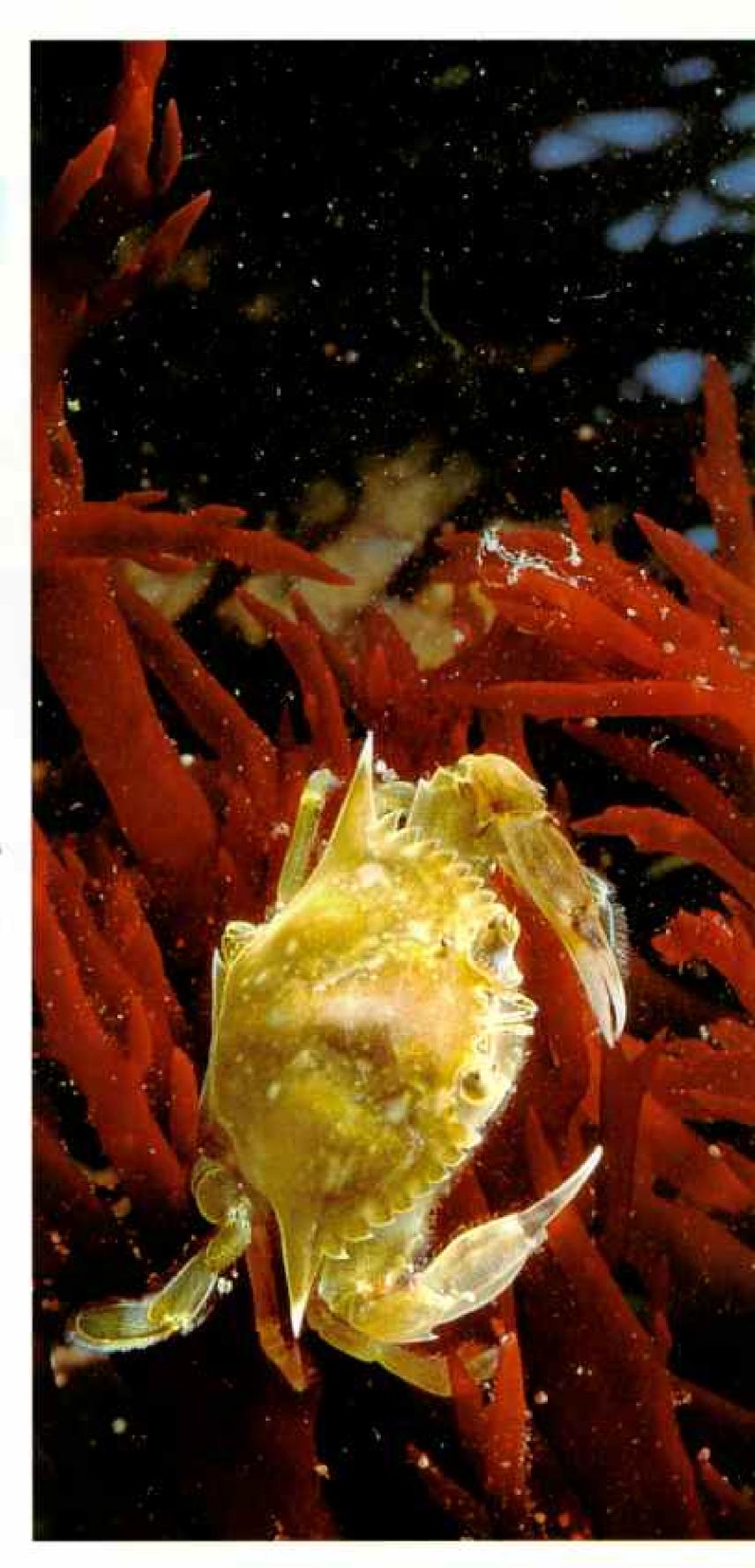


first spotted a young blue crab and a lined sea horse in a clump of red seaweed on the piling. The crab, agitated by the sea horse, snaps its claws in self-defense.

Both species come to wharf pilings to feed on smaller animals and free-floating plankton. Bobbing in the flow, the sea horse sucks tiny crustaceans into a toothless mouth. For stability while feeding, it may entwine its tail around a convenient blade of eelgrass.

Changing color to match its background, the fish camouflages itself to hide from predators. Bony protuberances with fleshy tabs all over its body help it blend with the fronds of plants.

The male sea horse actively participates in the birth of his young. The female deposits her eggs in the male's marsupium, where he fertilizes and broods them. In about two weeks, when the eggs hatch, sea horses spray out of the pouch.





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Pillar of Life

A VERTICAL WORLD

takes up residence almost immediately. Bacteria, algae, and protozoans cover the submerged surface.

This "slime" provides a foothold for larger creatures

young ivory barnacles (4) are among the first to appear. With them come sun sponges (12) and mosslike bryozoans, which spread over the piling by budding. Bright patches of algae such as sea lettuce (5) soon arrive, followed by hydroids (10) and bulbous sea squirts builder amphipods construct tunnels of mud and detritus for protection and for a niche on the crowded piling. Still others affix themselves to the shells of animals already attached. Almost every underwater part of the piling is covered with sessile species, each looking for food, shelter, and a place to propagate.



FEATHER

piling produce plankfanio

ander, as adults they

either attach to hard

murfaces or are free-

Most animals around the

LARVAL STAGES

SPRAY ZONE

Sea roadles (1) sturry in the damp sprny zone at the upper portion of pillings. These docknoath like crustaceans usually go no farther than the water's edge in wet their pills but will dive in if danger threateness.

Wharf crabs (2) also keep to the spray above the high-lide line, entering the water when it is firm to release their eggs

HIGH TIDE

INTERTIDAL ZONE

Sea lettuco undulales att waves want the piling between the high- and low-tibe lines. A common edible seaweed unod in soups and selado, it thrives in shallow water.

Blue crabs (3), an important commercial species, are abundant in the Cherapeake Bay. In a pood year nearly a huntred million pounts of the aucoulent orustaceats.

Нутыкого

Shellfish larvae undergo a metamorphosis: As adults

they look completely

no mussels and ovsters.

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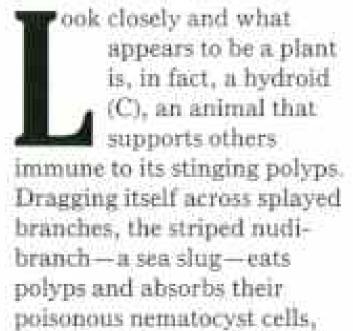
swimming, they include

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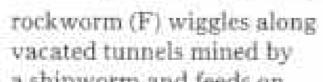
TANYETTELLIM DWARDLINGE, EEE B

enhancing its own defenses. A skeleton shrimp (A) incubating eggs in its brood pouch also feeds on the hydroid's polyps. A ringed sea spider (B) has a more parasitic intent: When her eggs hatch, young spiders burrow into the hydroid - a ready food source as they grow. Many of the piling resi-

dents eat what others leave behind. A red-gilled vacated tunnels mined by a shipworm and feeds on leftover debris.

Keeping a steady rhythm, blue mussels (G) stir up pulsing currents with their two siphons. The mollusks feed on plankton-rich water drawn through one siphon while expelling waste through the other. A syllid worm searches for invertebrates among mussel shells.

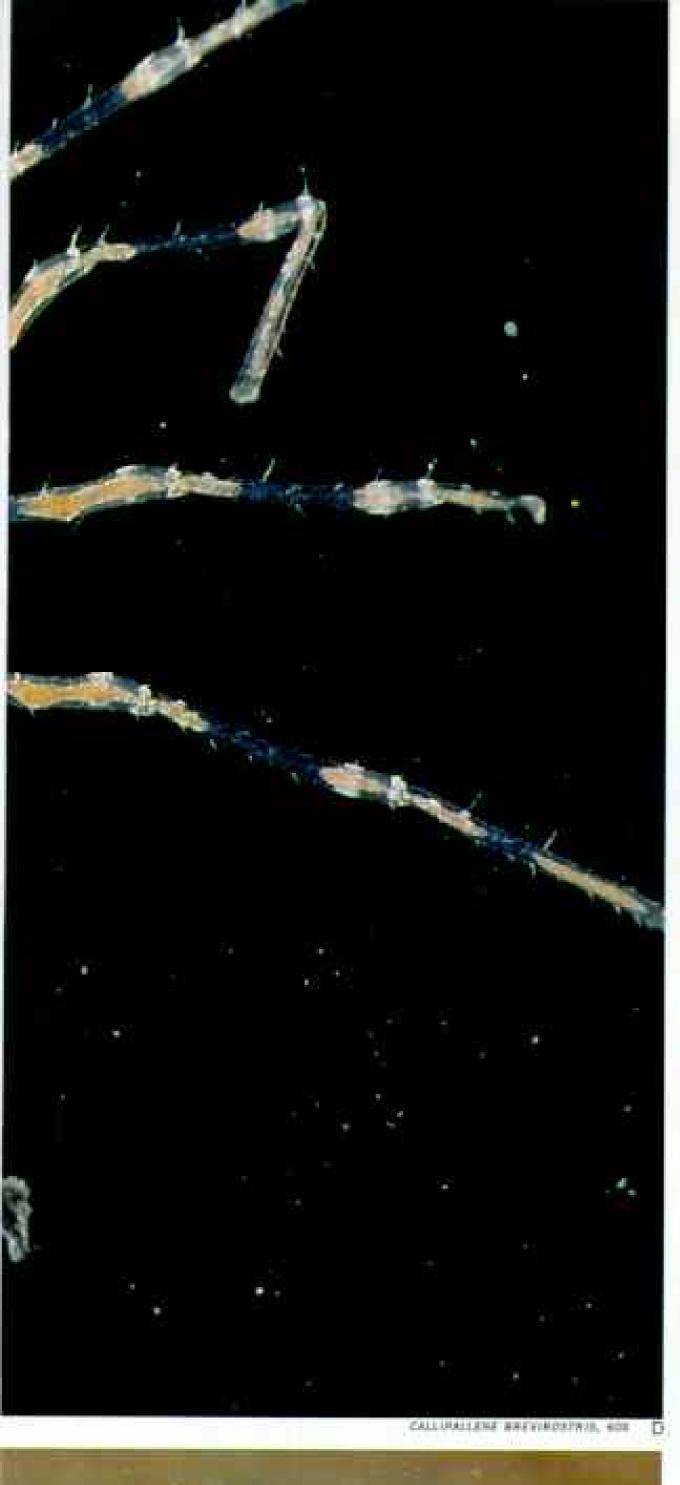


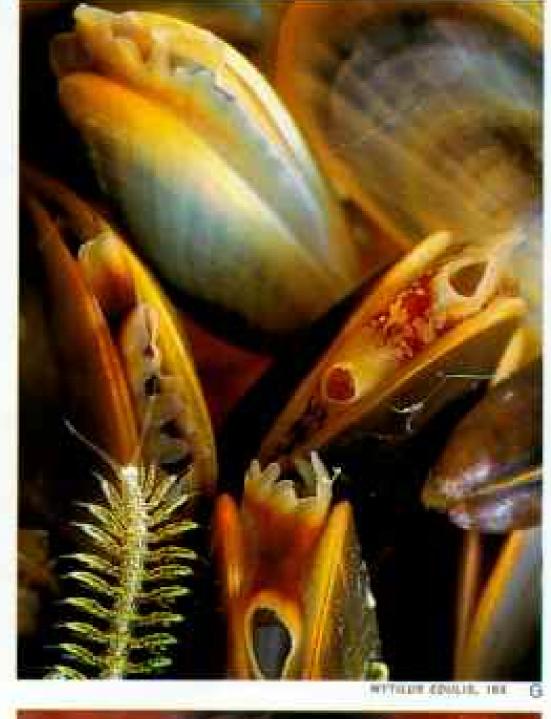




All gangly legs, a longnecked sea spider (D) carries his mate's eggs on specially adapted shorter legs. A tubebuilder amphipod (H) holds her eggs in a brood pouch. She gets oxygen to the eggs by fanning her swimmerets, flipper-like appendages beneath the abdomen. A common shore shrimp (E) actually carries her eggs in her swimmerets.



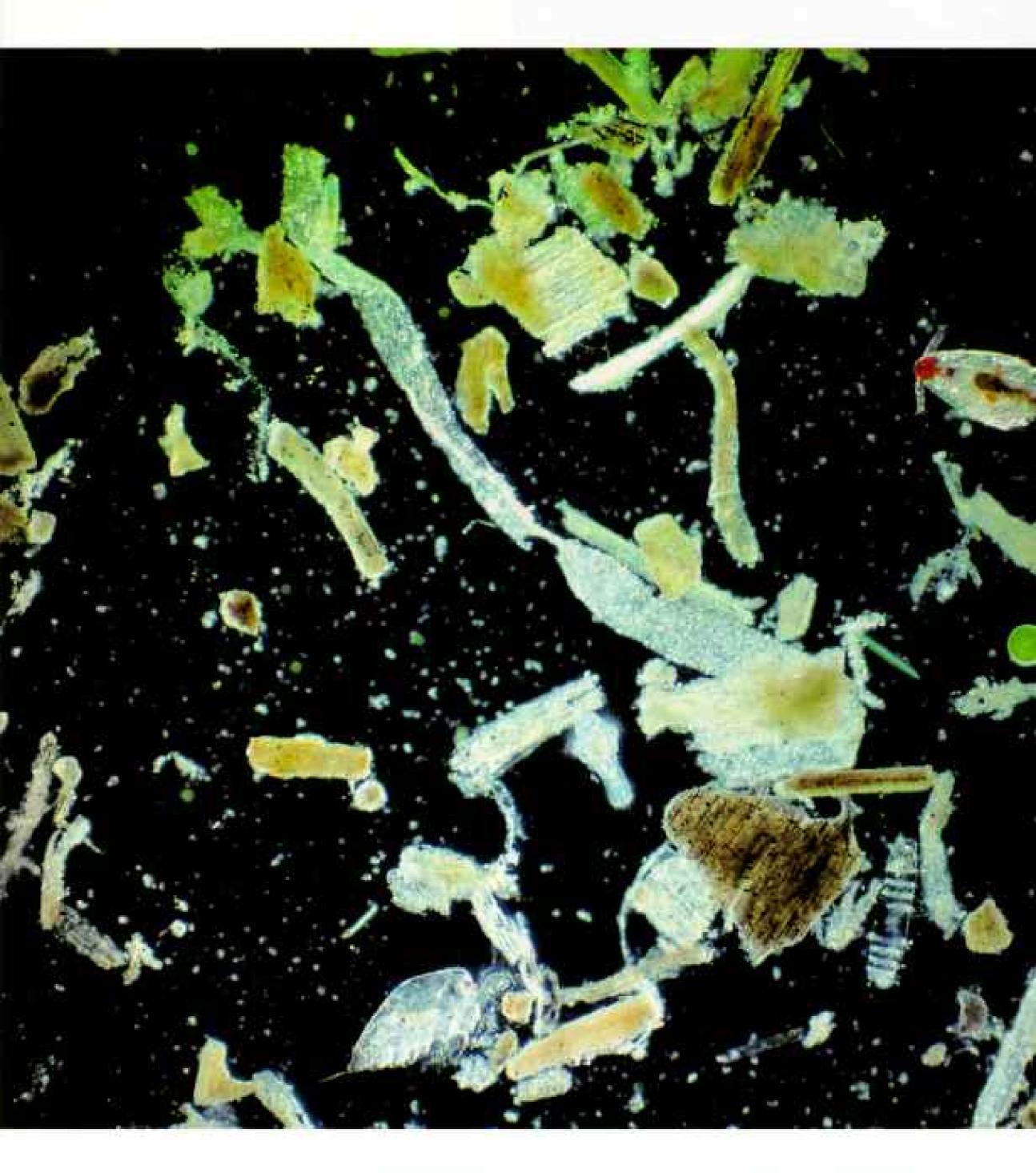








MARPHYSIS SANGUINEA, 108

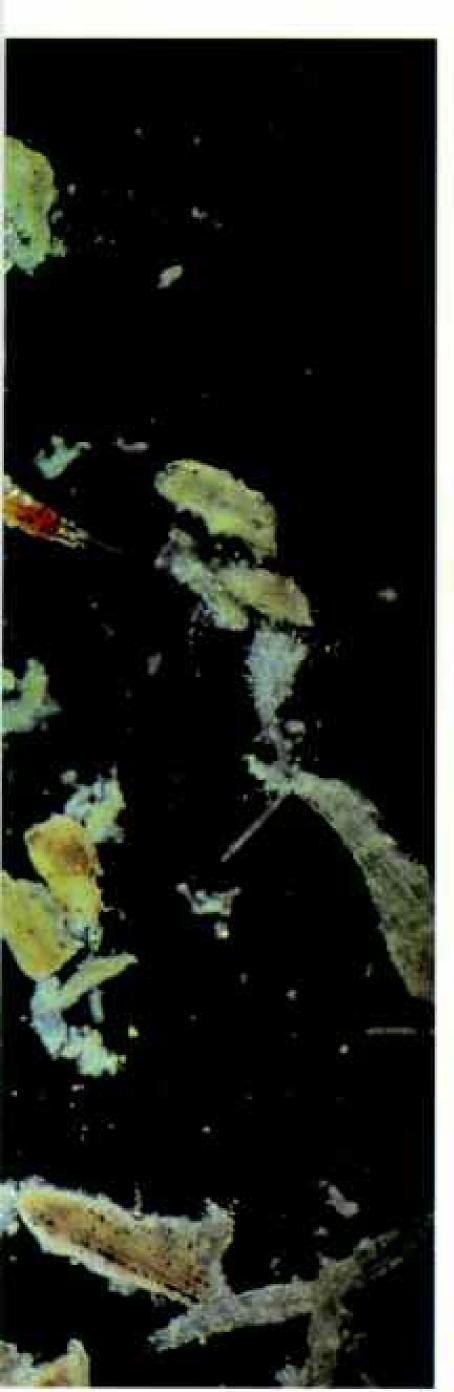


tion, wood fibers, and tiny organisms mix in an aquatic soup that is the beginning of the food chain (above). Magnified 62 times, this droplet of bay water makes clear why the Chesapeake is so cloudy.

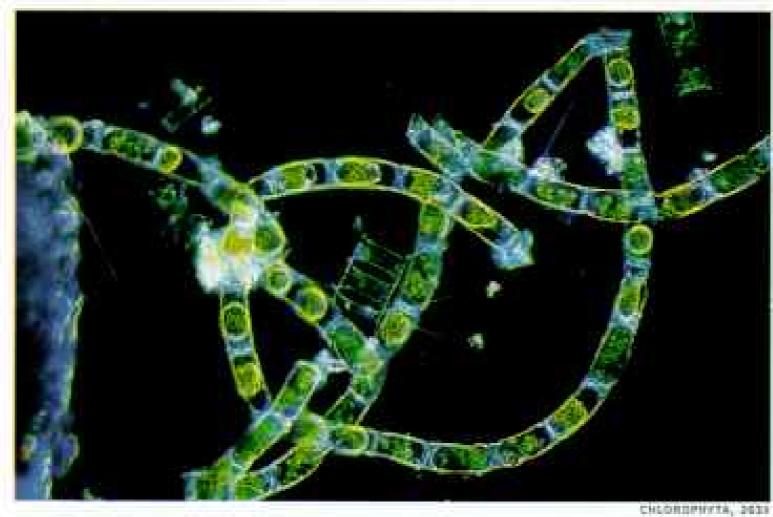
Whipping stubby antennae

(top right), a pinpoint-size copepod propels itself through the water, creating currents that draw food toward it. Among the most prolific crustaceans in the world, copepods may each filter more than three ounces of water daily.

A weak swimmer at this stage, a copepod larva (bottom









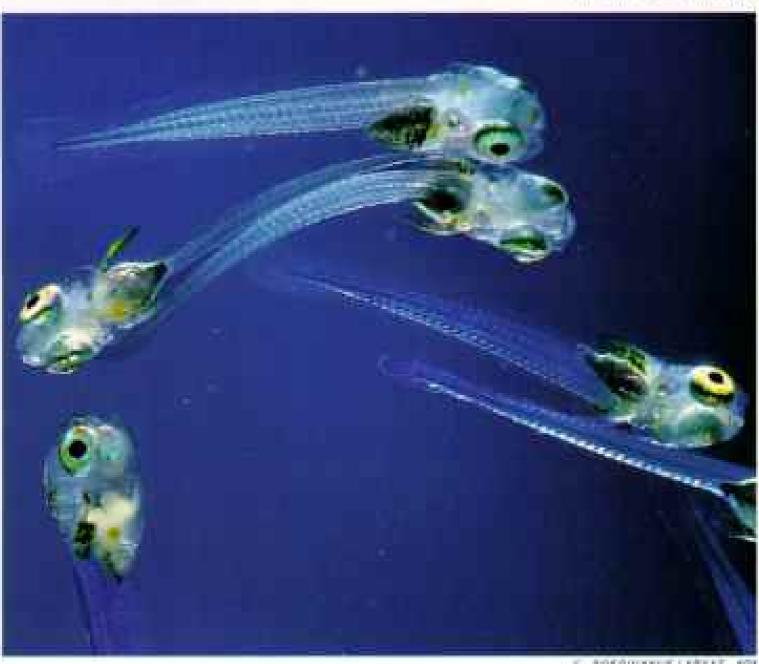
right) either lives on its internal yolk or feeds on plankton. Green algae in branching filaments speckled with phytoplankton (middle right) help give the bay its distinctive color. They are among the several kinds of microscopic material that nourish larvae and other minute animals clustered

around the wharf piling.

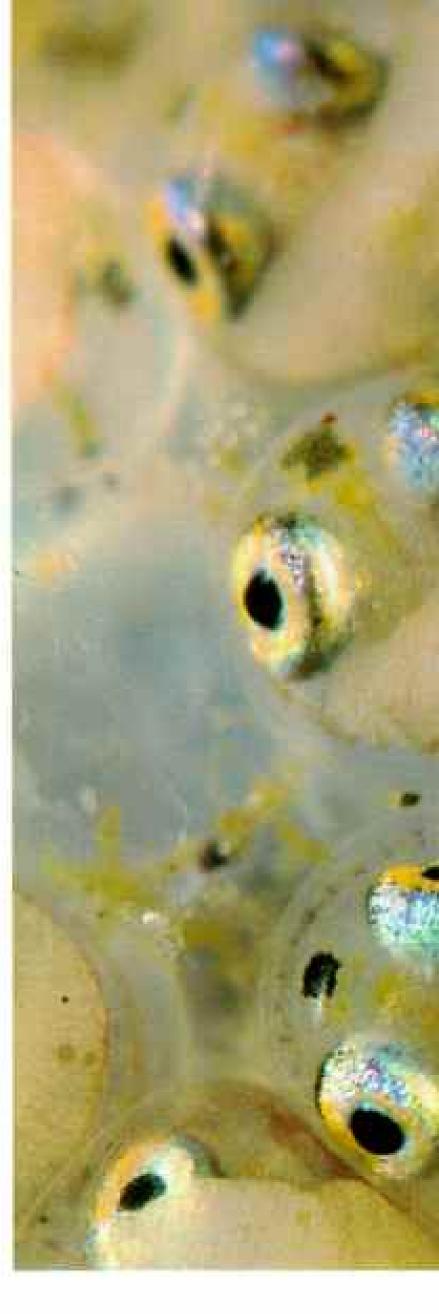
Algae reproduce normally when temperature, salinity, and nutrients in the water are in balance. This can be upset by agricultural chemicals that cause algae to bloom in excess. When algae die, the decomposing bacteria compete with the piling residents for oxygen.

Pillar of Life 105









atching a striped blenny (top) becomes a game of hide and seek-it darts in and out of its oystershell retreat a little too quickly for me. Determined to get a better look at the golden eggs lining the empty shell, I wait for the fish to go back in. Sneaking my hand under the

shell, I swiftly clamp both halves, bag my specimen, and return to the aquarium.

I move gingerly as I enter the motel room, which is cluttered with holding tanks on the dresser, water bottles on the floor, and light stands in every corner. One misstep could send me sprawling and destroy the blenny eggs.



When I focus my lens on a cluster of eggs, unhatched blennies stare back at me as if in walleyed surprise (above). As the larvae roll around in their egg cases, the large silvery eyes seem to follow my every move.

Lucky enough to have caught a male, which normally guards

the eggs, I sit back and wait for him to settle down in his new home. Thirty minutes pass before he takes on the job of wriggling his body over the eggs to aerate and clean them.

Another half hour passes, and nothing else happens. While the father protects the eggs, I reset the camera for a new series of shots. Then I watch the blenny

larvae pop out of the tiny bubbles one by one (bottom left).

When the larvae spring from oyster-shell hatcheries on pilings, they go straight toward the surface. Drifting in the currents, they take their place among the plankton that help nourish larger animals.

107 Pillar of Life





earing off a piece of sea lettuce from the piling, I find three small colonies of golden star tunicates carpeting the seaweed. Resembling tadpoles in their larval stage, golden stars metamorphose into immobile organisms. This kaleidoscopic cluster (left) will soon fade if exposed to air, so I rush to place the specimen in a bucket of bay water and head to my room to photograph it.

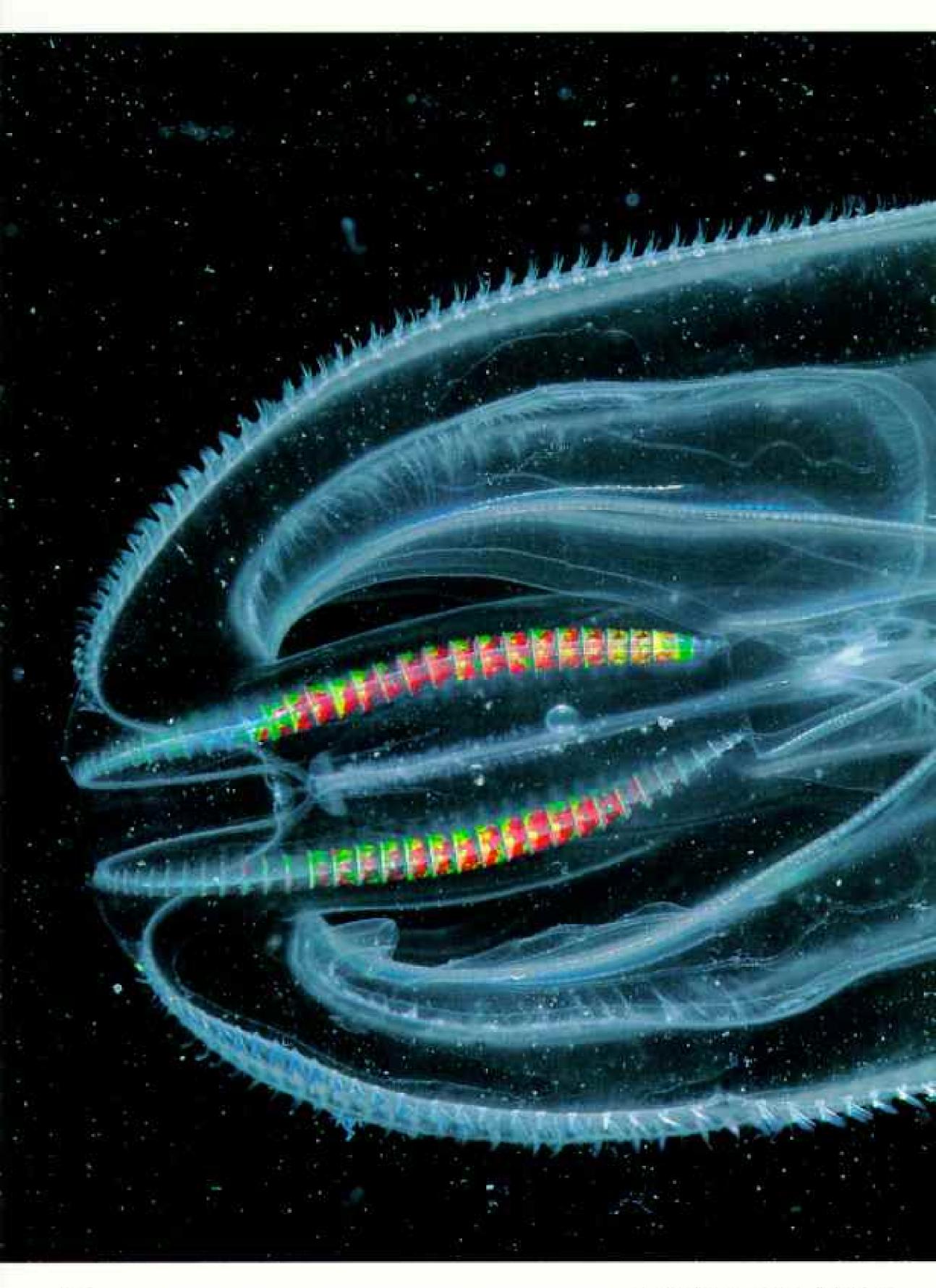
Embedded in a jellylike matrix, or tunic, each ray of the star is a single animal, which

multiplies by budding. I watch this little group as each individual feeds by drawing water through its own siphon, expelling it through a common one in the middle of the cluster.

Drifting freely, a sea nettle and young spider crab have a symbiotic existence. The spider crab-immune to the sea nettle's sting-rides in the nettle's bell (above) and takes snips of the jellyfish's tentacles for camouflage. Spines on the crab's body hold the disguise in place. The young spider crab protects the sea nettle by ambushing small prey.

Spider crabs cannot swim, except in the larval stage, when they sometimes attach to a sea. nettle. As the crabs grow, they hollow out niches in its bell. This nettle carries a full load of spider crabs, including two others not visible here. This one is so large it makes the nettle tilt.

When currents carry sea nettles close to a piling, spider crabs may leave their hosts and begin feeding on the pillar.





ossamer ghost of the bay, a sea walnut's colors shimmer across the spectrum. Fishermen often mistake sea walnuts, or comb jellies, caught on their lines for inert slime.

Hundreds of comb jellies move past me as I busy myself at the wharf piling. I carefully capture this fragile sea walnutalmost 100 percent water - by letting it float in my palm.

Sea walnuts contain special cells, or photocytes, that produce bioluminescence. During the day this light shines in various colors along eight comblike bands on their bodies. At night comb jellies glide through the bay like oscillating lanterns, emitting phosphorescent green or blue light. The flashing colors may startle predators and confuse other marine animals by disguising a sea walnut's shape.

Unlike sea nettles, sea walnuts do not have stinging cells to capture prey. Swarms of these carnivores drift along with mouths agape, voraciously consuming the plankton and small fish that are drawn inside.







bubble from a mud snail and stick to the aquarium glass (opposite). I spotted the mollusk in a litter of dead sea lettuce, where hundreds of other snails were feeding and mating. The mud snails' keen sense of smell had guided them to the decomposing detritus blown in during a storm. They also found a bonus of bait discarded by watermen.

As in the bay, the snail lays its egg capsules in neat rows. A slender tube-builder amphipod (bottom) spots an opportunity and invades the nursery but does not harm the eggs. The amphipod furrows between the rubbery capsules, constructing a tunnel from its mucus and debris. It leaves to feed on plankton floating in the water but when away from the tunnel is itself vulnerable.

Edging by the capsules, a striped sea anemone (left) waves its dozens of stinging tentacles in search of small animals. Stung and paralyzed, prey is swept into a mouth in the center of the anemone's body cavity, where the food is digested.

Slow but agile, these anemones are also reclusive; they move about in dark, sheltered places, trapping food as they go. Attached to the aquarium glass, the snail eggs are safe until they hatch. The mobile tube-builder amphipod nearby is not.

COMPRHUM BF., 238

the message I get when I make one last dive into the bay and discover blue crabs mating behind a newly molted shell. I am careful not to interrupt the two, which seek safety on a fallen piling nearby.

The ritual had begun a few days before. In summer and early fall the female, a "shecrab" to watermen, prepares to molt for the very last time. She rocks from side to side, waving her claws.

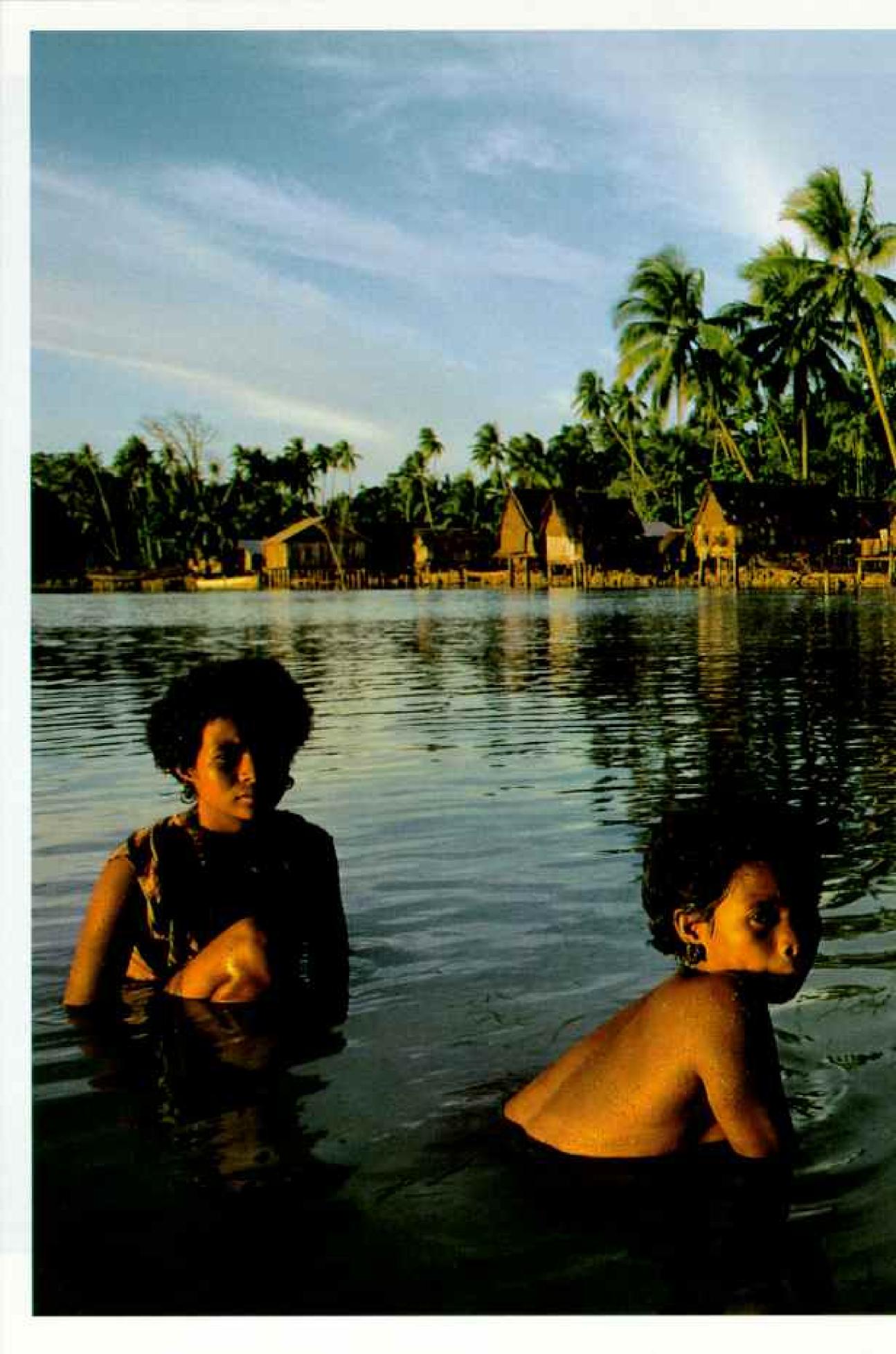
The male, a "jimmy," then cradles her with his walking legs and takes her with him in search of a secluded place out of harm's way. The female backs out of her shell and is ready-for the only time in her life-to mate. She nestles beneath the male in a copulatory embrace that may last 5 to 12 hours. Once the mating is complete, the male continues to cradle the female, now called a sook, for as long as 48 hours until her shell has solidified. She is also known as a sponge crab for the soft mass of eggs on her underside.

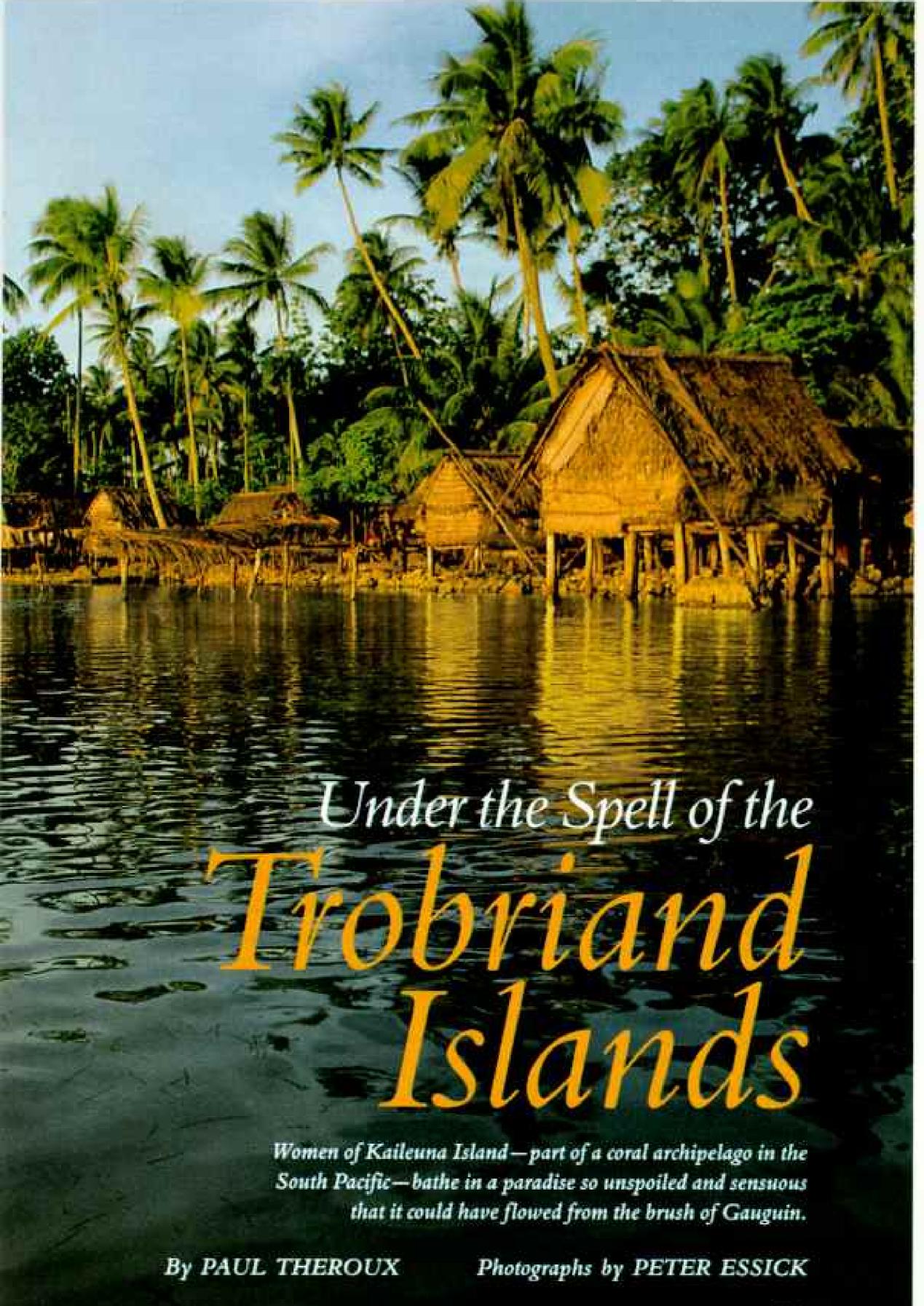
If the intimate exchange takes place in the fall, the female hurries off to find a burying ground. There she will snuggle into the sediment for the winter, storing the male's sperm packet until spawning time the following spring.

The male finds his own place to burrow, perhaps returning in the spring to the piling life that sustains him.









everywhere, above us and reflected in the sea, along with the sparkle of phosphorescence streaming from the wake of the bow wave. We sped onward, heading for Kiriwina, one of the Trobriand Islands of Papua New Guinea.

There were no lights on shore. It was as though we were in an old rickety rocket ship, an image that often came to me when I was in the Pacific, that this ocean was as vast as outer space, and being on this boat with new friends from the islands was like shooting through vitreous night from one star to another.

We had been spearfishing on an outlying island at the edge of the Trobriand chain. In the failing light our engine had conked out, and for an hour we had drifted toward the reef—five of us on board, John, Samuel, Stephen, the boy William—all Trobrianders—and me. With the engine restarted at last, we resumed our journey. In the almost complete darkness of a moonless night, only I had expressed concern. The water was full of hazards, and where was land?

"We can smell the islands," they told me.

Stephen had steered confidently through the darkness, avoiding shoals and rocks and the mud flats of Losuia harbor on Kiriwina Island. The Trobriands were like another world, but it was a world these men knew well, even in the dark.

William's mother was worried

PAUL THEROUX, a regular contributor to NATIONAL GEOGRAPHIC, is the best-selling author of more than 30 books, including his latest travel volume, The Happy Isles of Oceania, published this month. Peter Essick, who photographed "Retracing the First Crusade" for the September 1989 issue, recently completed coverage for a forthcoming article about corn. by his lateness. She was calling his name from the beach. We promised to meet again.

"I will take you to Tuma, way off, where the spirits are," Stephen said. He meant another island, but it was as though he were referring to a distant, haunted planet.

The Trobriands, a sprinkling of flat coral islands shimmering under an enormous sky, seemed like a galaxy apart when I first ventured there in 1990. Years ago I had read about the gentle people who lived there, who carved elaborate seagoing canoes from tropical trees, who went on lengthy sailing journeys just to exchange armbands and other shell ornaments, who grew yams in abundance and stored the surplus in elegant wooden houses, each towering like a cathedral at the center of the village.

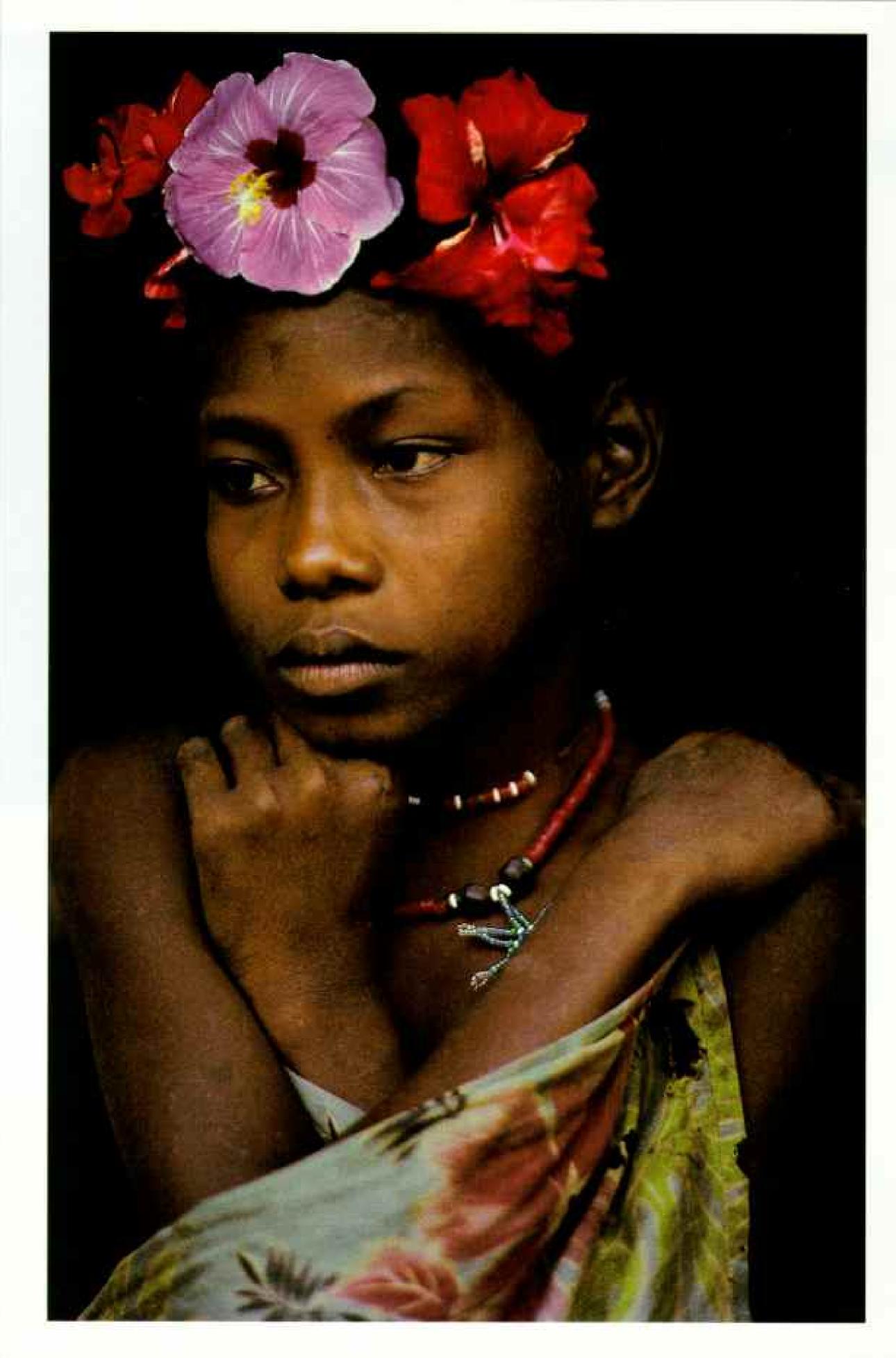
Setting out with my folding kayak and some notes from old books about these islands, I wondered whether the Trobriand culture of magic and self-reliance had survived the destructive effects of our century. After weeks of exploring, paddling on my own or with the Trobrianders in their boats, I was pleased to find that the islands were little changed.

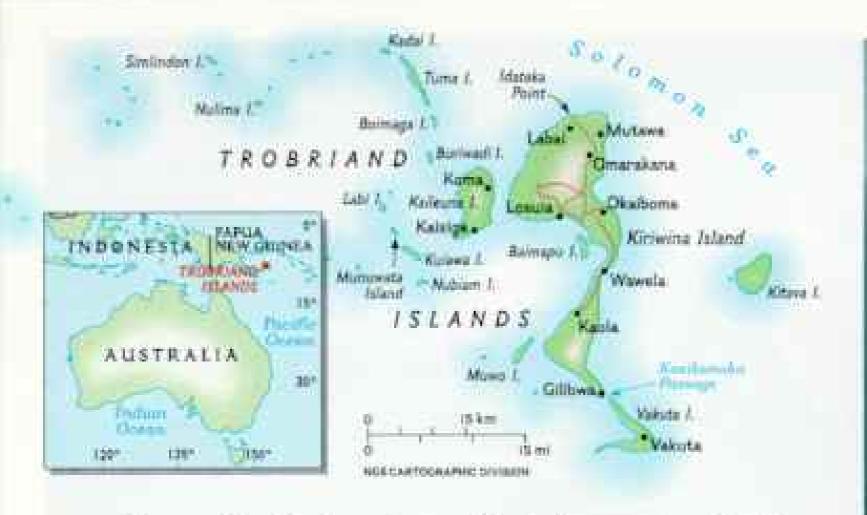
The islanders gave me a warm welcome, even though I was a dim-dim, their word for an outsider, someone of little consequence. Their skepticism, if not total lack of interest in outsiders, is one reason the Trobrianders value their culture and preserve it. They come close to seeing outsiders as lower forms of life.

But eventually I made friends among the Trobrianders. We fished together, we went for walks, we sailed, and often in the evening we ate together, sitting cross-legged in the bicayma, an open hut on stilts by the sea.

Eating freshly cooked fish and vegetables in that breezy pavilion, I was very happy—perfect Crowned with hibiscus,
necklaced with shell beads
and wild banana seeds, a boy
from Kitava Island wraps
himself in a sarong. At puberty,
when he leaves home to share a
bukumatula—bachelor house—
with other teenage boys,
such ornaments will help him
attract girls.

"Chastity is an unknown virtue among these natives," wrote
anthropologist Bronislaw
Malinowski of this society that
indulges sex before marriage.
Western fascination with his
1929 book, The Sexual Life of
Savages in North-Western
Melanesia, turned the Trobriands into the "islands of love,"
a reverie for romantics
everywhere.





weather, good food, pleasant
people. The wind kept the mosquitoes away. And the sunsets
were extravagantly beautiful.
While we ate, children would
climb the coconut palms and
toss the sweet green nuts down
to a boy with a machete, who
trimmed and opened them for us
to drink. One evening while we
were eating, a small boy brought
me a hatububula, or lei, of white
frangipani flowers, and I
thought: paradise.

of hellfire for sinners have altered the Trobrianders' view that their islands are a paradise, full of magic and sensuality. Life there is short but very happy. A Trobriand elder told me, "When the missionaries first came, they stopped people decorating themselves—boys wearing shell armlets, girls painting their faces, putting on earrings and grass skirts. They said these were enticements."

But the feathers and paint and beads that the missionaries condemned as enticements, the Trobrianders regarded as adornments, and in time the people reasserted their ancestral customs.

Now even the schools encourage the students to decorate themselves and wear Trobriand dress—the boys in armlets, the girls in grass skirts—once a week. Most islanders claim to be Tropical spawn of coral reefs,
Papua New Guinea's Trobriand
Islands support 21,000 people,
whose ancestors derive from
Southeast Asia. Gardening lies
at the heart of Trobriand culture,
dominating economic, social,
and spiritual life. On the main
island of Kiriwina cultivated
plots have replaced much of the
rain forest; portions survive
on the southernmost tip near
Gilibwa (right) and elsewhere
along the coast.

Protestant or Catholic, but Christian theology does not impinge very much on their traditional beliefs. In a village one day I found the pastor of a Christian church revolving a small child over some smoke coming from a coconut shell. "A burning grasshopper's egg," he explained: so the child would have strong legs.

Chief Nalubutau is the repository of all island lore. Slender and fine-featured, dignified in his strings of beads and earrings, he is probably in his 70s—a great age in a place where life expectancy is low.

As chief, he offers counsel to the younger (but more powerful) paramount chief, Pulayasi.



Nalubutau can describe Trobriand death and transfiguration, as well as mythology, giving explicit details of how the first Trobrianders emerged from the caves and grottoes at Labai, near the top of Kiriwina, the main island.

Malinowski, the Polish intellectual who was a pioneer of modern anthropology. Malinowski lived in the islands from 1915 to 1918, poking his nose into people's lives and asking interminable questions, generalizing from these details to found the discipline of social anthropology. Several generations of anthropology students have been fascinated by the strange and surprising customs Malinowski described in



his works, especially the one with the dated but irresistible title The Sexual Life of Savages in North-Western Melanesia.

"We could not pronounce his name," Chief Nalubutau told me. "We called him Tolibogwa. It means 'telling old stories.' He did nothing but write down the old stories, which is how he got the name."

What did the people think of him?

"Not many people were interested in him," Chief Nalubutau told me. "He was accepted because he was kind. He was known as the man who liked to ask questions."

Malinowski is long dead, but he would find himself at home in the islands today. New Paramount Chief Pulayasi has many of the responsibilities of his predecessors—controlling the weather, for one. Pulayasi puffed a cigarette and told me how he can make it rain, he can cause the sun to shine or the wind to blow.

How did he do this? I wondered aloud.

"Magic," he said, and smiled. We were speaking through an interpreter, a young man named Patimo Tokurupai. I said, "Did someone give him this magic when he became chief?"

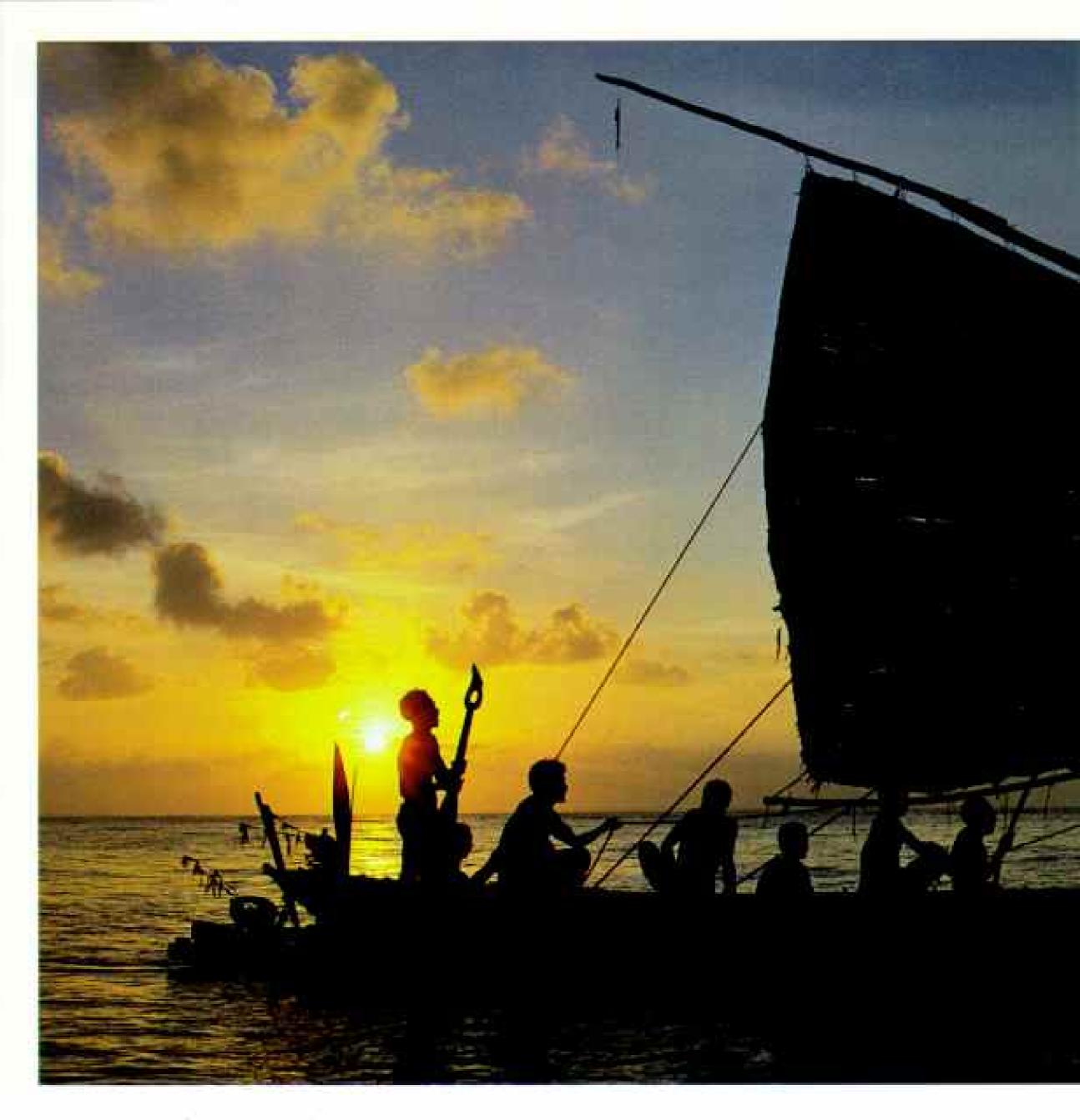
"No. He has had this magic for many years. He was controlling the weather even before he became chief." The chief, wearing shorts and a Coca-Cola T-shirt ("Fun Run 1988"), smiled again his crimson betel nut smile and squinted as though to say: Next question!

"How many wives does the paramount chief have?" Only a select few, like the paramount chief, can be polygamous.

"Two. But there are more coming."

Patimo explained: It was important that the paramount chief have many wives, that he have connections with most if not all the noble clans.

Local legend says the Trobrianders are the offspring of their own islands. Outsiders believe their forebears arrived from somewhere in Southeast Asia by



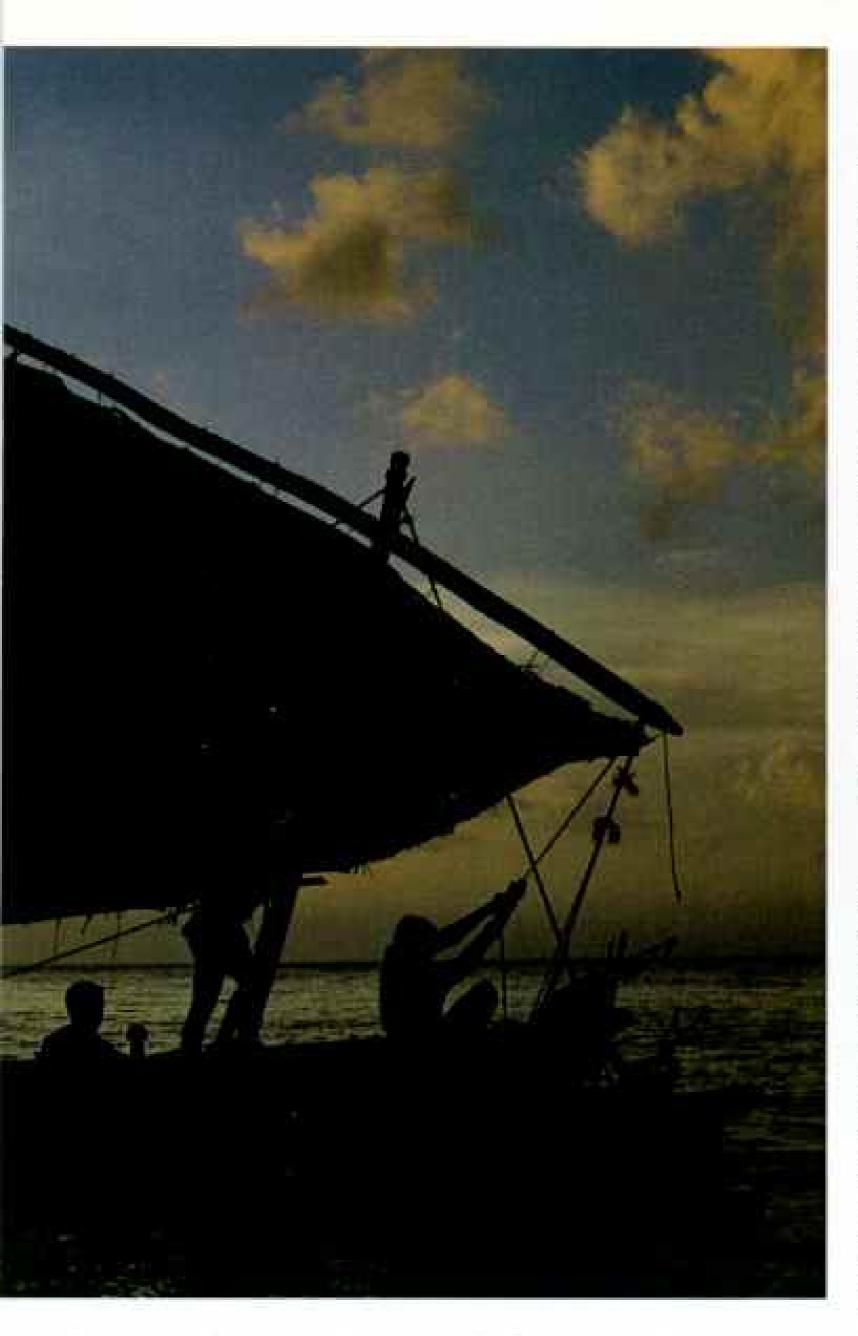
Under sail of stitched pandanus leaves, adventurous traders put to sea in elaborately decorated outrigger canoes to exchange ceremonial shell ornaments on neighboring islands. Necklaces and armbands pass from island to island in a cycle of trade—called the kula ring—that strengthens regional alliances.

way of New Guinea some 40,000 years ago during the last glaciation, when a partial land bridge existed. But the ambiguity of their precise origins is quite in key with their physical ambiguity: There is no typical Trobriand face or physique or skin color or hair type. The people are all sorts, some Negroid, some Papuan or Polynesian, some with straight hair and some with tightly curled hair; some are very dark and some are light brown; most tend to be small in stature, but some are tall. It is almost as

though this tiny archipelago was at one time a cultural crossroads—certainly many of their words are Polynesian. Their word for canoe, waga, would be instantly understood all over the Pacific.

They called my folding kayak a waga, and they marveled at it when I assembled it on the beach. A crowd of men and boys gathered: some gaping, some fooling with the kayak pieces, and one or two trying to help me put the thing together.

On this sort of occasion - a



hot humid day on a muddy Trobriand foreshore, picking my way among the broken coral and hearing the laughter of the islanders and their certain mockery ("What is the dim-dim doing now?")-I was always reminded of how Malinowski, the most sympathetic of ethnographers, would spend a day among these laughing people and would then go back to his tent and write in his private diary, "The natives still irritate me, particularly Ginger, whom I could willingly beat to death. I understand all

the German and Belgian colonial atrocities" or "I am in a world of lies here." It was clear that what he hated most—what all travelers hate—was not being taken seriously.

They teased him and they teased me. It is irritating, but so what? The Trobrianders are seldom scolded. No children I have ever come across live a less repressive existence. The youngest play all day, and on the moonlit nights they go on frolicking—I often heard little kids laughing at midnight. Yet they also work in

the gardens and pick coconuts and go on fishing expeditions.

For nearly everyone sexuality is a matter of tact, not an occasion for guilt-teenage, unmarried sex is encouraged; boys of 14 or 15 share bachelor houses called bukumatula, where they have total privacy with their girlfriends; and the annual yam harvest is a festival lasting a month or more in which marriage is suspended for many. For a reason that no one can explain, the birthrate is lower than might be expected. And as for the wrath of God-the general belief in the Trobriands is that after death a person's spirit travels to the nearby island of Tuma, not to hell.

HE YAM is prized in the Trobriands. The plant is well suited to the islands; it grows well in the thin soil, and as with the staple foods of many countries a whole mythology has grown up around it. The yam house is a tall beautiful structure in every village, and the vegetable itself is the centerpiece of all social activity. In most of these houses in the Trobriands, there hangs a fourfoot giant yam, held in a frame of two lashed poles. It is a boast and a trophy. It is more than food. It represents wealth and prosperity and is a symbol of life and strength, like corn in the ancient cultures of the Americas.

"Come see our garden,"
villagers would say to me soon
after I arrived—they were
intensely proud of the profusion
of healthy plants, in particular
the yams.

"We eat yams only at feasts,"
I was told, but a visitor was an
excuse for a movable feast, and
I was served yams—boiled, or
steamed in an underground
oven—wherever I went. There
are scores of words for yam or
yam dishes. My usual breakfast
in a village was a delicious







Neighbors lend helping hands, and heads, to parade each family's yams from garden to village, where a few workers will reap the ultimate praise: to be called tokwaibagula—good gardener. Staple of Trobriand diet (below), yams symbolize power and wealth. Yet personal worth lies not in how much one has but in how much one can afford to give away.



creamy porridge of shredded yams boiled in coconut milk.

Plants are tended with great care, and the yam harvest is the highlight of the Trobriand year.

"We must avoid that road," a man said to me one day in July. He sounded genuinely worried. "Some girls are bringing yams there."

Because the harvest belongs to the women in this matrilineal society, any man who accidentally happens upon the procession of women carrying yams from the garden is chased, attacked, sat on, and sexually ridiculed. He doesn't have much of a chance; it is usually seven or eight against one. His clothes are stolen, and he is sent stark naked back to his village, where he becomes a laughingstock.

Even cricket in the Trobriands has acquired a sexual dimension. In some villages, whenever a batsman makes a good shot, all play stops while his teammates do the pelvic-thrusting mweki-mweki, or tapioca dance, around the cricket pitch. Since Trobriand cricket may involve as many as 60 players, this can become quite an energetic display of masculine bump and grind.

But not everyone approves.

Chief Nalubutau told me, "That is a silly dance. It was introduced by the people from Mutawa village. It caught on, and everyone does it, but it is no good."

kayak, down the east coast of Kiriwina, past
Wawela, I came across a fishing party from the north of the island. They had secured permission from a nearby village to fish from this stretch of beach—they used nets and spears and baited hooks. And they caught green sea turtles with their hands.

They would give some fish to the village that allowed them to use the lagoon. The rest they would

take back to their own village.

To preserve the fish, they smokedried it—in fact I had found the camp by paddling toward the wisps of rising smoke.

On the day they returned to their village, there would be a feast, and most of this fish would be eaten with vegetables—the greens called "pumpkin tops" and darker spinachy leaves called aibika, along with sweet potato, taro, and cassava.

Reflecting on this diet of steamed vegetables and fresh fish, I was reminded of something Wulf Schiefenhovel, an anthropologist who has studied the islanders for ten years, had told me: "These people have an almost perfect diet—little fat, mostly from coconuts, very little cholesterol, no fried food, only a few mild spices. And there's plenty of food available."

Obesity is as rare in the Trobriands today as it was in Malinowski's time. People praise each other for being slim, and a potbellied person is seen as undesirable, or even sick.

But if the diet is so good, why is life expectancy so low? The answer is simple: infectious diseases and bacterial infections. A small cut often becomes infected on these islands and can become a very serious wound in a short time; there is a high incidence of tuberculosis; there is some leprosy. And there is malaria of a particularly virulent kind. The islands teem with mosquitoes. Because of the mosquitoes, I preferred camping to sleeping in a village-my tent was absolutely mosquito proof. Camped with the fishermen one warm night, I asked whether they thought their lives could be improved. Was there anything they wanted?

At first they said no—life was better here than anywhere else in Papua New Guinea. I urged them to ponder the question, and one said, "Our lives would be a bit better if we had a vehicle, but we will never have enough money for our own truck."

That is perhaps just as well. One of the more pleasant aspects of the Trobriands is the absence of traffic-a few trucks, a few jeeps, not much more. There is only a small electric generator; there are no telephones, no televisions, no neon signs, no streetlights. Now and then you hear an outboard motor, but a moment later it coughs and dies-choked on weeds or smashed against the coral. As a result the Trobrianders are very self-sufficient. Everyone has access to canoes.

And, using canoes, they still play the kula game. This is outwardly a ceremony of exchange, with people taking shell ornaments from island to island and passing them along to friends who, in turn, take ornaments to other islands. For hundreds of years the kula partners have been traveling around Milne Bay to the islands beyond the Trobriand group - the Amphletts and Woodlark and Dobu and Normanby in the D'Entrecasteaux group-anchoring on little coral atolls at night and leaving in the morning.

The so-called kula ring is a sort of brotherhood, but women are also involved. Each kula member has one or more partners, who give or receive these artifacts, each with its own pedigree. Hundreds are in circulation, and the kula expeditions are one of the highlights of the Trobriand year.

The voyage in the kula canoe, the masawa, is the thing. Significantly, masawa is also the Trobriand word for "playing" — much of the kula activity is regarded as serious play, preparing for the voyage, taking the arm shells and necklaces on board, sailing to an island on the horizon, being feted there and giving speeches.

"I do not want to show Paul our arm shells because he will want to buy them," a kula man said in my presence, to make his friends laugh. Nevertheless he took them out. They were not beautiful—they were cracked and yellowing pieces of curved shell woven with small beads and dangling cowries. The necklaces were lengths of tiny shell disks, strung together. that participating in kula activity was tremendously engaging and friendly, there was no stigma attached to being excluded from it.

When I spoke to kula men about their expeditions, they tended to talk about the food they had eaten, the weather, the comradeship on the canoe.

Lyndon, a kula man from Kaisiga, told me, "All kula people are friends."

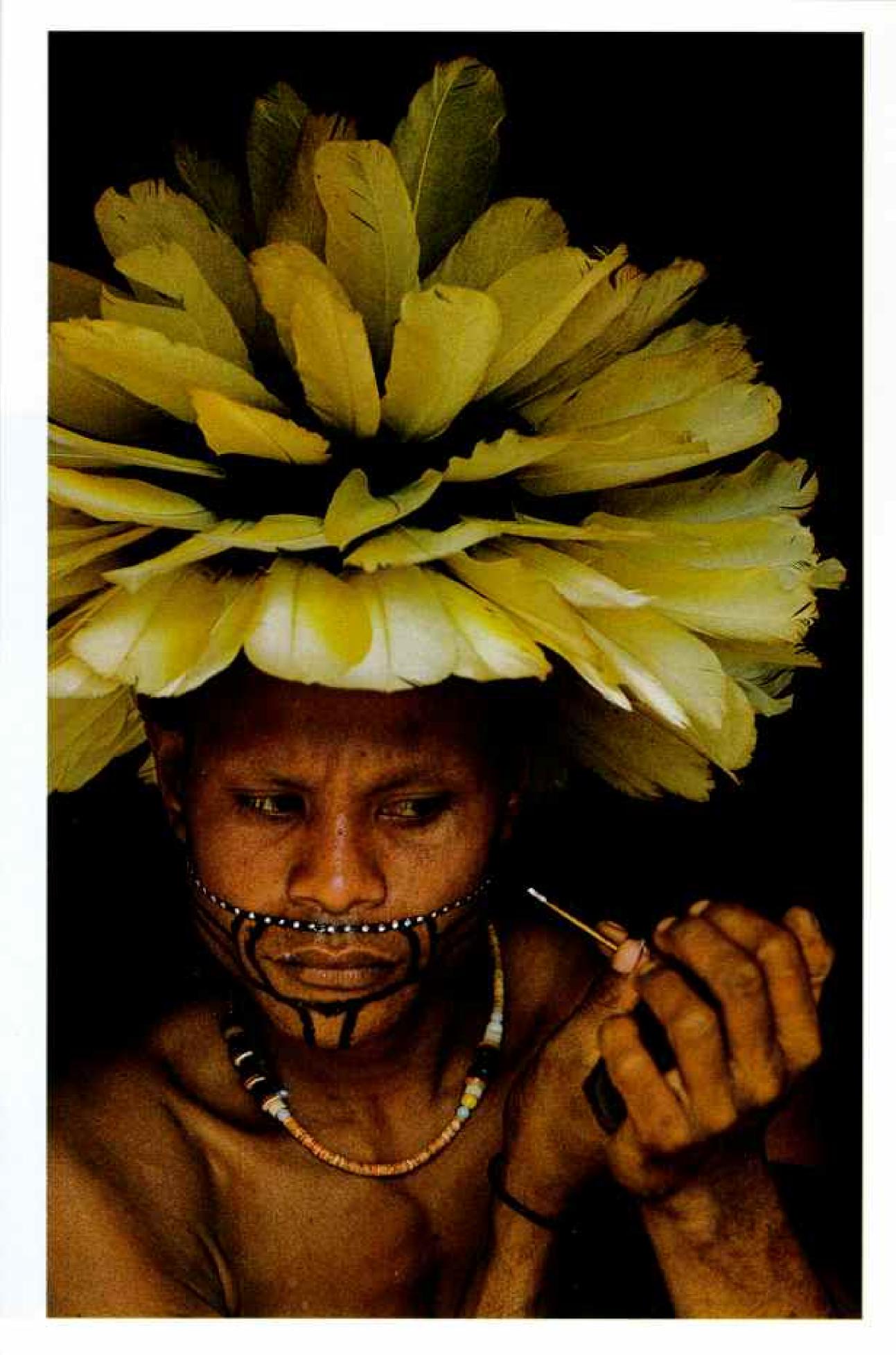


Crested with cockatoo feathers,
Mwakiwosa Medova adds dots
of powdered coral mixed with
water. He will join the feasting,
singing, and dancing (left) that
energizes yam festivals, which
can last more than a month. It is
a season as well for passion. Adolescents glisten with coconut oil
and glow with an application of
yellow pollen. Spouses are given
license for sexual adventures.

These pieces have no intrinsic value, but they become more important as they pass from person to person over the years. They have no practical use. They are not usually worn but rather hung up on the walls of a hut. Now and then you see one being worn at a traditional dance by the son or daughter of a kula person. Each object has its own name and its own personality. The pieces are not owned by anyone, and it would be unthinkable to sell one.

Joining the kula voyages was not for all Trobrianders. I had the impression that only a minority of the islanders were actually kula people and that they were brought into the small circle of kula society by friends and relatives, as one might be asked to join a bowling club in another culture. And, while I could see first glance an odd village, and with each of my succeeding visits it seemed even odder. For one thing, everyone had white teeth in Kaisiga, and no one smoked, and there were no pigs.

One day I was spearfishing with some men and boys from Kaisiga. We were about two miles out at sea, where there were remnants of a reef in the deep water. The younger men could dive incredibly deep, to 30 feet or more, and then they hung on to the coral with one hand and speared fish with the other. Normally I watched them, flourdering many feet above them. On this day I saw a large shark gray, about seven feet longapproaching. It must have sniffed the blood of the fish we had already speared. The shark



made directly for Zechariah. I swam in the opposite direction, straight for the boat. I tumbled in and waited.

When Zechariah surfaced, he was out of breath but unruffled. Had he seen the shark?

"I saw him, yes. I shout at him. I say, 'Hoop! Hoop! Hoop!' He swim away."

"But why didn't you kill him?"

"Because I am Seventh-day Adventist."

He could not imagine killing any creature he wouldn't eat. And now I understood why the white teeth in Kaisiga, the non-smokers, the pork avoiders; they didn't chew betel nut or use tobacco, and generally they obeyed all the dietary prohibitions of Leviticus—no pork or shellfish for these islanders.

No Trobriander I met showed any serious concern about sharks, although they saw them all the time. I had a dread of sea snakes, but I was always laughed at when I mentioned this. Bored fishermen played with sea snakes by tweaking their tails. In several specific places on Kiriwina there are crocodiles - some of them the malevolent-looking, seagoing variety. No one pays much attention to them either. "Now and then they eat our dogs," a man told me. The last person eaten by a croc was a woman washing clothes alone at Boli Point near Losuia about 20 years ago. I was told not to worry, but I always paddled very fast when I approached Boli Point.

peace with nature and were generally on good terms with one another. Yet fighting was not uncommon, and though the causes seemed trivial, I saw that Trobrianders could be very competitive. They vied with one another in their gardens, and they competed in growing the longest yams. They

argued about which village had the prettiest yam houses, the best canoes, the most coconuts. There were dance competitions, and every village had a soccer team. Matches between villages were fiercely contested. One day I heard that in a dispute over the ownership of a boat the people of Kaisiga were marched upon by about 50 men from Koma, a village on the east coast of their little island. The besieging men blew conch shells and shouted to terrify the Kaisigans, who armed themselves with spears and crowbars and sharpened lengths of iron; some men carried shields.

In the battle that ensued, certain rules were observed: The fight was on neutral ground outside the village, and as soon as a man was seriously injured—the equivalent of first blood—all fighting ceased, and the man causing the injury ran, staying in hiding for 24 hours. He could be killed by the family members in the opposing village if he was found within that time—but



he wasn't. Thirty men were injured; six were hospitalized in Losuia, one of whom later died. The government fined some of the villagers and sentenced others to several months in jail.

That was a great surprise—the men of the peaceful village turning into warriors. I began to think that because these islands were so small, the inherited land and possessions of each village were very precious. No outsider was allowed to presume upon them. I should have known.

They were valiant fishermen, they were fearless divers; why shouldn't they be warriors when the occasion demanded it?

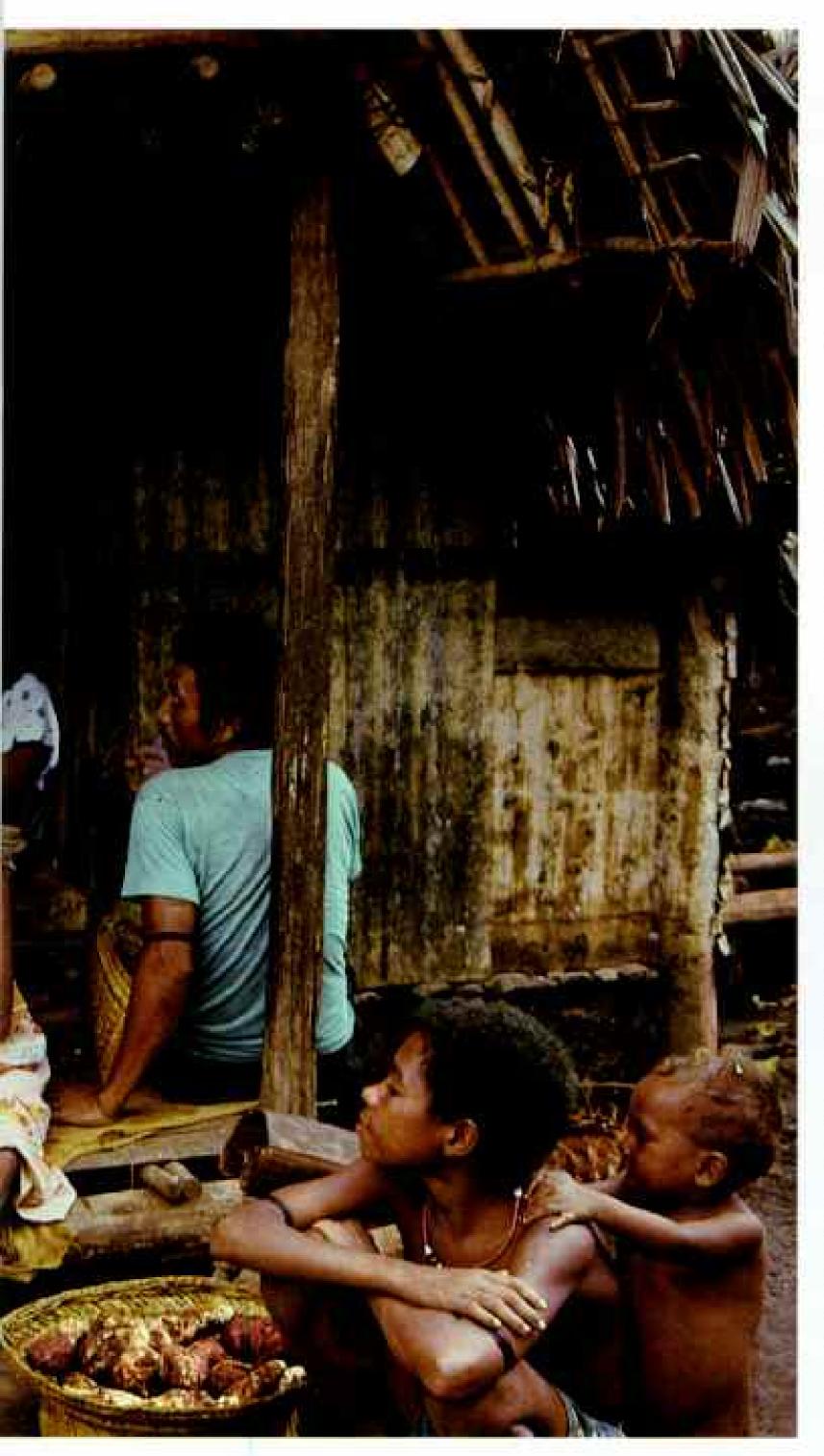
There are not many islands in the Pacific where large oceangoing outrigger canoes are still being made and sailed, but on the Trobriands canoe building is part of the daily life of a coastal village. It is all accomplished by hand, and without wire or nails. About 18 months after the first chops of the adz begin hollowing Piercing sunlit shallows with a wooden, metal-tipped spear, an islander from Gilibwa scours the reef for fish. Though most of his catch goes to feed his family, he may sell some for cash and trade the rest for vegetables.





Paramount chief of the Trobriands, Pulayasi visits with relatives—sitting respectfully at his feet—at the Omarakana home of one of his wives. Polygamy is permitted a few men of high rank and brings wealth; each wife's family must provide yam tribute. The powers of magic and such kula articles as the shell armband hanging beside him help Pulayasi maintain authority.

out the 30-foot log, the canoe is finished. It is lashed, with fittings and outrigger in place. Parts of it, particularly the splashboard and prow, are beautifully decorated and carved. The canoe can accommodate 35 people. Before it can be sailed, ceremonies are performed to empower



the vessel with magic, and these are the same ceremonies that Malinowski witnessed 70-odd years ago. The canoe is always named.

"What is this canoe called?" I asked Meia, the master canoe builder in Kaisiga, who was supervising the lashing of a new outrigger. The name was translated for me: Sailing With the Wind. I asked who had taught him to build such beautiful boats, and he said his father. It was impossible to tell how old this man was, but I estimated he was in his 60s.

No one in the Trobriands has much idea of his or her true age. Birthdays are not celebrated or even remembered.

"It is an interesting idea," a young islander said to me when I explained what a birthday is. "But my mother and father have forgotten when I was born."

of the ways a Trobriander shows responsibility. I was always very curious about the bachelor houses, and I asked a number of young men how it was decided that they should move out of their parents' house and live freely by themselves.

"There is no ceremony,"
Madolu Monubweri told me. He
was about 18. He had been living
in a bachelor house in his village,
Okaiboma, for about three years.
"It simply happens—you feel it is
time."

I asked him to be explicit, and that was when he mentioned the garden. "When you go to the garden by yourself, when you can do all your gardening work, then it is time. You ask for your own plot of land. And when you garden by yourself, you should have your own house."

Usually this happened when a boy was 14 or 15, he said. A friend helped you build your house, using tree trunks for the posts, mats woven from coconut fronds for the walls, and swamp grass for the roof. All it contained were places for sitting and sleeping—most of these bukumatula had the look of oversize dollhouses. The boys continued to eat at home. And even when they brought a girl into the house—for days, weeks, or months—they still ate with their parents.

"At that age you should have more freedom," Madolu said. "Girls have freedom, even though they live at home. I think it is all a good idea. How do you know whether this is the right person for you until you have lived together?" an interest in visiting the smaller, more
distant islands, the
Trobrianders helped me and
gave me advice on the winds and
the currents. One islander told
me I must never worry if I
happened to be lost at sea in
my kayak.

"There are so many islands out there," he said with a sweep of his hand. "Just catch one and sleep there, and when you are rested, you can go on."

Now and then they accompanied me in their own canoes. We visited Tuma, the island of ghosts, where all Trobrianders go when they die, and from whence all child-spirits arise.
The island was limestone and coral, with Gothic contours of steeples and spikes because it had been sharply eroded by the sea at the south end. In the middle there was a sandy beach and a palm grove.

"Let's stay here tonight," I suggested to them.

"We won't sleep," Simon, a friend from Kiriwina, muttered darkly. "The spirits will be singing and chanting."

Night was always regarded as inauspicious. There seemed to be a genuine fear of the dark in the Trobriands, and it was one of the reasons the village huts never had windows: People sealed themselves into their houses, barricading the door against witches and spirits.

When we left Tuma, much to the relief of the others (it was as though we had visited a spooky cemetery on a foggy day), we were preceded by dolphins, and I asked, "Do you eat them?"

Some people ate them, they said. Food was a complex subject, because there were so many taboos—some food was regarded as inedible by certain chiefs, some people ate dogs and bushpigs and some didn't, and there were unappetizing fish, such as stingrays, that were sold or traded only to the poorer inland villagers who, it was said, didn't



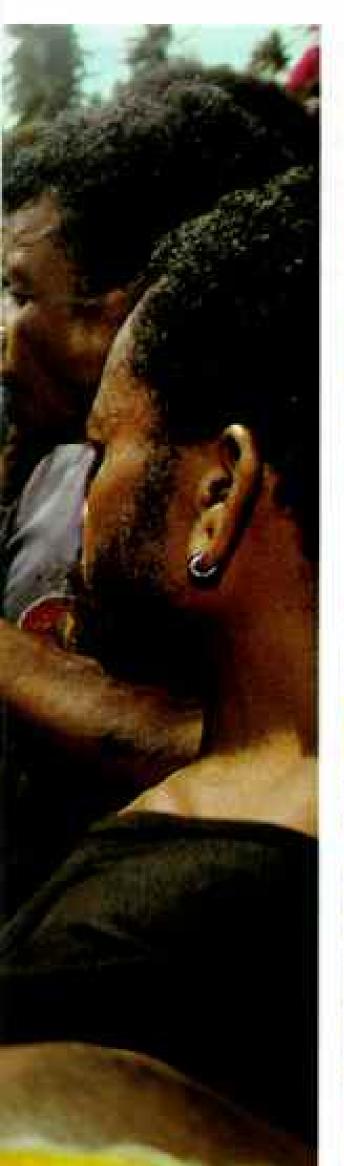
know any better. When I seemed to be taking too lively an interest in these exotic meals, Simon said, "But I have heard that in America you eat crocodiles sometimes, and we never do that."

small island in the long chain of islands that forms the western edge of the archipelago. It is so far away that Munuwatans who go to the market in Losuia are often stranded there for days if the weather turns bad. I had seen them sleeping out under the trees on the beaches of Kiriwina, waiting out a storm.

Not quite a mile long and half a mile wide, Munuwata's strangest feature was that it had no drinking water—no spring, no stream, no pool, not even a swamp. Why on earth would people wish to live in a place where there was no water?

There was a Trobriand answer: because the island was so lovely. It was the prettiest island I had seen in the whole archipelago. It was full of coconut trees, it had grassy fields and one small shady village of well-made huts, perhaps 150 people all together ("not counting children," someone told me). The vegetable gardens were large and fertile. When the Munuwatans

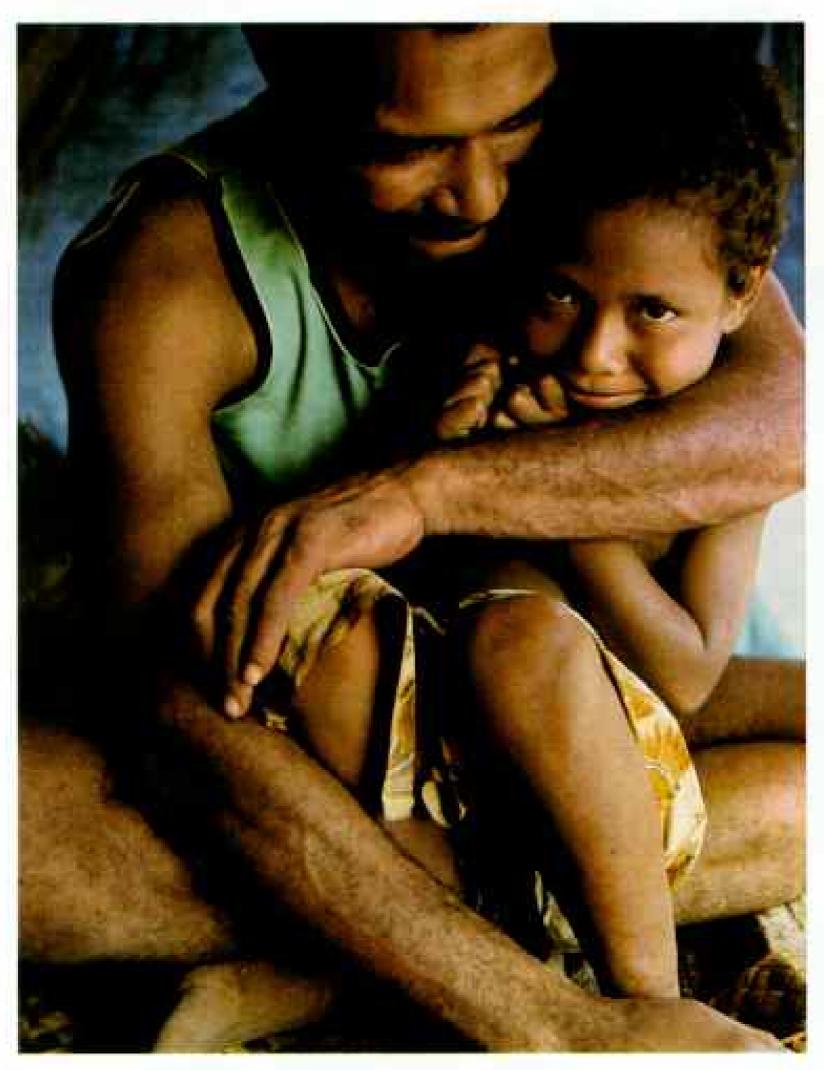
A shamefaced villager is given comfort by loved ones jamming Losuia harbor to part with him and some 70 others being shipped to prison on the main island of Papua New Guinea. Their crime: insult turned manslaughter. A dispute between two villages over yam quality left one man dead. Heads shaved in mourning, women of his village stand grim faced amid betel palms felled during the melee.







needed fresh water, they sailed a mile and a half to Labi Island, where there was plenty. They also caught rainwater from their roofs, and they saved it in containers they had fashioned from net floats that had washed up on the beach. Gathering and conserving water was one of the nuisances endured by the people of Munuwata, but they had wisely turned it into an art. conclusion that they were peaceful, than there was a bloody
battle between villages. But
there was always a truce at the
end—the chiefs came and listened to grievances and a feast
was planned to cement relations.
What made me happiest was seeing how loyal to traditions the
people could be, whether it was
face painting or setting forth in
their impressive canoes. It



Loving comfort but not kinship is what a boy from Gilibwa finds in his father's embrace; spouses usually come from different clans, and children belong only to their mother's clan.

Fiercely proud of their society, customs, and way of life, Trobrianders set little value on the opinions of outsiders. Islanders have weathered colonial rule, missionary intrusion, and anthropological examination.

Tourism, a more recent threat, has been limited by poor roads, little electricity, few hotel rooms, and lack of telephones. As amenities improve and outside influences increase, island traditions will be tested as never before.

The Trobriands often baffled me, but that is not an unusual confession. It would be much stranger for me to say I understood it all. The place is small, but it is subtle, and it is shot through with magic. And it seemed contradictory at times. No sooner had I reached the seemed to me, and to people who knew much more than I did, that the culture was intact.

Perhaps that is the reason the islands seemed like a world apart, like isolated stars in an empty immensity of watery darkness, and this sailing was like going slowly from star to star.



LeSabre Ladies and gentlemen

(*	92 Buick LeSabre Limited	'92 Toyota Cressida Sedan
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Drivetrain	Front Drive	Rear Drive
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Forum

Apes and Humans

The March 1992 article made a marvelous contribution to the understanding of our close relatives, the great apes. The lead picture showed dramatically a situation where human disease could pass to the apes and wipe out the entire population. Dian Fossey was very aware of this danger and in 1985 asked me, as a trustee of the Morris Animal Foundation, for help in providing a veterinarian. Since her death the foundation has funded the Volcano Veterinary Center in Rwanda, the first facility to provide health care to an endangered species. Dian's work at Karisoke continues, supported by the Digit Fund.

> RUTH M. KEESLING President International, Digit Fund Englewood, Colorado

It was a thrill to see the mountain gorilla Papoose's infant (pages 4-5). In a study funded by National

Geographic at Karisoke, Pascal Sicotte and I followed and observed Papoose during the time of Pasika's conception. In fact, we determined she was pregnant just ten days into gestation in July 1990. Michael Nichols's picture was my first opportunity to see Pasika up close.

> Nancy Czekala Zoological Society of San Diego San Diego, California

Ho-hum! NATIONAL GEOGRAPHIC has produced another predictable "monkey article." Your persistent allegations of a supposed relationship between humans and monkeys is no longer boring; it has become nauscating. This issue in its entirety went straight into the furnace.

ALAN S. PRIEST Burns Lake, British Columbia

Please continue to support these studies as we will continue to support you.

MR. AND MRS. S. C. COLWELL Lower Nicola, British Columbia

The portrayal of an animal rights terrorist holding a picture of two young chimpanzees (page 32) calls attention to a "worst-case scenario," but not the one intended. Ironically the real worst-case scenario was played out when four young chimpanzees were removed from our laboratory on a cold winter night by strangers wearing frightening masks. To this day the whereabouts of the stolen





STONEHENGE, WILTSHIRE, ENGLAND, 7:53 A.M. STILL GOING.

animals is a mystery. They probably perished in the hands of "liberators" who lacked expertise in chimpanzee care. Had they not been removed, they would now be living in social groups at the breeding colony where they were born.

> John C. Landon President, Bioqual, Inc. Rockville, Maryland

I was disgusted by the photograph of the chimp "entertainer" on pages 8-9. This exploitation of basically defenseless animals is exactly why animal rights groups are so necessary today. Forcing an animal to behave like a human is morally, intellectually, and emotionally repulsive. Unfortunately, the obvious delight shown by Mr. Jiggs's audience is what makes this cruel exploitation possible.

> LORRAINE JOHNSON Tacoma, Washington

MacArthur

Geoffrey C. Ward says, "No soldier in our history has been more extravagantly admired—or more savagely reviled—than Gen. Douglas Mac-Arthur." Have you heard of George Armstrong Custer?

> BETTY AND BILL MCALEENAN Kinnear, Wyoming

Your article is about the most fair and evenhanded that I have read. I served with the U.S. Eighth Army in the liberation of Leyte and the subsequent occupation of Japan. I can personally attest to the fact that MacArthur's "I shall return" played a significant role in sustaining the Filipino people during the Japanese occupation. And in Tokyo it amazed me to see Japanese civilians waiting outside MacArthur's headquarters just to catch a glimpse and bow to him. I believe no other person could have pulled off the peaceful occupation of an extremely hostile nation.

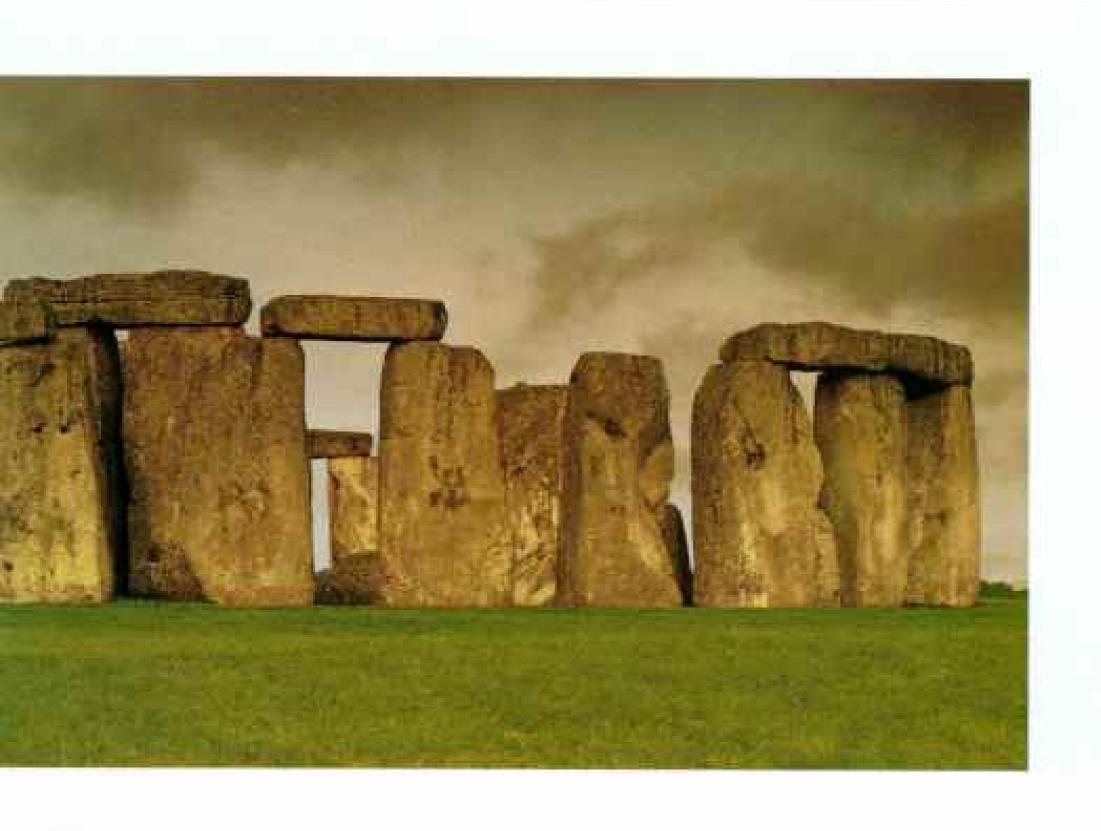
> RAYMOND E. LOGAN Ridgewood, New Jersey

Both my parents served under MacArthur in the Orient, and I considered him one of my early heroes. As I studied history on my own, my evaluation changed considerably. On page 65 a photograph shows MacArthur embracing General Wainwright, who as commander of I Corps on Bataan displayed personal bravery and true concern for his troops. Yet earlier, in a most unkind, self-serving act, he openly berated Wainwright over the Bataan surrender, saying that a major counterattack is how he would have saved the day.

Robert Berg La Luz, New Mexico

This disgraceful article about General MacArthur presents an indecent assault on his reputation.

> DONALD R. FLETCHER Lombard, Illinois



The article reads like a PR release issued from MacArthur's headquarters.

> George L. Trees Fort Washington, Maryland

The foreign officers visiting West Point (page 61) are not Portuguese but Italian. All wear Italian military uniforms. At MacArthur's right I recognize Gen. Armando Diaz, who was Commander in Chief of the Italian Army during the last year of World War I and signed the armistice with Austria-Hungary.

STEFANO FERRARI Milan, Italy

Douglas MacArthur was not born at Fort Dodge, Arkansas, as no such place ever existed; he was born in the Married Officers Quarters at Little Rock Barracks. The building is now the home of the Arkansas Museum of Science and History.

> Joa Stafford-Humphrey Little Rock, Arkansas

The downed B-17 on pages 68-9 is one of 12 ordered from Hawaii to Australia to provide the only U. S. air power in the area. On February 27, 1942, six planes left Townsville, Queensland, on the first U. S. bombing mission of Japanese-held Rabaul, New Britain. I was navigator on one. We all met fire from Japanese Zeros and headed back to Port Moresby. One of the six, number 43-2446, ran out of fuel and made an emergency landing.

Since its discovery several years ago it has been named "Swamp Ghost," and efforts are under way to bring it to the United States for museum restoration.

> Lt. Col., Horace E. Perry, USAF (Ret.) Friday Harbor, Washington

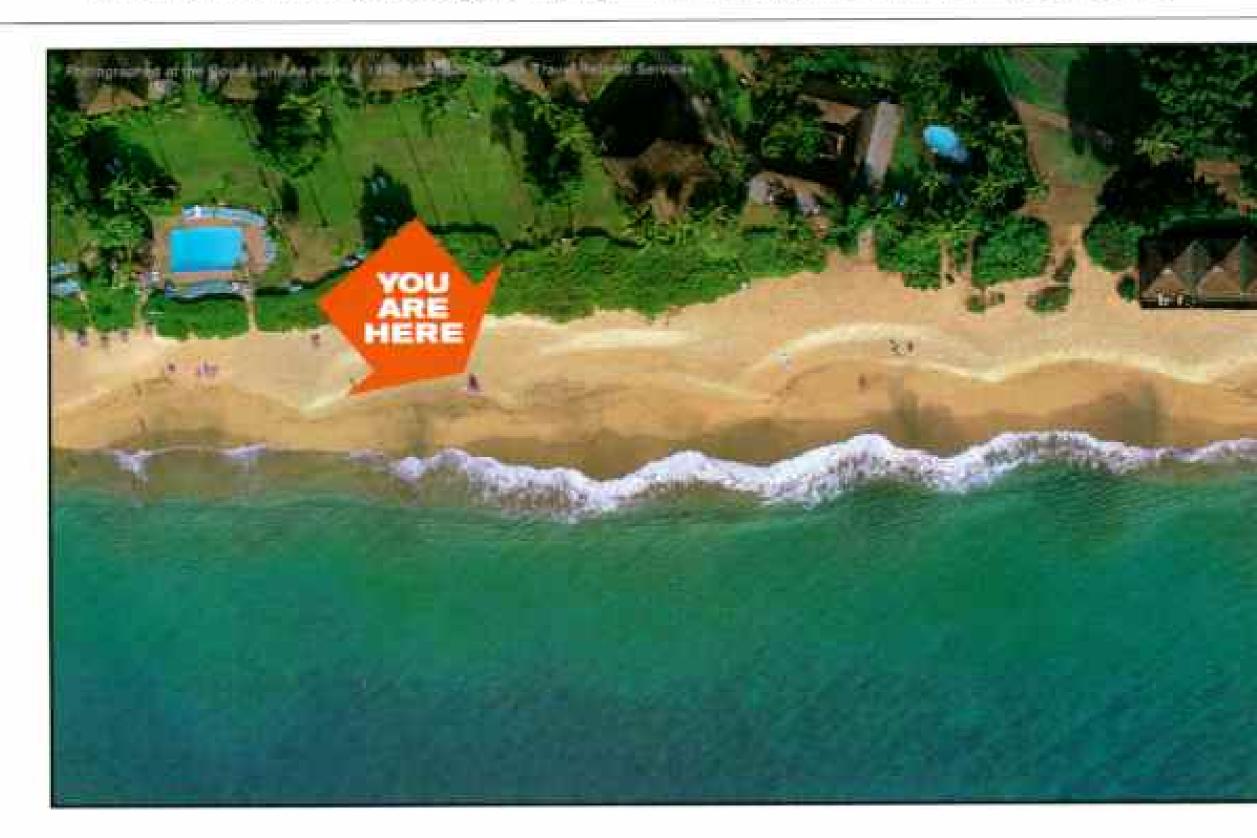
Sacred Peaks of the Andes

I consider this contribution by Johan Reinhard most valuable. As a well-trained cultural anthropologist from Vienna University, Reinhard has been specializing for years in high-altitude archaeology and ethnography, and in the Andes he has discovered an endless field of new sites of ceremonial centers.

Anna Hohenwart-Gerlachstein International Union of Anthropological and Ethnological Sciences Vienna, Austria

Lake Tahoe

It was a paradise, a Tom Sawyer childhood, growing up on Tahoe's south shore in the 1950s. Trout
Creek and the Upper Truckee meadows were full
of trout, which we boys diligently pursued. We
hunted croaking hordes of frogs, splashed through
the marshes after garter snakes. In the fall we
stood in wonder at clouds of ducks and geese overhead. The meadows were also breeding grounds
for mosquitoes. They would drift up and pester
summer barbecues. That was "unacceptable." So



Introducing a Travelers Cheque for couples who

progressive city fathers purchased a little white truck that putted up and down our streets spewing pesticides that misted over the meadows, killing the mosquitoes. The food chain was broken. No more frogs or snakes, the geese prefer golf courses, and the boys of summer are no more.

> CHRIS HARDT Carson City, Nevada

Yes, sheer volume of people causes major problems, and the backcountry is at capacity. Cal Sno-Park and Nevada's Spooner Lake project block free access to snow-play areas, and the traffic still smogs up the air. But most of us are trying. We now transport our treated sewage, refuse, and garbage out of the basin. We have restored old dump sites and are buying unbuildable lots. Our loved and hated bistate agency (TRPA) has blocked what would have been a massive buildup from ski slope to lakeshore. Come back and look again.

> J. MICHAEL SHARP Stateline, Nevada

My maternal grandfather, William Henry Knight, caused Tahoe to be so named. He arrived in California as a young man riding a horse behind a covered wagon in 1859. Passing a beautiful lake called Bigler, after California's third governor, he thought, What an ugly name. Then in San Francisco he compiled the first map of the Pacific states, in 1862. He learned that the Indians called

the lake Tahoe, meaning "big water" or "high water," and had his cartographer put Tahoe on the map; it was accepted in Washington.

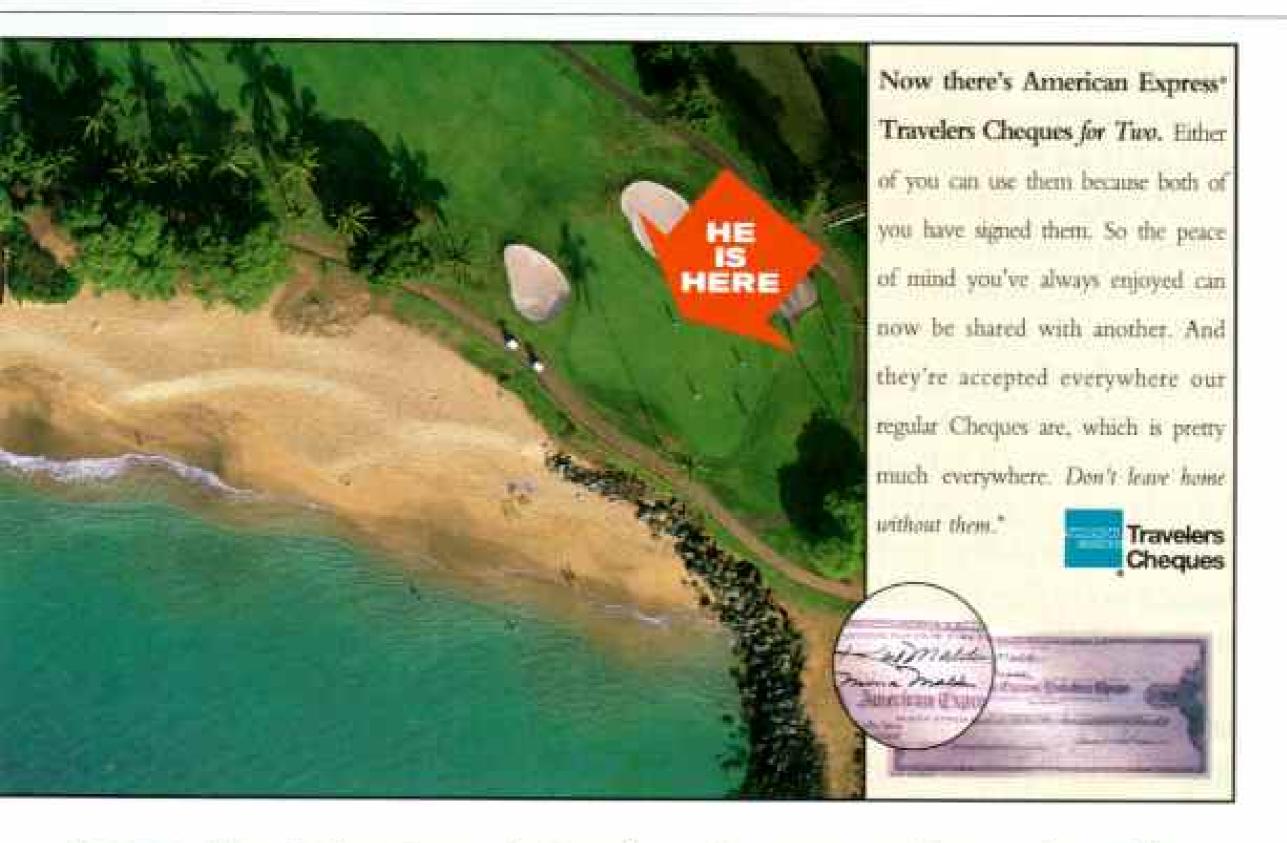
> Waldo Ruess Santa Barhara, California

Earth Almanac

Contrary to your March report, polar bears and oil and gas activities do not raise "new concerns." The reader is left with the impression that the Arctic National Wildlife Refuge's coastal plain is important for the species, but note that it covers 1.5 million acres, about the size of Delaware. During the past 11 years the U. S. Fish and Wildlife Service has counted a maximum of four dens and in some years none in the ANWR area. These few dens have been found near the coastal bluffs where development is least likely. It is highly unlikely that carefully controlled development in ANWR would adversely affect polar bear habitat. The oil and gas industry has carried out activities in harmony with wildlife for several decades.

RICHARD A. W. Hoos Mackenzie Delta Pipeline Project Calgary, Alberta

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



have tied the knot, just not around each other.

Aluxurycary

It's powerful. It's affluent. And it's beautifully put together.

It's friendly. It's efficient. And it's

simply fun to drive.

And the connection is perfectly logical. This is the new Civic EX Sedan from Honda. Most luxury cars stop you with their good looks. That, however, is where we start. Extensive wind tunnel testing drew the shapely lines of the near perfect form. The

car is naturally good looking.

You may notice it looks longer. We've increased the wheelbase and length.
Which improves the ride and adds room inside.

A close look reveals fewer gaps and tighter seams. The windows fit flusher than ever. Again, to cut aerodynamic drag and noise.

The whole body construction is amazingly strong. Mainly because of Honda computer-aided design and innovative building techniques. You want a body like this to last. So we've upgraded the corrosion safeguards.

The stronger body provides a stiffer, more solid platform for the improved suspension system. Which will provide you with an incredibly smooth ride and superior handling.

While driving, you'll appreciate the large glass area of the windshield and side windows. And you'll also become subtly aware of the many considerations given to you and your passengers in our new design.

The larger instruments are easy on your eyes. And new pushbutton

Civic EX

controls activate the heater and ventilation system. The front and rear seats are fully supportive.

Everything's plush and posh inside. Rich carpeting adds to your comfort and helps quiet the noise from outside.

ou can relate to.

into your

grasp. The cruise

control is at your fingertip.

Within the steering wheel an airbag

(complementing the seat belt) waits

diligently to serve. Like in all luxury

And speaking of quietness, we replaced all of the mechanical cables with silent electric wires to power the instruments. Even more, we sealed off about everything else we could.

The steering wheel is thick and falls comfortably anti-lock disc brakes.

Right next to the brake pedal is the accelerator, which assumes a new meaning. An extraordinary engine propels the car like nothing before. The engine knows to breathe more air as it works harder to produce more power. Just like you would.

As you step on the accelerator, the engine computer commands valves

in each cylinder to open farther. That lets in more air and fuel from the electronic fuel

injection system. The final result is more

> horsepower when you need it. And more efficiency at slow speeds.

> The complete process is called variable valve

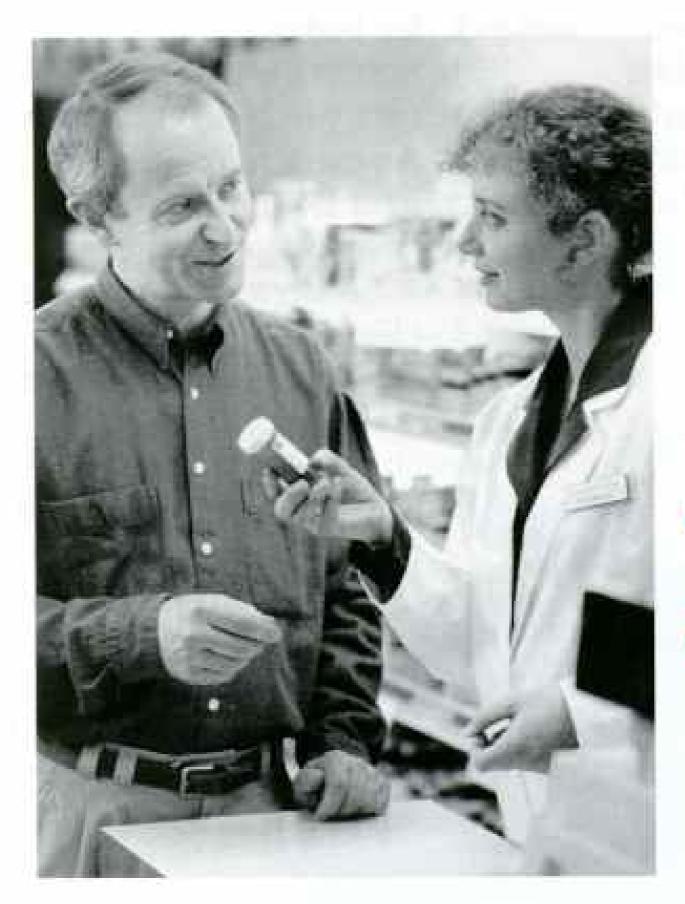
timing. You'll like what it does.

This superbly designed engine is matched to a five-speed manual shift with a smooth hydraulic clutch that never needs adjusting. A four-speed automatic transmission is available.

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Geographica



Written Record of Life in a Roman Frontier Post

eantime winged Rumor, flitting over the shaken encampment...."

This passage from Virgil's Aeneid, scribbled in Latin upon a thin piece of wood by a child learning to write, turned up in a cache of historical treasures: more than a thousand "documents" buried in the remains of a Roman fort established on the frontier in far northern England about A.D. 90.

"Actually there were nine forts, built one on top of another; down at the bottom, everything survives," says Robin Birley, excavator of Vindolanda, 12 miles from the modern town of Hexham. "Some of the

documents contain the year or the date. This period was almost a blank in British history, so they've given us names of people, the regiments based here, the commanders and their wives. They contain the correspondence of ordinary people garrisoned here."

Most documents are army records or mail. Like the writing exercise, many hint at everyday life on the edge of empire. In one, an officer's wife invites another to a birthday party (above); in a second, a soldier gets a letter from home saying he soon will receive "woolen socks, two pairs of sandals, and two pairs of underpants."

Orphans in a Storm, Shoes Sneak Ashore

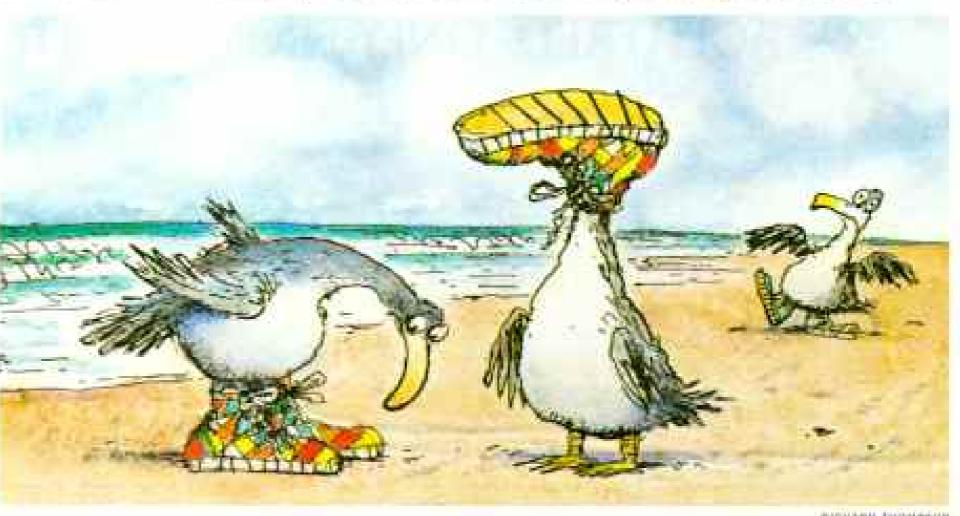
Ceanographer Curtis Ebbesmeyer is charmed when drifting bottles with notes in them turn up. He never thought drifting sneakers would give him the same "transforming experience" until hundreds of high tops began washing up on Pacific Ocean shores from the Queen Charlotte Islands to southern Oregon.

In May 1990 about 40,000 pairs of South Korean-made Nike shoes slid overboard in mid-ocean when a storm struck a ship carrying them, in airtight containers, from Pusan to Seattle,

MINDOLANDS TRUST

By the following January, beachcombers 2,000 miles to the east were
finding sneakers. Since then, the
Seattle-based Ebbesmeyer has been
gathering reports, poring over computer models, and plotting where
1,300 shoes landed. He has decided
that 1990 currents took the footgear
farther south than they would have
in a normal year. But in an El Niño
year (National Geographic, February 1984) with strong southwesterly currents, shoes might have ended
up farther north, in Alaska, he says.

Rich Hastings, transportation manager for Nike Inc., says the cargo containers probably imploded when they sank, and the sneakers floated because of an air-cushioning system in their soles. "It's like putting a life jacket on each shoe."



RICHARD THOMPSON

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GOODFYEAR

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Geographica



POFFERFORD



M. MONTGOMERY, N. S. POREST SERVICE (BELDWIC BUEN METERS, VISUAL

Dresden Plans to Rebuild Its Landmark Church

or nearly half a century Dresden's Frauenkirche—Church of Our Lady—has stood in ruins, recalling the night in February 1945 that British and American planes rained

bombs on the
German city sometimes called Florence on the Elbe
(Geographic,

With Germany again unified, city and church officials now plan to rebuild the Lutheran church whose dome towered above Dresden for two centuries. Many Dresdeners—and the former East German government—had opposed reconstruction even as many other historic structures rose from the ruins, preferring to keep the rubble as a symbol of war's horror.

Fortunately, the church had been surveyed and restored shortly before the bombing, so the necessary architectural records and building details are available. But it will take time, perhaps as long as a decade, and lots of money: A minimum estimate is a hundred million dollars, most of it to be raised by private donation.

The Frauenkirche was completed in 1743, granted to the city's Protestants by a Saxon ruler who was forced to become a Catholic in order to become king of Poland too.

Battling a New Intruder: the Asian Gypsy Moth

The U. S. and Canadian governments are mounting a defense against a Russian invasion. No, the clock has not been turned back. These invaders are Asian gypsy moths, foliage-chomping insects

that can cause billions of dollars in damage. Experts believe they entered North Amer-

> ica from Russia last year in egg masses attached to grain vessels. The larger Asian gypsy moth (left) is a more voracious feeder than

the common North American strain and can feed on Pacific Northwest tree species. Unlike the flightless North American female (below), an Asian female can fly 20 miles between mating and egg laying.

The U. S.
Animal and
Plant Health
Inspection Service is barring from
West Coast ports
ships found carrying egg masses,
and the Tacoma and Portland
areas as well as Vancouver, British
Columbia, have been sprayed with a
biopesticide.

"Missing" Bat Reappears in the Galápagos Islands

Galápagos Islands led to his theory of evolution, most of the islands' creatures have been copiously researched. Yet their two native bats have been practically unstudied.

A University of Tennessee zoologist supported by the National Geographic Society has obtained the most detailed information yet about these bats, including the happy news that one species—unreported for a century—is locally abundant.

Gary F. McCracken reports that the species, Lasiurus brachyons, is common on two islands in the Galapagos chain, Santa Cruz and San Cristóbal, while the other native bat, Lasiurus cinereus, is present on those and three other islands. He traced the bats by listening to their distinctive calls. L. cinereus, popu-

larly called the hoary bat, is also known elsewhere in the Americas. McCracken is conducting genetic studies to determine if L. brachyotis is indeed a separate species or if it is related to another mainland bat, the red bat.

McCracken attached radio transmitters to several brachyotis to study their habits. He found that they roost in the same small trees or bushes daily after returning from nightly foraging for insects.

-BORIS WEINTRAUB

We Like To Think The World Revolves Around The New Jeep. But Actually, It's The Other Way Around.



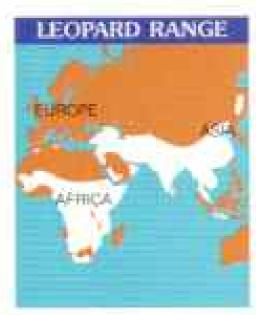
The New Jeep Grand Cherokee Limited







WILDLIFE AS CANON SEES IT



Leopard Genus: Panthera Species: pardus Adult size: Length, 91-191 cm, tail, 58-110 cm Adult weight: Male, 37-90 kg, female, 28-60 kg Habitat: A variety of habitats in Africa, the Middle East and Asia Surviving number: Unknown

Capable of surviving in habitats as diverse as rainforests and deserts, and across a geographic range that stretches from Africa to the Far East, the leopard has proved itself to be the most adaptable of all the big cats. But despite this resilient nature and remarkable adaptability to different environments, leopards are declining in number and are now threatened or endangered throughout much of their widespread range. 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 leopard and our entire wildlife heritage.



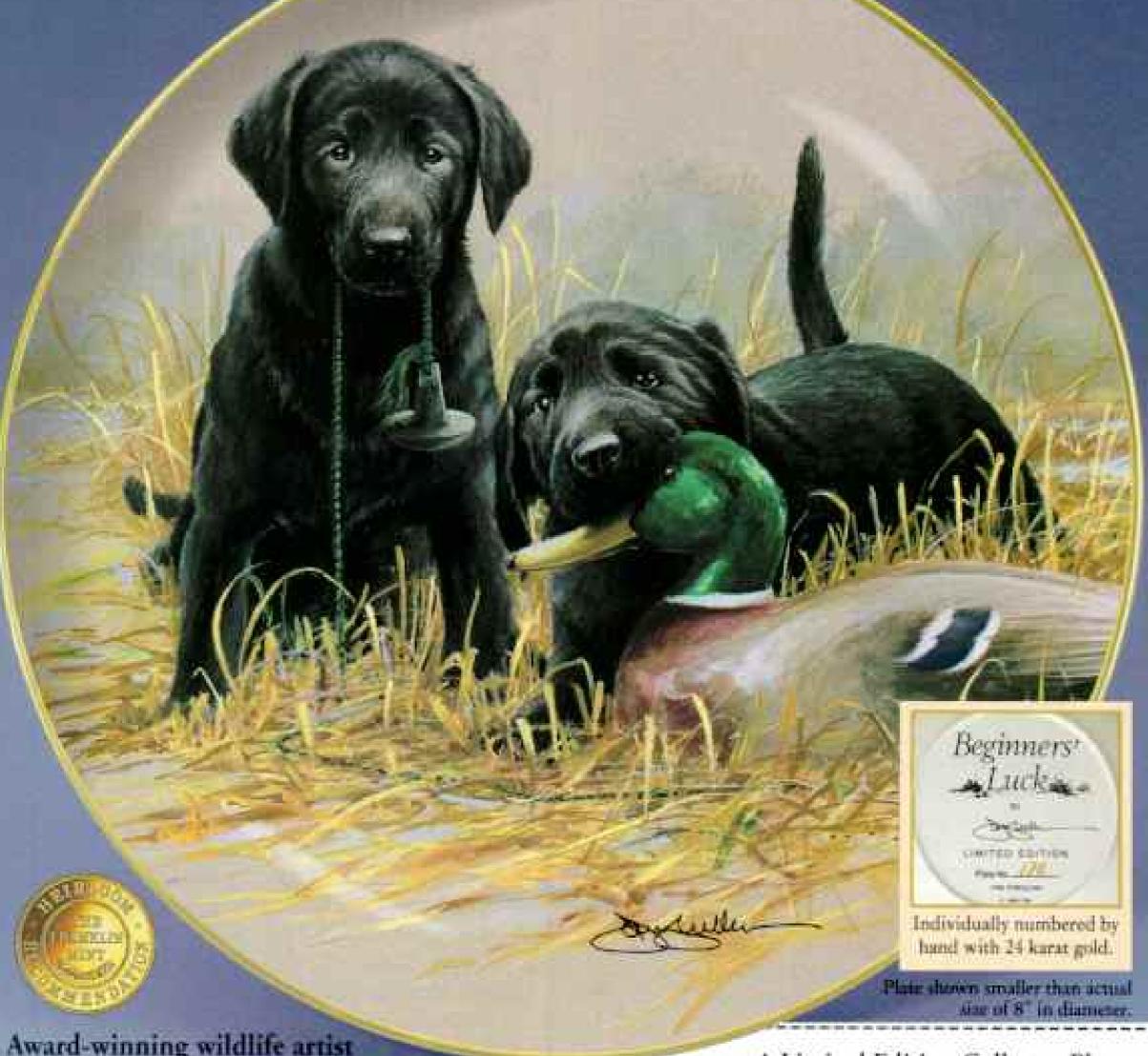


Photographed by

Jonathan Scott



Beginners' Luck



Award-winning wildlife artist James Killen creates an endearing work of art in fine porcelain.

hey have the best of intentions, these two adorable black labrador retriever pups. But they've "captured" the master's decoy, instead of the duck!

America has always had a warm spot in its heart for sporting dogs-for their energy, their breeding and their unwavering loyalty. Now renowned wildlife artist James Killen portrays that incomparable canine spirit in a limited edition collector plate, Beginners' Luck. Crafted in fine porcelain, then hand-numbered and bordered in 24 karas gold, this magnificent imported collector plate also bears the arrist's signature mark on the reverse side.

Priced at just \$29.50, it will be closed forever after just 45 firing days. Available evelusively from The Franklin Mint. Franklin Center, PA 19091-0001.

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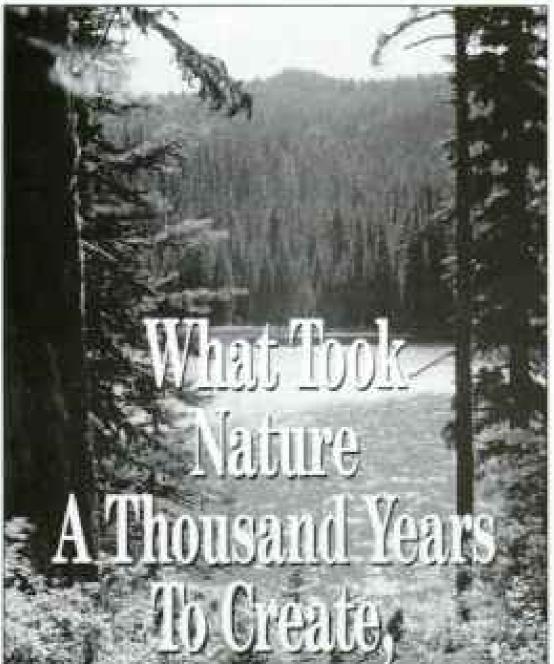
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Our ancient forests provide clean air, fresh water, and natural habitat for many rare wildlife species. Can human-kind afford to ignore these vital interests?

The Wilderness Society believes that the short-term gains of the timber industry should not supersede the long-term interests of the American people. Please join our dedicated team of ecologists, economists, and foresters in waging this crucial battle. For more information, or to send a tax-deductible contribution to our Ancient Forest Protection Campaign, write to The Wilderness Society today.

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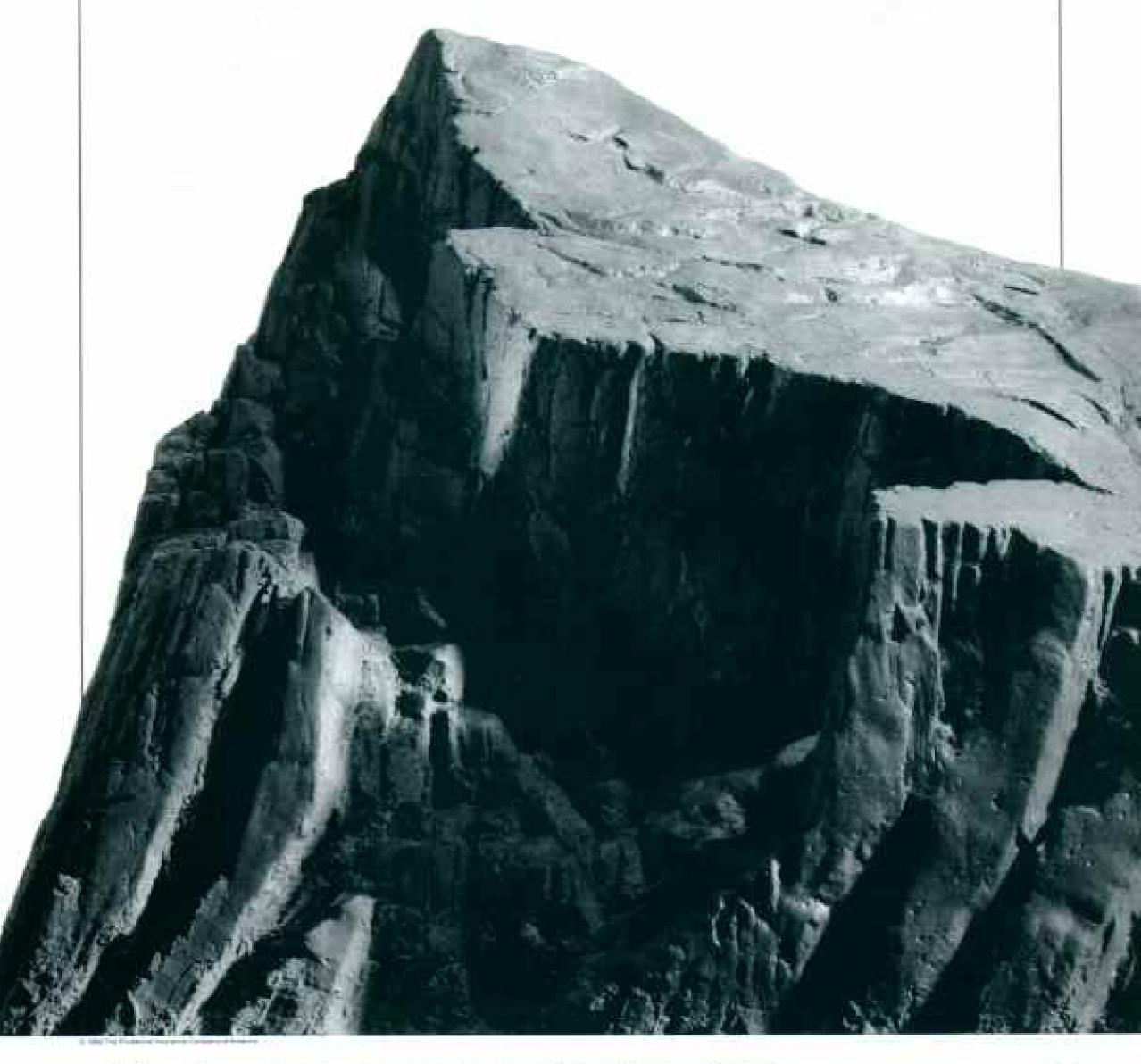
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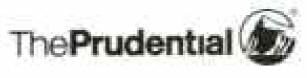
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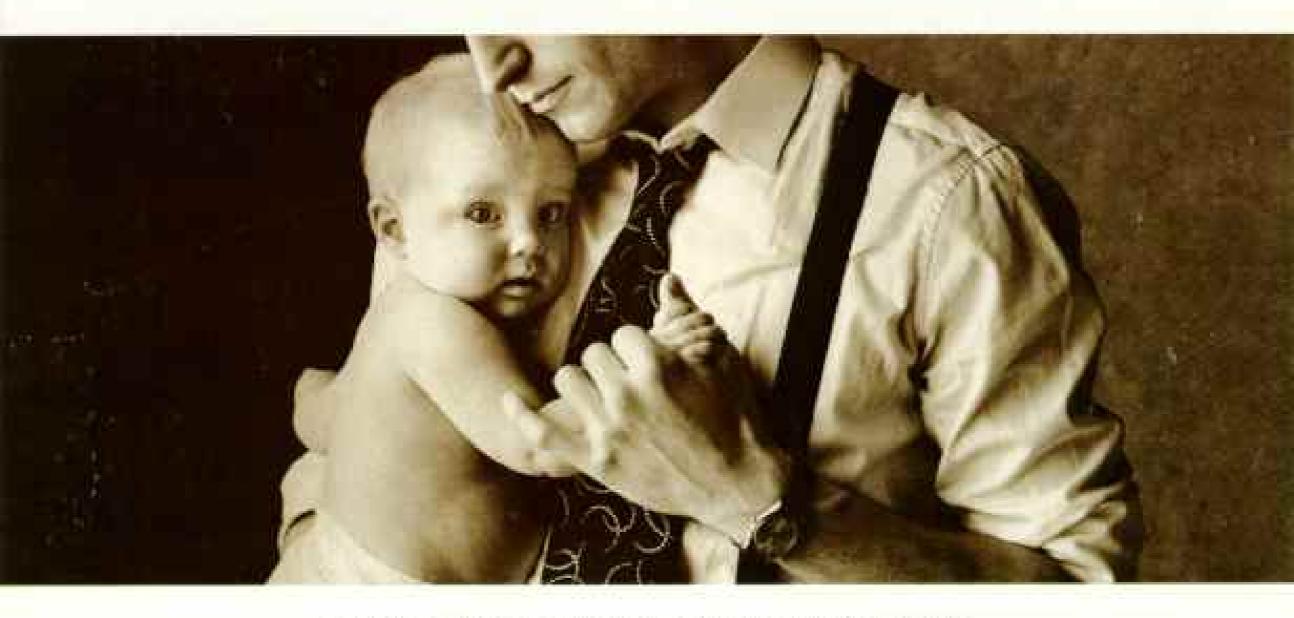
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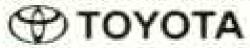
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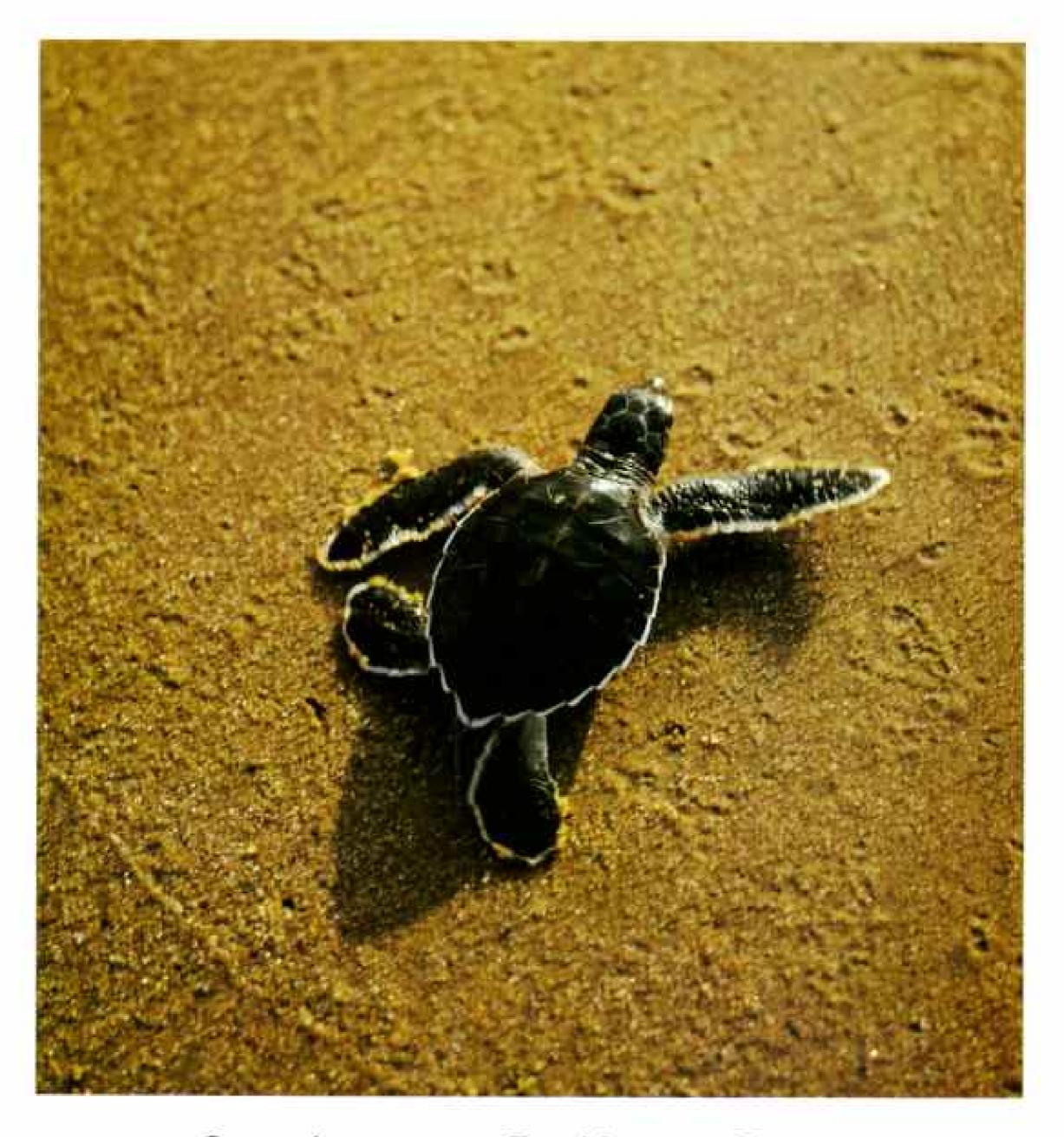
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Some Arguments For Nuclear Energy Are Smaller Than Others.

Around the nuclear electric plant on Florida's Hutchinson Island, endangered wildlife have a safe haven. The baby sea turtles hatching on nearby beaches are more evidence of the truth about nuclear energy: it peacefully coexists with the environment.

America's 110 operating nuclear plants don't pollute the air, because they don't burn anything to generate electricity. Nor do they eat up valuable natural resources such as oil and natural gas.

Still, more plants are needed-to

help satisfy the nation's growing need for electricity without sacrificing the quality of our environment. For a free booklet on nuclear energy, write to the U.S. Council for Energy Awareness, P.O. Box 66080, Dept. TR04, Washington, D.C. 20035.

NUCLEAR ENERGY MEANS CLEANER AIR.

On Television



MAR CURPORATION (ABOVE); ASHIAN WARREN, IMAR CORPORATION

Larger Than Life: IMAX and the Mountain Gorilla

alf man, half beast—so it was said in 1902 after a German Army officer sent home some intriguing bones from deep in central Africa. Ninety years later a new film brings that creature—the endangered mountain gorilla—to life with astonishing realism. "The images are so detailed," says executive producer Christopher Parsons, "that you can almost see individual hairs on a gorilla's back."

Produced by Imax Corporation in association with the National Geographic Society, the 40-minute "Mountain Gorilla" uses giantscreen technology to immerse the viewer in the sights and sounds of the Virunga Mountains in Rwanda—and in the daily life of one gorilla family.

Key to the picture quality is a film frame three times as large as the normal 70-millimeter movie frame. Projected onto screens up to eight stories high, the images fill the viewer's field of vision. Fidelity is also achieved through sound: A sixchannel, four-way audio system adds



to the sensation of observing the animals in the wild.

Even director Adrian Warren was surprised at the first footage projected onto the big screen. "It was just like being back with the gorillas—only without the rain and stinging nettles."

Fewer than 350 mountain gorillas survive in a 250-square-mile area high in the Virungas. Straddling Rwanda's borders with Uganda and Zaire, this wilderness lies within one of Africa's most densely inhabited regions and provides a tenuous home base for the gentle apes.

To capture their ways, the film crew (left) made four trips to the Virungas. sometimes working near Karisoke Research Centre. founded by the late Dian Fossey. Each day during the six-week bouts of filming, they lugged massive equipment-the camera and its accessories weigh 170 pounds-up steep, muddy slopes. "I was glad to do that for the gorillas," Warren says of the arduous climbs.

As if those were not obstacles enough, on the final visit a skirmish between rebel forces and government troops halted filming.

All the struggles to make the IMAX film are themselves the subject of a documentary film for television. National Geographic EXPLORER's "Mountain Gorilla: On Location" tells the story behind the IMAX project.

"MOUNTAIN GORILLA: ON LOCATION," EXPLORER, TBS SUPERSTATION, JULY 5, 9 P.M. ET. IMAX/OMNIMAX THE-ATERS ARE IN SCIENCE CENTERS, MUSE-UMS, AND THEME PARKS WORLDWIDE.



If it had less legroom, a lesser warranty, and cost thousands more, it could be a Cadillac.

Logic would seem to dictate that when you pay thousands of dollars more for a car, you should get a lot more car. Apparently, in the case of the Cadillac Sedan DeVille versus the Chrysler Fifth Avenue, logic does not apply. Both cars provide ample room for six, air-conditioning, automatic transmission, automatic load leveling, stereo sound system, fully reclining seats, all as standard equipment. Both offer safety and performance. A driver's air bag is standard on the Chrysler Fifth Avenue, as is a powerful fuel-injected, 3.3-liter V-6. Anti-lock brakes are also available. Here, however, is where logic totally falls apart. The restyled Chrysler Fifth

Avenue costs thousands less, yet it has

more rear legroom than the largest Cadillac.* And it offers a better warranty: bumper-to-bumper protection for 5 years or

50,000 miles! So if you're looking for a great luxury car, defy logic. Pay less, get more. Chrysler Fifth Avenue. For more information, call 1-800-4A-CHRYSLER.

ADVANTAGE: CHRYSLER



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EarthAlmanac



An Island A-slither: Alien Snake Overruns Guam

hey are ill-tempered, mildly poisonous, and up to ten feet long. On Guam they have multiplied into millions, decimated wildlife, crawled into homes, and even attacked infants. This menace, the nocturnal brown tree snake, has virtually no natural enemies, and the islanders' efforts at control have been to no avail.

"We don't have any magic bullets," says Robert Beck of Guam's Division of Aquatic Wildlife and Resources. "Folks are having to learn how to live with the snakes."

Native to the southwest Pacific. the snakes probably arrived on Guam, far to the north, as shipboard stowaways after World War II. In at least one area their density has reached an astonishing 30,000 a square mile: the 130,000 Guamanians are hopelessly outnumbered on the 209-square-mile island.

The lean, mean eating machines have wiped out 9 of 12 native bird species and subspecies on the island. The endemic Guam rail and Micronesian kingfisher have been saved by captive breeding.

In recent years the island has suffered hundreds of blackouts when climbing snakes short-circuited power lines (and themselves). Traps, electric fences, and fumigants have so far had little impact. Another invasion is feared in Hawaii, where brown tree snakes have been found in aircraft arriving from Guam.



Old Tires Burn for Power, Add Rubber to the Road

ike coat hangers breeding in the environmental closet, two billion used tires have piled up in the U.S.; 280 million more are discarded yearly. Two cleanup strategies are on a roll: burning tires to make electricity and adding scrap rubber to asphalt for roads.

"Tires are like funny-shaped barrels of oil," says Robert Graulich of the Oxford Energy Company. An automobile tire does indeed contain about 2.5 gallons of oil, and Oxford runs two power-from-tires plants, including one in Connecticut (above). It burns 11 million tires a year, producing enough electricity to serve 15,000 people. A smaller plant operates in California, and two more are planned. The company's high-temperature combustion processes keep emissions within federal and state limits. By 1995 Oxford hopes to recycle more than 60 million tires a year.

Tires can also be ground up and blended into asphalt. States that don't recycle scrap rubber in other ways will soon be required to use it in asphalt for federally funded roads.



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Earth Almanac

Sierra Club at 100: Still in John Muir's Footsteps

t remains as lively a group as John Muir could have wanted when he wrote in 1892 that he hoped "to do something for wildness and make the mountains glad." On May 28 the Sierra Club was founded, with Muir as its first president. Thus began a century of grass-roots activism, from fighting the Hetch Hetchy dam-Muir's most bitter defeat-to gathering 1.1 million signatures on a 1981 petition against Interior Secretary James Watt.

Besides raising Cain on Capitol Hill, these conservationists, now numbering more than 625,000, are famous for having fun together in a big way. In 1901 club secretary William Colby started the annual High Trip, a group outing in the High Sierra. Soon armies of 300 members invaded the mountains, with mules hauling stoves.



BY ANDEL ADAMS, IN 1992 TRUSTEES OF THE MASEL ASSAULT PORCESSION TRUST

huge cook pots, even iceboxes. Ansel Adams recorded the 1931 trip with this unusual double exposure (above). Although such mass outings have faded away. the club reenacted the first High Trip this June to celebrate its centennial.



Targeting a New Strain of the Sweetpotato Whitefly

s if California growers - periodically attacked by the Medi-▲ terranean fruit fly—didn't. have enough to fret about, last fall along came another winged peril. A new type of whitefly, Bemisia tabaci, swirled like massive clouds of dandruff across fields of melons, lettuce, broccoli, and other vegetables. Crop damage totaled 118 million dollars, 2,200 jobs were lost, and a state of emergency was declared in Imperial and Riverside Counties.

The pest was dubbed the poinsettia strain of the sweetpotato whitefly in Florida, when it was sighted on ornamental plants there in 1986. "In

California the numbers went from troublesome in July to devastating by September," says Tom Bellows, an entomologist at the University of California at Riverside, Pesticides and other remedies failed. "People were even trying to vacuum the insects off their plants," adds Bellows. As part of a proposed fiveyear program, he intends to search for a natural whitefly enemy. Wasps and ladybird beetles are currently the most promising candidates. The right foe might turn up in the Middle East, where the whitefly possibly originated.

Can the Quagga Defy Extinction's Quagmire?

I hat looked very like an unfinished zebra, with faint stripes on its hindquarters, none on its legs, and a brown background? The quagga, hunted to extinction in South Africa a century ago. Yet researchers believe the quagga's genes live on, and they are attempting to bring back this vanished animal by selective breeding.

DNA cloned from preserved quagga skins has shown that the animal was a subspecies of the plains zebra. Scientists suspect that its genes might still be present in southern plains zebra populations. In 1987 they began breeding poorly striped and brownish zebras from Etosha National Park in Namibia and Zululand in South Africa. Some of the ten foals born since December 1988 bear striking quagga-like features, such as reduced striping and a predominantly white tail brush.

-JOHN L. ELIOT





On Assignment



JOSEPH B. STANCAMPIANO, NES

erging two hobbies into a career, wildlife photographer George Grall (above) plunged into his first Geo-GRAPHIC assignment -- a close-up of life on a wharf piling.

"When I was three in Illinois, a neighbor kid taught me to climb our fence," George recalls. "I slipped away and brought back a dead snake I found on the road. I've been interested in wildlife ever since."

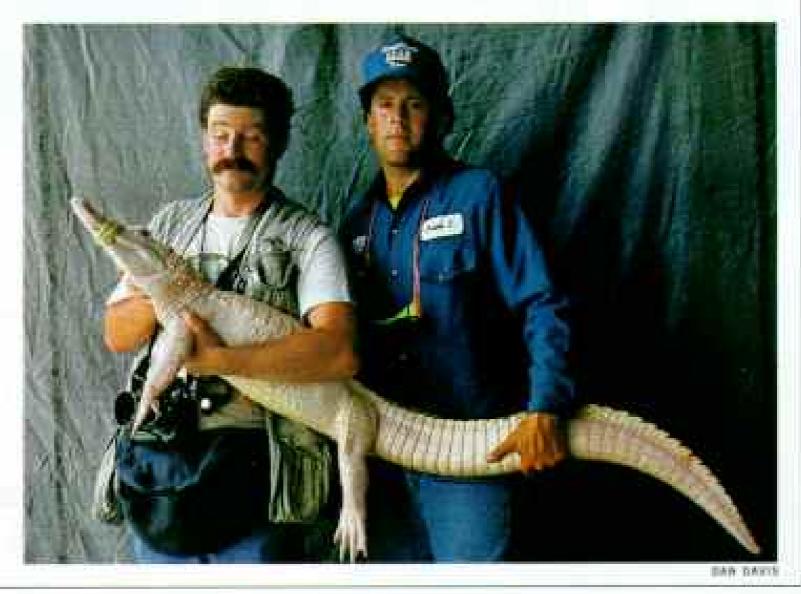
George's parents encouraged his enthusiasm for animals and also nurtured his appreciation of art, which led to photography. "I sold turtles and snakes for two dollars each when I was 16," he says. "That money got me my first camera." Since then he has been "into a lot of animals that other people overlook, especially the small ones."

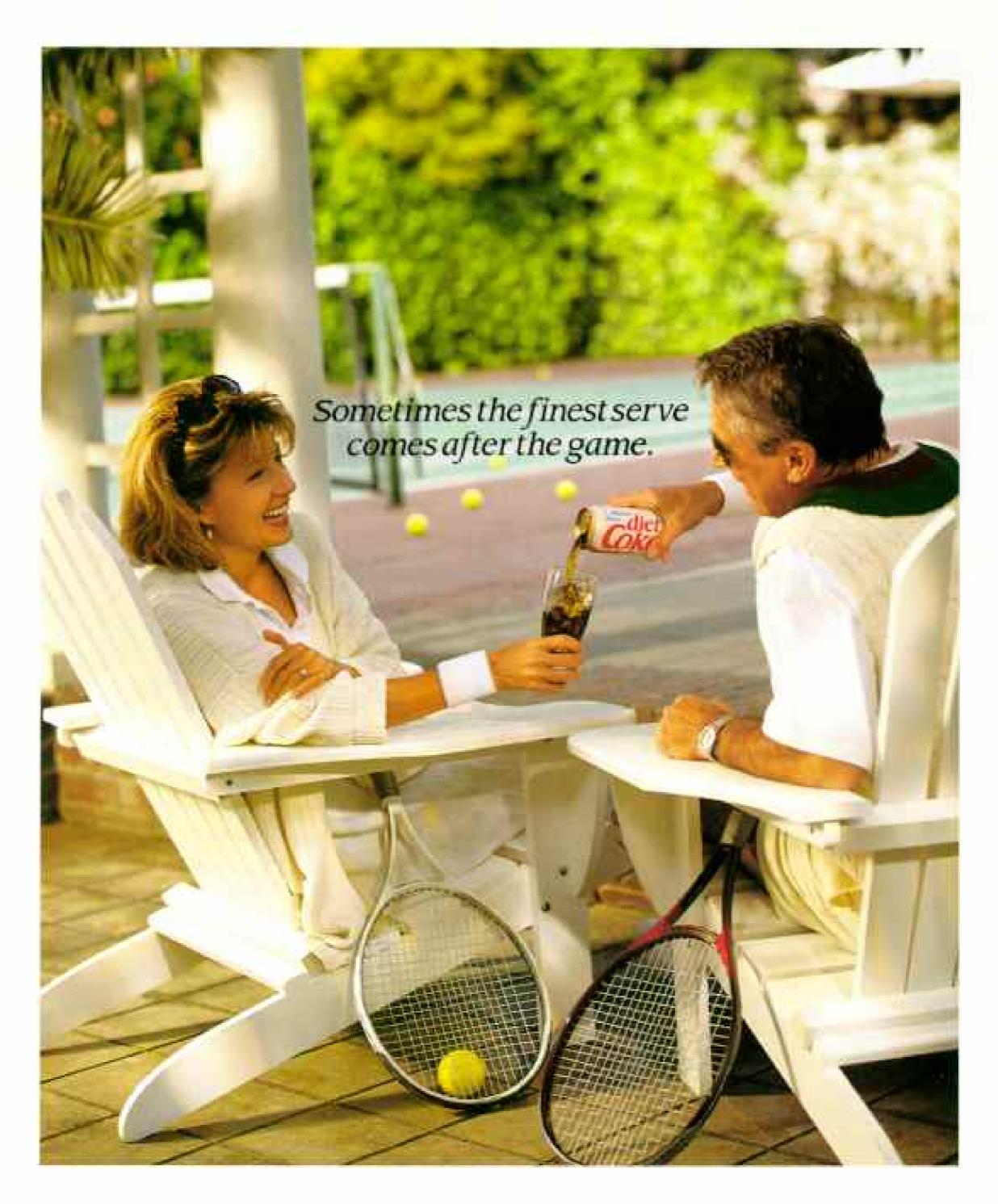
Another man who loves his job, photographer Joel Sartore, at left, says, "It's amazing to get paid to have great experiences." On his first GEOGRAPHIC assignment, the Gulf Coast, he was "catapulted off an aircraft carrier and swam along

with manatees." At an alligator farm Joel and marine biologist Frank Ellender hoist a rare white alligator. Only 18 of these are known, all males from a clutch near Houma, Louisiana, "It was like lifting a sack of chicken feed, except a sack can't throw you across the

room with a flick of the tail."

During tamer days Joel studied journalism at the University of Nebraska, then worked for the Wichita Eagle. In January he became a GEOGRAPHIC contract photographer; he and his wife, Kathy, live in Lincoln, Nebraska.





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