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Sierra

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1991-92 International Outings

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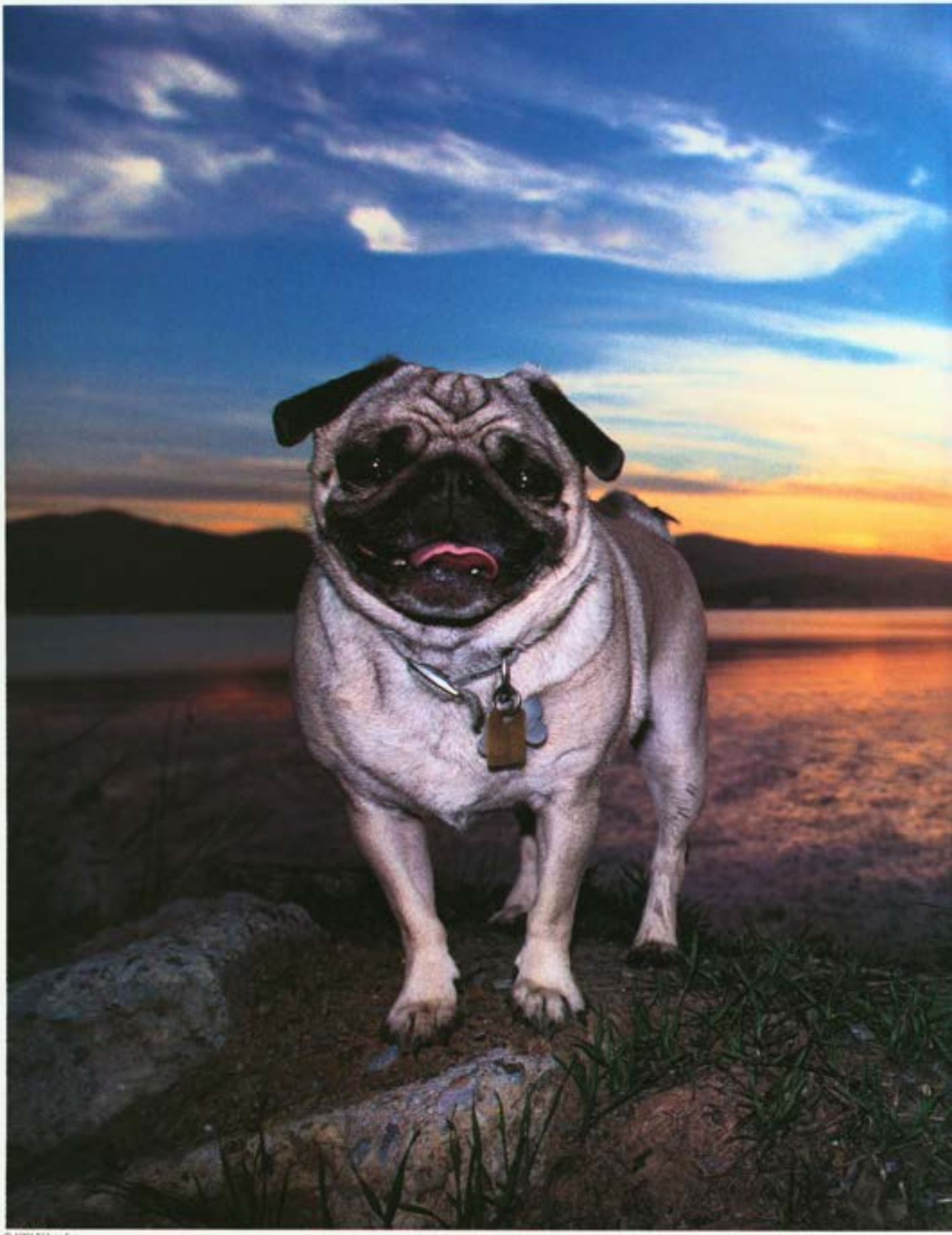

Fergie, normal dog. Ann Crump, regular person. They took a walk with the N6006 and some beef chewies.

Art happened.

The Nikon N6006 is a serious SLR that almost anyone, anywhere can pick up anytime and have fun with.

Case in point, one Ann Crump. She lives in Belvedere, California, across the bay from San Francisco, and usually makes art with watercolors and oils.

She's not a professional photographer.

Yet, as you can see to the left, she used the N6006 to create nothing short of a masterpiece.

Or at least one killer dog picture.

The model is Ann's three-year-old pug, Fergie, photographed in all her glory on a sunset walk using the N6006 and a 28mm Autofocus Nikkor lens.

To put it in technical terms, Ann used Auto Balanced Fill-Flash, autofocusing, and Matrix Metering.

In normal talk, she picked up the camera and did what anybody would do.

She said cheese. Then shot.

In a world where telephones and coffee pots have become complicated, taking terrific pictures has actually become easier.

The N6006 is why. It will focus automatically in light as dim as a single candle, or you can focus manually. It will automatically select the proper exposure, or let you do it.

You can choose from three light meters: a Spot Meter, a Center-Weighted Meter, or Nikon's Matrix Meter, an exclusive system that reacts instantly when the action is moving fast or the light changes unexpectedly.

Or, when you want to think about the picture instead of the exposure.

Or, in the case of *Fergie on a Rock*, when your subject needs a little glow shed upon it. Pop up the flash, and the N6006 will light the foreground subject while letting the sun shine through in the background.

Fergie on a rock

by

Ann Crump, painter

Maybe you never tried a picture like that because you thought it was too difficult.

Well, Ann Crump did it with one hand, while holding a dog biscuit overhead.

Quite a picture in itself.

Almost all the functions on the N6006 are controlled by a convenient dial next to your thumb, and a simple multi-button keypad.

An LCD readout clearly shows you what you're doing. If you ever think you're doing something wrong, just press any two buttons on the keypad and the camera reverts to totally automatic. It forgives you, instantly.

See the N6006 at authorized Nikon Dealers where you see this symbol. For more information on the N6006, and the benefits of the exclusive Nikon MasterCard, call 1-800-NIKON-35.

Using a feature called Focus Tracking, the N6006 can even keep moving subjects, such as cars or bikes, in focus.

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In other words, the N6006 is not a toy.

It's the Nikon designed for people who are serious about pictures but hate spending time on buttons and gizmos.

Maybe that's you. Somebody with dogs to walk. Kids to chase. A job to go to. And in between, pictures to make.

Well, it's not any harder to own a Nikon.

With the N6006, it's not any harder to take the pictures you've dreamed of instead of just plain old pictures.

After all, the face on your left is the work of an ordinary person using an extraordinary camera.

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*The Saab 9000 Series: From $22,895 to $33,995.***
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Look at the price sticker, and you'll find that the 900 is the lowest-priced import in America with ABS and a driver's-side air bag standard.

The moral being: Set out to build a conventional car, and it will come out looking ordinary.

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*The Saab 900 4-door sedan based on 1990 HLDI study. **MSRP excluding taxes, license, freight, dealer charges and options. Prices subject to change.

VOL. 76/No. 4 JULY/AUGUST 1991

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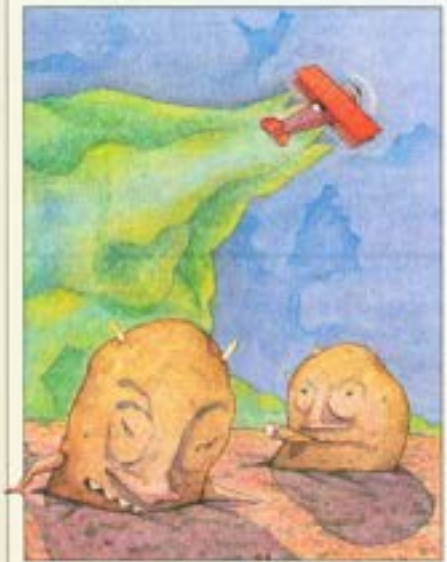

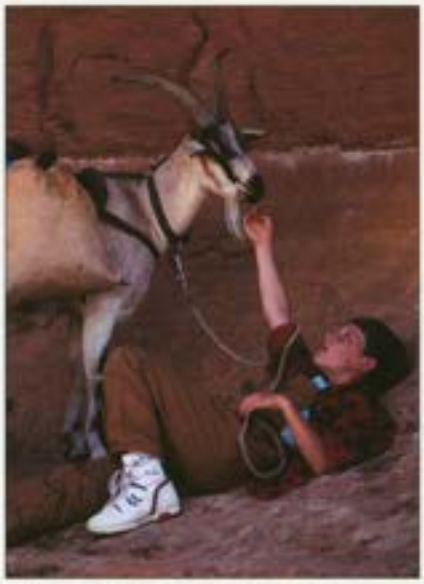

COVER: A tropical forest on Hawaii's Big Island. For a report on the pharmaceutical riches of the rainforests, see page 36.
Photo by Steve M. Alden.

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Kick the Oil Habit

President Bush's vision of our future, as expressed in his so-called National Energy Strategy, has oil wells off our shores and on the coastal plain of the Arctic National Wildlife Refuge in Alaska. It embraces more oil imports from the Middle East, more highways clogged with gas-guzzlers, and more nuclear-power plants creating high-level radioactive waste. If this is Bush's best swing at "the vision thing," he has visibly struck out.

The time has come to demand that our nation's lapsed commitment to energy efficiency and renewables be revived. To do otherwise is to condemn ourselves and our children to future wars, price shocks, and environmental despoliation both at home and abroad.

The Sierra Club is taking this message to the country's grassroots in a national campaign—one that encourages the United States to "Kick the Oil Habit." The Club has proposed a comprehensive alternative energy strategy that relies on technologically feasible, supremely affordable energy-efficiency and renewable-energy sources to reduce drastically our voracious appetite for petroleum. Our top priority is to pass legislation in the current Congress that would increase the fuel efficiency of our automobiles, and thus reduce demands for oil drilling in the Arctic Wildlife Refuge and off our coasts.

Already, Sierra Club volunteers in more than 20 states are circulating "Kick the Oil Habit" petitions. But we need to do more. The worst aspects of the Bush energy strategy have been included in legislation sponsored by senators Bennett Johnston (D-La.) and Malcolm Wallop (R-Wyo.). The bill, S. 341, is now awaiting a vote by the full Senate. We must defeat S. 341 and adopt a conservation-minded set of policies at the national, state, and local levels; otherwise, we can expect a continuing string of environmentally destructive energy-production proposals in the years ahead.

We urge you to take up this challenge. Start by filling out and mailing the coupon below. Join with your neighbors and fellow Sierrans to circulate petitions and develop other campaign strategies. Together, we will convince the United States to kick the oil habit, and so create a brighter future for us all.

Michael L. Fischer
Executive Director

Kick the Oil Habit

YES! We urge Congress and the President to:

- require automobiles to average 45 miles per gallon by the year 2000.
- protect our natural crown jewels, such as the Arctic National Wildlife Refuge and fragile coastal areas, from destructive oil and gas drilling.
- adopt a national energy strategy based on energy efficiency.

1. Name [please print]_____
Address_____
City_____ State_____ Zip_____
2. Name [please print]_____
Address_____
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❑ **Please send me a petition circulation kit.**
Return this coupon to "Kick the Oil Habit,"
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Albert Bierstadt: Art & Enterprise.
A century ago the paintings of Albert Bierstadt drew crowds. Yosemite, the Sierras, the Rocky Mountains, and more were captured on his spectacular canvases. All had imagined the new American frontier, but here were the visions that would drive them West. Over 70 oil paintings present the best of Bierstadt's career. *Through 9/1/91*

The Exhibition is sponsored by Philip Morris Companies Inc.

A Time of Change: Northern California Women Artists, 1895-1920
When California's first state art academy opened in San Francisco in 1874, enrollment was largely composed of women. By 1895, as women increasingly entered the work force, many were encouraged to seek careers as artists. Twenty-six works bring to light the talents of Helen Hyde, Lucia Mathews, Marguerite Zorach, and others. *Through 8/25/91*

San Francisco's de Young Museum features one of this country's leading collections of American art. On view are works by Paul Revere, Winslow Homer, Mary Cassatt, Grant Wood, and Georgia O'Keeffe. And this summer, two special exhibitions of art from one of the most exciting times in our nation's history. Museum hours are Wednesday through Sunday, 10 a.m. to 5 p.m. For more information call 863-3330.

top: Albert Bierstadt, *Yosemite Valley*, 1868, The Oakland Museum

right: Georgia O'Keeffe, *Petunias*, 1925, The Fine Arts Museums of San Francisco

center: Helen Hyde, *A Mexican Coquette*, 1912, Achenbach Foundation for Graphic Arts, The Fine Arts Museums of San Francisco

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RUNNING IN PLACE?

"Positive Energy: First Steps Down a Safer, Softer Path" (March/April) described the environmental consequences of energy production, but focused narrowly on efficiency improvements as a means of reducing these impacts and forestalling increased consumption. You alluded to new technologies for energy production that are "waiting to be implemented," but the follow-up article had a most pessimistic tone: Each possibility was either unproven, limited in applicability, or posed environmental problems of its own.

It should be apparent that the effects of energy production depend on aggregate rather than per-capita demand. The impact of even a draconian 50-percent reduction in individual energy consumption would be wiped out by the increase in global population expected before the middle of the next century. There would be an attendant reduction in the available land needed for the more promising of the cited alternatives.

In this, as in other environmental issues, population growth represents a more significant threat than economic and political shortsightedness. We are forced to run ever faster (i.e., to endure increasing costs or inconvenience) merely to remain where we are.

David E. Ortman
Midland, Michigan

IT'S IN THE MIX

President Bush's energy strategy continues our misguided reliance on fossil fuels and other nonrenewable resources. As demonstrated by the Persian Gulf war, it is quite expensive to "protect" those resources.

We believe a mix of energy strategies is needed in order for this country to achieve its stated goal of "energy independence." The United States will be far better off from the perspectives of both environmental and national security if:

- the administration supports fuel-efficiency legislation currently before the Congress;
- R&D budgets for renewable energy sources (such as solar, wind, and biomass) are increased;
- the tax on petroleum products is increased;
- home and appliance energy-efficiency standards are toughened;
- the Arctic National Wildlife Refuge is put off-limits to oil drillers;
- efforts are made to wean Americans from their single-occupant vehicles (e.g., high-occupancy and transit-only lanes, mass transit).

Christopher and Anne James
Seattle, Washington

MISDIRECTED CLOUT

Why are the environmental groups with the most political clout concentrating so much on auto fuel efficiency? The surest way to hold down the amount we drive is to stop building new roads and to remove other economic incentives that encourage businesses to locate farther from where people live.

We are the only major industrial nation that lacks a modern, comprehensive railway and public-transportation system—and yet the Bush administration wants to quadruple the mileage of the Interstate Highway System!

Russell Reagan
Palo Alto, California

PACs AMERICANA

Why is our government committed to profligate energy consumption? Consider a few numbers: In 1988 the oil industry gave $1.7 million to George Bush's campaign organization. (Two top executives of Atlantic Richfield alone gave $200,000 of that, and have given another $100,000 since; ARCO is today leading the oil-industry drive to throw open the Arctic National Wildlife Refuge to drilling.) From 1983 to 1988, energy-industry PACs contributed more than $7 million to U.S. senators, and more than $11 million to House members.

The energy industry pays our elected representatives very well. What do you suppose it pays them to do? The industry does not profit from conservation; it profits from consumption. Congress and the administration have crafted the energy policy they have been paid to craft, a policy that maximizes energy profits by maximizing energy consumption.

We must force Congress to change the laws that permit special interests to buy legislation of their choice. And make no mistake: Congress will have to be forced. Congress finds the present arrangement *very* profitable, and is not about to change it voluntarily.

Brooke Jennings
Salt Lake City, Utah

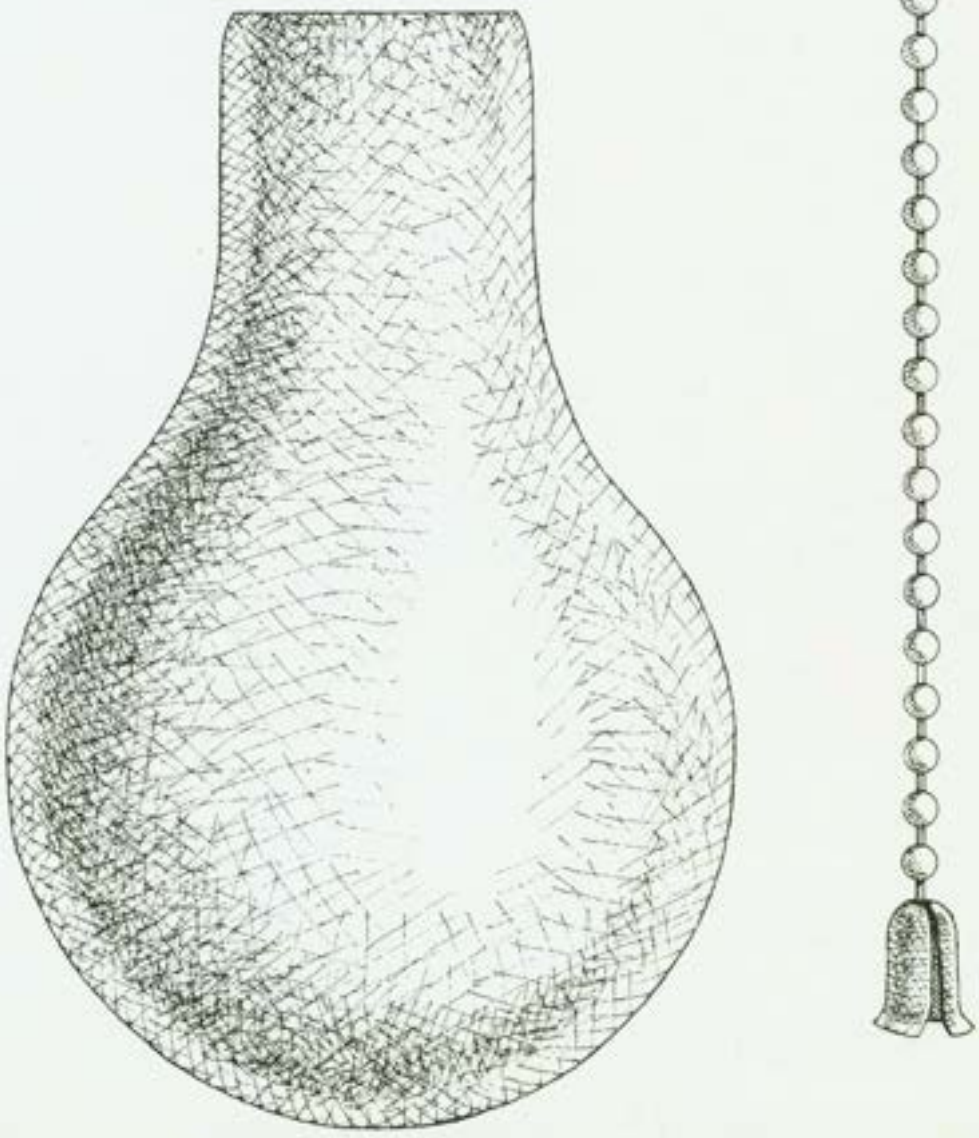
A FEW ALTERNATIVES

You're wrong, Sierra Club! Nuclear energy is a very feasible source of energy for the coming decades. It has proven to be efficient, cheap, virtually limitless, and safe. It's public hysteria (read: ignorance) and politicians' harnessing thereof that's keeping nuclear power as a mistrusted and grossly underrated utility. Let's keep our options open and use reason and fact, not unfounded fright tactics, to determine the new world order of global energy policy in the era ahead.

Sally Haskover
Solana Beach, California

I'd like to offer a wholly unscientific, unresearched, shoot-from-the-hip, Jeff Funderburk clause for the new, not-yet-ready-for-the-public U.S. energy policy: "All passenger vehicles, light trucks included, are allowed an engine displacement of no more than two liters (2000 cc). There are no restrictions on turbo- or supercharging. For each increment of 500 cc larger than 2100 cc, a $5,000 tax will be charged. Emissions standards will not be changed or eased. Older cars not meeting these standards will be allowed until the car is ten years old, at which time a registration fee surcharge

Everyone agrees we'll soon be needing more electricity. But there's little agreement on how to get it. Especially with the environment at stake. ❧ *Hydropower is limited by geography. Nuclear energy's problems continue to be debated. And the sun, the wind, the tides — they're all attractive, but none is economically practical on a broad scale yet.* ❧ *So, for at least the near future, we're going to have to rely, for the most part, on fossil fuels.* ❧ *But all fossil fuels are not created equal. One is clearly best for the environment. And that's natural gas.* ❧ *Natural gas produces less carbon dioxide emissions, it produces no sulfur dioxide, and it creates no particulates — the visible smoke you see. All of these are serious air pollutants.* ❧ *Further, because new high-efficiency, gas-powered generating plants are relatively simple to build, gas is also one of the quickest and cheapest ways for producers of electricity to increase their output.* ❧ *In short, if natural gas didn't exist, we'd have to invent it. As it is, nature has given us vast resources of natural gas right here in North America. It just seems natural to use them.*



will be added, at a rate lower than the new-car rate."

The purpose of taxing displacement seems to make sense (to me, at least). You can't fudge on it, as you can on fuel mileage. (There are a lot of two-passenger, two-door, six- and eight-cylinder "personal cars" on the road rated in the mid-20s for fuel mileage, with names like Camaro, Firebird, Thunderbird, and so on, that don't really get in the mid-20s in daily driving.) Larger-displacement cars use more fuel, generally speaking, and are not required to burn it as efficiently to get their horsepower.

Jeff Funderburk
Jacksonville, Florida

Your article indicated that solar-power satellites (SPS) will only be available "deep into the next century." By organizing and utilizing the financial resources of a global energy consortium and using existing technology, SPS could meet the entire world's energy needs in 30 to 40 years.

Chris Faranetta
Space Studies Institute
Princeton, New Jersey

You say that deployment of solar-power satellites will depend on "the right mix of cheap photovoltaics" coinciding with regular cargo shuttles into space. Allow me to point out that SPS are not dependent on photocells to derive energy from the sun; a "regular" heat engine will do the job!

John Hart
Department of Physics
Xavier University
Cincinnati, Ohio

LET'S GO TO THE MAP

A careful examination of the graph on page 21 of your March/April issue ("More Pence at the Pump = Less Rubber on the Road") suggests some findings that were ignored in the accompanying caption.

If we set aside the United States for a moment, we see that there is *no* discernible correlation between fuel cost and per-capita gasoline consumption in the other ten nations studied. Denmark, at about $3.80 per gallon, has about the same per-capita consumption as the United Kingdom, at $2.60 per gallon; Norway, at about $3.20 per gallon, has about the same per-capita consumption as West Germany, at $2.20 per gallon; Italy, at about $3.90 per gallon, has about the same per-capita consumption as the Netherlands, at about $3 per gallon; France, at about $3.10 per gallon, has about the same per-capita consumption as Austria, at $2.70 per gallon. If the correlation your discussion describes is a valid one, the per-capita consumption trend line at the right would follow the same smooth trend line as the price-per-gallon figures at the left. It clearly does not do so.

It is only when the U.S. is added back into the picture that it becomes possible to draw the superficial—and, I believe, incorrect—conclusion that you have drawn. And inasmuch as the correlation you are asking us to accept is not valid among the other ten nations, might it not be more useful to ask what it is about the United States—other than its low gasoline prices—that gives us such a high level of consumption? (It is probably not our wealth; both West Germany and Denmark had substantially higher per-capita incomes than the U.S. in 1988.)

A quick glance at the maps of Europe and the United States suggests that ours is a far more sprawling and geographically dispersed society than that of any of the other countries studied. Outside New England, the scale of the American landscape is vastly greater than that of any of the European countries examined. The average population density of the ten [foreign] countries studied is about 436 per square mile, compared to 60 per square mile in the U.S. Might these facts not impact on driving habits and gasoline consumption?

A second consideration has to do with historical patterns of settlement. Much of the U.S. was settled and developed after the automobile became a major determinant in space planning. Virtually all of Europe and Japan were settled and developed before the automobile emerged as a planning determinant. This impacted, among other things, the distances between market centers as well as the character of those centers. In general, market centers in the U.S. are more remote from one another, and downtown streets tend to be broad thoroughfares. There are towns all over Europe with streets so narrow it is a major challenge to pass through them in a mid-size American sedan. European cars tend to be smaller than in the U.S. not because Europeans are inherently more conservative, but as a practical consideration in getting around.

Zoning regulations are another area that might be examined. Vast numbers of people in the United States who are engaged in small-scale service businesses could live and work under one roof, except that zoning regulations do not generally permit it; we commute in order to preserve the pristine purity of our residential zones. I think it would be more useful to examine some of these factors in greater detail in an effort to better understand why we are the way we are, rather than beat ourselves with the guilt stick on account of some overly simplified and incorrectly interpreted statistics.

Jay Seavey, AIA
Manchester, New Hampshire

The "More Pence = Less Rubber" headline perhaps placed undue emphasis on the role price plays in determining per-capita fuel-consumption patterns here and abroad. Reader Seavey rightly suggests that in the United States a number of other factors are at play. Oversimplification is rarely a virtue; it was for that reason that we were careful in our caption to cite factors other than price that obtain in the ten foreign nations studied (higher auto-registration fees and better-developed transit systems, for example).

CORRECTION

In our May/June feature "Earth Works" we mislabeled one of the artworks reproduced from the exhibit "The Illustrator and the Environment." The painting on page 67 is Beauty and the Beast *by Janet Woolley.*

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ILLUSTRATIONS AND GRAPHS BY MAX SEABAUGH

AN ENVIRONMENTALIST'S GUIDE TO THE BUSH ADMINISTRATION OIL POLICY

CORPORATE WEALTH THROUGH WASTE

Carrots for the energy industry: That's the core of George Bush's advice this summer as legislators in both houses of Congress try to concoct a national energy policy. Leasing the Arctic National Wildlife Refuge for oil and gas development is essential, Bush says; so is increased production of natural gas and nuclear power. Energy efficiency? For Bush, it's a topic hardly worth mentioning.

Free-market principles are said to be an integral part of Bush's energy creed. But he's a pragmatist at heart, shedding his laissez-faire mantle when pushing for subsidies to the energy industry, and donning it again when confronted with talk of new regulations, taxes, and import fees. "Too heavy-handed," he declares these traditional policy tools.

In his National Energy Strategy released in late February, Bush showcased a long list of industry-friendly measures that he said would ensure a "secure, efficient, and environmentally sound" energy future. This latter claim spurred Richard Heede and Robert Bishop to fire up their computers. The two analysts with the Rocky Mountain Institute, the nation's premier energy-efficiency think tank, rigorously examined one key section of Bush's National Energy Strategy—its controversial oil provisions. Their aim was to get beyond the document's promises and ideology by comparing it with an alternative energy policy based on efficiency. They gave Bush's high oil-production goals a reality check, and then compared both plans' probable effects on the cost, consumption, and import of oil over the next 20 years.

Did the researchers conclude that the Bush strategy would make our energy future more secure, as advertised? "For some people it will," they say, "but only if they happen to run oil companies."—***the editors***

THE EFFICIENCY SCENARIO

In preparing an alternative oil policy fired by efficiency gains rather than by drilling in the Arctic Wildlife Refuge, we first examined the transportation sector, which consumes about two-thirds of the oil used in the United States. We assumed that, on average, new automobiles would increase their fuel economy by 2 miles per gallon a year after 1992, reaching 45 mpg by 2000 and 65 mpg by 2010—a conservative goal that can be met with existing, cost-effective technology. We posited that the efficiency of other forms of transportation—planes, buses, trucks, and so forth—would improve at the same rate, a goal also achievable with technology that is now readily available.

Our strategy ignored belt-tightening options: We assumed that no cutbacks would be required either in the number of cars or in the miles that we drive them. Instead, we figured that these factors would increase at the present rate.

Finally, we assumed that the amount of oil put to other uses—33 percent goes for home heating, industrial boilers, asphalt, and petrochemicals—would decline at 5 percent a year, as it did for much of the 1980s due to efficiency gains.

by Richard Heede and Robert Bishop

Bush's National Energy Strategy (NES) can't deliver on its biggest promise: to reverse a steady decline in domestic oil production.

1. OIL EXTRACTION

Figure 1 shows: (A) the nation's existing extraction rate, which is declining by 4 percent a year; (B) how little that extraction rate would be raised by leasing the Arctic National Wildlife Refuge (a move that President Bush has called central to the nation's energy security); and (C) the National Energy Strategy's projection—more precisely, its quantified hope—that increased subsidies to the oil industry could boost that rate by 20 percent, from 8.8 to 10.6 million barrels a day by 2010.

Why do the administration's oil-rich dreams seem so unlikely to come true? The United States is the most densely drilled petroleum region in the world. Its oil-extraction rate has been gradually declining since 1985. More than half of the country's 13 largest oil fields are four-fifths depleted. Delivering new supplies, whether by squeezing more oil from old wells or by finding and developing new ones, is becoming increasingly difficult—even with subsidies.

Given these realities, we find the National Energy Strategy's extraction goals geologically and economically improbable.

If the NES were adopted, the nation's energy bill would skyrocket.

By 2000 the country would be paying $185 billion a year for oil under Bush's plan—almost twice as much as it pays today. By 2010 the figure would rise to $260 billion.

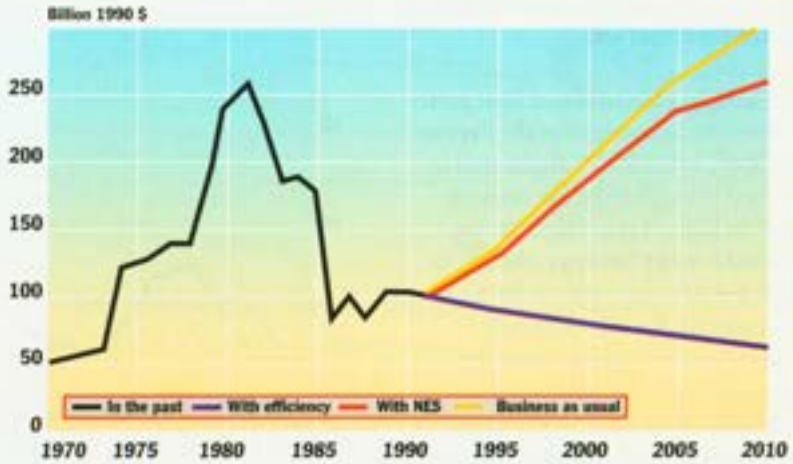
Making efficiency the cornerstone of our energy policy would send the curve in the other direction, offering savings instead of rapidly escalating costs. Neither curve includes environmental or security costs, both factors that would be far smaller in an energy-efficient economy.

"We know how to run the present U.S. economy on one-fifth the oil we are now using," says energy expert and Rocky Mountain Institute founder Amory Lovins. The efficiency improvements Lovins is talking about would cut demand at a cost of about $5 per barrel of oil saved. The oil that Bush would wrest from Alaska would run three to seven times more per barrel, not even considering the devastation of the Arctic Wildlife Refuge.

Our efficiency proposals offer compound benefits: Not only would we need less oil to do our work, what we *did* need would be cheaper.

Energy-efficiency gains made since 1973 are now saving the nation $100 billion per year. As Figure 2 shows, we could enjoy an even bigger financial reward in the future if we could learn to run the country on less.

2. OIL COSTS



By ignoring waste, the NES would help increase our consumption of oil.

3. OIL USE

Because Bush's scheme misses key opportunities for meeting our energy needs more efficiently—by raising auto fuel-economy standards, for instance—oil consumption would rise as shown in red. Our efficiency scenario, on the other hand, could reduce oil consumption significantly over the next ten years and keep demand level in the decade after that.

People who have doubts about whether substantially greater auto efficiency is possible should consider Volvo's prototype LCP 2000. It seats four comfortably, is more crashworthy than federal standards require, accelerates faster than the average car today (from 0 to 60 in 11 seconds), *and* gets 81 highway miles to the gallon. To top it off, Volvo has devised a streamlined manufacturing process that would make the LCP 2000 no more costly than typical Volvos today.

Other models on the automakers' drawing boards are similarly impressive: the General Motors TPC gets 61 mpg in the city and 74 on the highway; the Renault Vesta 2, 78 in the city and 107 on the highway; the Toyota AVX, 89 and 110—to name but a few encouraging examples. Manufacturers are hesitant to market these fuel-efficient models, however, because U.S. consumers have little incentive to buy them; gas is too cheap.

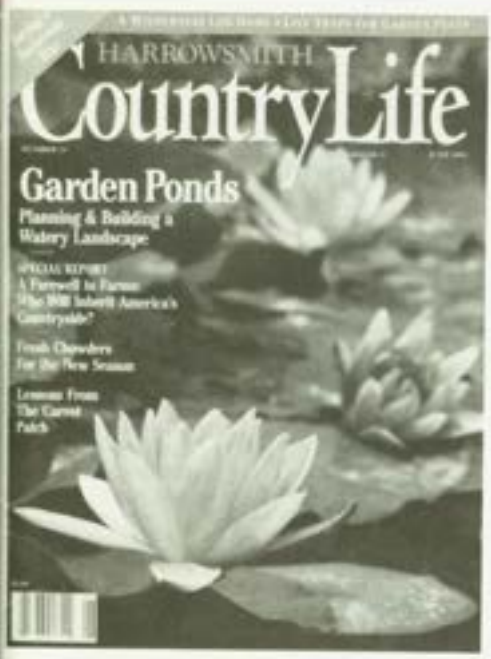
There's no shortage of innovative thinking among the world's auto designers—just a failure by industry and government to put such thinking to work. As oil analyst Rob Watson of the Natural Resources Defense Council points out, "The right place to look for the biggest energy reserve is not the Arctic National Wildlife Refuge, the Outer Continental Shelf, or Saudi Arabia. It's time to drill in Detroit."

The NES would make us increasingly dependent on oil from the Persian Gulf.

After having gone to war at least partly to protect its oil interests in the Persian Gulf, the United States might well be expected to make reducing imports one of its highest priorities. Yet the National Energy Strategy (shown in red) does nothing to reduce the national appetite for oil—it merely suggests subsidizing domestic producers and using alternative fuels. Because these measures can't keep up with unbridled consumption, adopting the NES would boost imports.

Putting cost-effective energy efficiency measures to work, on the other hand, would reduce imports from almost 8 million barrels a day in 1991 to 6 million barrels a day in the year 2000 (shown in purple). Along with this decrease in imports would come a welcome increase in national security. ■

4. OIL IMPORTS



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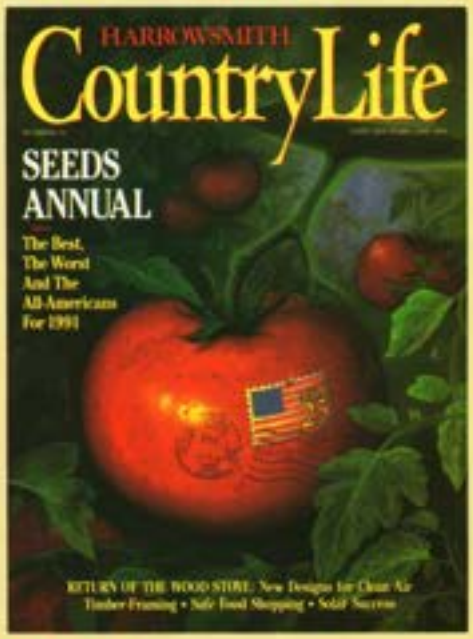

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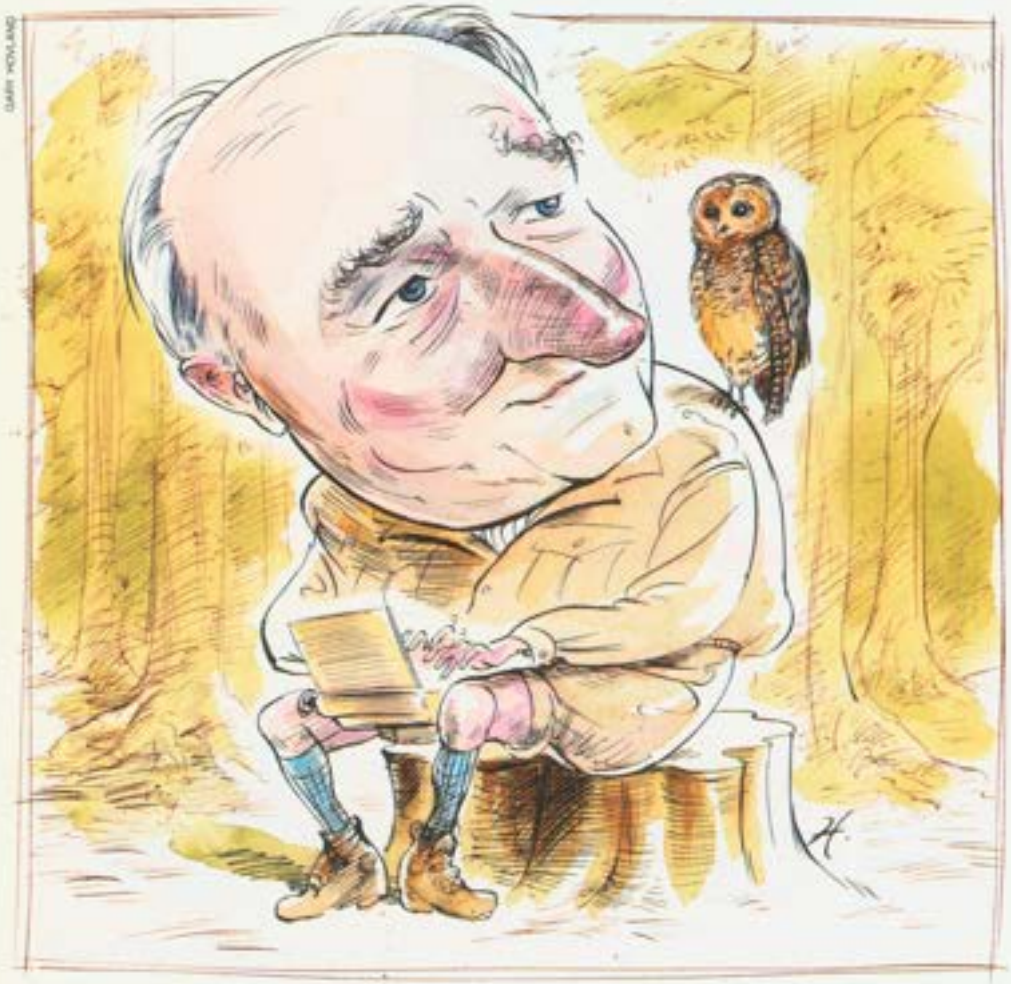
WILDLIFE POLICY

The Owl and the Scientist

In government, censorship is the status quo—so how did an agency biologist manage to change the course of the spotted-owl debate?



Joan Hamilton

JACK WARD THOMAS, a six-foot-two former Texan who has worked for the Forest Service for 25 years, doesn't know what to make of a shoebox full of newspaper stories devoted to his recent exploits. Wildlife biologists don't normally think of themselves as headline fodder. "You want to see the stories that make me sound like St. Thomas—or like a salivating beast?" he asks a visitor.

Thomas' rise to fame (or, in some circles, notoriety) *is* initially hard to fathom: He led a team of government scientists that compiled a dry, 427-page report entitled "Conservation Strategy for the Northern Spotted Owl." But the spotted owl is no ordinary bird. It has become a symbol of the Pacific Northwest's—perhaps even the nation's—declining biodiversity. And Thomas' team did not draft an ordinary, dust-catching pile of pages about the owl's future.

While virtually all government documents are filtered through agency managers and their politicized bosses in Washington, D.C., this one came directly from the team's 17 scientists, in pure and unexpurgated form. The team's candor enraged the timber industry and caused consternation in the White House. More than a year later, however, the report has withstood all attacks and helped spare millions of acres of old-growth forest from the axe. In the process it has set an inspiring example for agency scientists eager to break free of the censorship routinely inflicted by their bosses.

When Thomas was recruited for spotted-owl duty in late 1989, the bird had been in the nation's newspapers for many months. Favoring the same old-growth forests coveted by the Northwest's timber industry, the owl population had been reduced by 80 percent; only 3,000 to 6,000 pairs remained in the United States.

One of the Forest Service's preeminent biologists, Thomas was chosen as much to rescue the government as to save the owl. In a series of courtroom clashes, the Forest Service, the Fish and Wildlife Service, and the Bureau of Land Management had suffered one defeat after another at the hands of conservationists. Finally, in April 1989 a U.S. district court judge in Seattle demanded that the agencies produce an unimpeachably scientific plan for owl conservation.

Thomas hesitated at first when the chief of the Forest Service tapped him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for the task. He had never studied raptors—and had never even seen a spotted owl. Why divert energy from his elk studies? More important, why enter a discussion so heated that the smoke of politics could easily obscure whatever insights science had to offer?

Thomas warmed to the proposal only after the heads of all three agencies made a promise seldom if ever given to a staff scientist: He would work without political interference.

In November 1989 a blur of 12-hour days and 7-day work weeks ensued. Thomas handpicked a team that included the most reputable spotted-owl researchers in the country, and they sifted through every scrap of research data they could find. They agonized over how best to protect the species in a region where logging is a way of life. In Thomas' memory, agency scientists had never played such a high-profile role in shaping national wildlife policy.

The committee's report, released in April 1990, was hardly a conservationist's dream. Searching for a compromise that would allow "continuation of some substantial cutting of mature and old-growth forests," the team had reluctantly written off up to half the region's spotted-owl population. But to ensure the long-term survival of the other half, it recommended a logging ban on 30 to 40 percent of public timberland in the Northwest.

Not unexpectedly, "Gladiators on both sides attacked," Thomas recalls. "Billions of dollars were at stake, thousands of jobs, and the welfare of the ecosystem. We were at the eye of the storm."

Environmentalists accused Thomas of shortchanging the owl, while loggers charged that his plan would bankrupt the Northwest by making it a "wildlife sanctuary." Estimates of job losses reflected the hysteria of the moment: The Bush administration estimated 20,000; the timber industry, 100,000. Impressed by the worst-case scenario, Malcolm Wallop (R-Wyo.) chastised Thomas at a Senate hearing for producing "one of the most outrageous examples of the abuse of science and public policy this senator has yet to see." Soon President Bush tiptoed into the fray, calling for "balance" and convening high-profile committee number two, which included such administration heavyweights as the chiefs of the Office of Management and Budget and the Council of Economic Advisors. In June this "Task Force on the Spotted Owl" announced confidently that it would find a way to protect both the loggers' jobs and the owls' forests.

In search of the politically perfect middle ground, Team II asked four university scientists to scrutinize the Thomas group's effort. But if administration officials hoped to discredit the report, they were destined for disappointment. "It is one of the best reports on an environmental issue I've ever seen," said biologist James G. Teer of Texas A&M University. "Moreover, no endangered-species plan has ever gone this far in compromise. To go

Murphy's Oil Soap is also terrific on wood floors.

any further would be a travesty."

After months of meetings, Team II finally conceded, finding "the case for the Thomas report too strong to rip it apart," according to the *Washington Post*. The team issued a perfunctory press release instead of a report, passing the buck to Congress to come to the aid of the Northwest's loggers. That effort died in October, however, when Oregon Senator Bob Packwood's attempt to weaken owl protections was defeated 62 to 34.

By then the Thomas report had already begun to make its mark on northwestern forests. Shortly after Team II disbanded, the Forest Service stopped just shy of adopting the Thomas team's recommendations, saying it would operate "in a manner not inconsistent" with them. Congress reduced the agency's timber-production target from 3.85 billion board feet in fiscal 1990 to 3 billion in fiscal 1991. The reduction, though only two-thirds of what Thomas had recommended, was substantial nonetheless —the equivalent of 170,000 truckloads of trees. The Bureau of Land Management agreed to reduce its yearly cut in Oregon from 990 million to 750 million board feet.

Sierra Club Northwest Regional Director Bill Arthur says the report has changed the tenor of the debate on Capitol Hill. "Now we have the politicians talking about the need for legally defensible and scientifically credible government studies," he marvels. "That's progress."

Even in this case, the scientists will not have the last word. With dog-eared copies of the Thomas report in hand, the courts are determining whether the latest Forest Service and BLM timber plans meet the conservation requirements of existing laws. Congress is pondering whether those laws are wise and sufficient. Conservationists are pushing for ancient-forest legislation that would protect not only the owl, but other key elements of the Northwest's old-growth ecosystem. And the Fish and Wildlife Service has declared the northern spotted owl a "threatened species," a legal boost that may make the timber industry long for the days when the Thomas team was calling for protection of only half the spotted-owl population.

Back working on his elk studies, with new scientific and conservation awards on the wall that honor his struggles for the spotted owl, Thomas has the air of a weary but satisfied man. "We have proposed," he says. "It is for others—agency administrators and elected officials and the people whom they serve—to dispose."

JOAN HAMILTON *is a senior editor of* Sierra.

CLEAN AIR

O Say, Can You See?

On a bad day at the Grand Canyon, you might as well be in L.A. What good are scenic wonders if you can't see 'em?

Paul Rauber

NO ENVIRONMENTAL VICTORY is permanent. Twenty-four years ago, David Brower and the Sierra Club successfully beat back a plan by the Bureau of Reclamation to dam the Colorado River in the Grand Canyon. But that was not the end of the matter. Back then, the dispute had to do with whether one would be able to see the inner canyon for the artificial lake behind the proposed dam. Today the question is whether one can see the canyon for the smog from the nearby Navajo Generating Station, the source of 12 percent of all sulfur-dioxide emissions in the West.

Denied a hydroelectric-power station at the Grand Canyon, the air conditioners and hair dryers of Los Angeles, Phoenix, and Las Vegas get their

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Wildlife Refuge

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What a difference the day makes: Some call it smog, others say it's just bad weather.

juice instead from Navajo, a massive coal-burning power plant at Page, Arizona, only 15 miles from the Grand Canyon's north rim. Navajo is owned by a consortium of cities and utilities including the Salt River Project, which operates the plant. The largest shareholder in the operation is that would-be dambuilder, the U.S. Bureau of Reclamation.

When it opened in 1974, Navajo had no emissions controls whatsoever. Worried environmentalists were assured by Interior Secretary Walter Hickel that the plant would not be allowed to degrade views in the Grand Canyon, and that it could easily be fitted with pollution-control equipment later. But when highly efficient smokestack scrubbers became available, Navajo's operators stalled on purchasing the expensive technology; today the plant is still the dirtiest in the West. Its three 775-foot smokestacks pump 200 to 265 tons of sulfur dioxide daily into southwestern skies. In 1987 a National Park Service study found that up to 70 percent of the winter haze in the Grand Canyon originates at Navajo. On an increasing number of days, visitors cannot see from one rim to the other.

Even Congress hasn't gotten Navajo to clean up its act. In 1977 the Clean Air Act was amended to protect visibility in "Class I" areas—national parks larger than 6,000 acres, and national wilderness areas larger than 5,000 acres. It mandated that "best available retrofit technology" be used in cases like Navajo where a single source of pollution (as opposed to a general source, like automobile exhaust blowing over from Los Angeles) produced a significant effect.

It took until this year, however, for the Environmental Protection Agency to come up with the regulations prom-

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ised 17 years ago. "This is the first big test of how the law is going to work," says Rob Smith, the Sierra Club's Southwest representative. "This is the test of whether the EPA has the political willpower to move ahead."

So far, the agency's willpower has proved no match for White House muscle. In February 1990 the EPA pleased environmentalists by issuing draft regulations calling for a 90-percent reduction in the amount of sulfur dioxide released from Navajo, to be achieved through the installation of pollution-control equipment at a cost of some $2.3 billion. Then came the backlash. Despite George Bush's stirring pronunciamento on the 1990 Clean Air Act ("It is unjust to allow the natural splendor bestowed to us to be compromised"), his Office of Management and Budget whittled the EPA proposal down to a 70-percent reduction. Although an internal EPA memorandum characterized the OMB's rather scanty objections as "reflecting a cursory reading of the study," the EPA acquiesced. When Administrator William Reilly released the 70-percent proposal this February, he portrayed it as a victory for the environment and "President Bush's commitment to clean air."

Some commitment. Agency figures show that the White House plan would save only $3.5 million a year, and sacrifice two-thirds of the visibility of the EPA's original 90-percent plan. "What we just plain don't understand," gripes Representative Gerry Sikorski (D-Minn.), "is why the bean-counters and the deal-makers at the White House strongarmed EPA into abandoning its proposal for a 90-percent control, and accepting the woefully inadequate 70-percent control."

Bob Yuhnke of the Environmental Defense Fund's Rocky Mountain office blames conflict of interest. "If the federal government didn't have a polluter interest in this plant," he says, "the decision would be a lot easier." The conflict is especially intense within the Interior Department, home to both the Bureau of Reclamation (which owns a quarter of Navajo, and favors no regulation) and the National Park Service (which supports the 90-percent-reduction plan). When the EPA held public hearings on the issue this March in Phoenix, Interior forbade the Park Service to present its position.

Even the 70-percent compromise was too much for Navajo's operators, who stubbornly maintained that it would "not result in more than minimal improvement in visibility at the Grand Canyon." The Salt River Project spent $14 million on a study (which the Environmental Defense Fund called a "disinformation campaign") that sought to discredit the 1987 Park Service report, arguing that poor visibility in the canyon is caused by bad weather, not sulfur emissions. Salt River doesn't want to install pollution-control equipment until the turn of the century, when it would become eligible under the Clean Air Act to market its "pollution credits" to still-dirty

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ing "greenprint" derived in part from the American "Blueprint for the Environment," a document prepared in late 1988 by U.S. nonprofit organizations and subsequently ignored by its recipient, newly elected President George Bush. But business groups lobbied successfully to eliminate from the plan those measures that would most affect industry. They wanted to avoid, for example, a so-called carbon tax levied on factories emitting air pollution. In the end, current Environment Minister Robert de Cotret released an agenda that relies heavily on self-regulation and voluntary compliance.

Environment Canada officials say they chipped programs off the original plan out of concern over the recession, not to appease business interests. And they point out that the remaining programs, such as protection of the Arctic environment and cleaning up the Great Lakes, are nothing to sneer at.

The Sierra Club of Canada and other Canadian environmental groups agree that these projects are essential. But they're now focused on the plan's great unknown: how the government will allocate the money. To this end, the Club's national office in Ottawa has organized a monitoring committee that is preparing a comprehensive analysis of the Green Plan. The idea is to make sure that the government fills in its broad-brush view of Canada's environmental future with some fine detail.

MARK MARDON *is an associate editor of* Sierra.

BIOTECHNOLOGY

Better Nature Through Chemistry

Biotech's breakthroughs: Hardball tomatoes, blue roses, and potatoes poisons can't kill. Is this the best we can do?


CHRIS SCHMIDT

Paul Rauber

SOMEHOW IT DOESN'T sound like progress. For years we've been hearing about all the great things biotechnology is going to do for agriculture, from producing better yields to getting rid of chemical poisons. So here's what's probably going to hit the market first: a cotton plant genetically altered to tolerate an herbicide that kills fish and may cause birth defects.

Maybe it's not the first thing *you* would have come up with, given the opportunity to play God in the laboratory—but then you probably aren't

being funded by a major chemical or agribusiness corporation. Producing a new life form is an expensive proposition, and Monsanto, Rhone-Poulenc, and Ciba-Geigy aren't in it for fun.

The Campbell Soup Company, for instance, wants to get into marketing fresh tomatoes nationwide. It turned to Calgene, a biotech firm, for help in developing a tomato that would stay hard even longer than the red baseballs you buy in the supermarket now. Such tomatoes could be left to ripen longer on the vine, the result being, it is hoped, better-tasting baseballs. (A project to develop longer-lasting flowers with "novel color traits"—blue roses, for example—was abandoned last year.)

Such products, as Calgene CEO Roger Salquist readily admits, will succeed or fail in the marketplace. But the consuming public won't have a say on what is fast becoming agricultural biotechnology's biggest challenge: making the world safe for increased pesticide sales. The trade publication *Chemical Week* expressed the promise of herbicide-resistant crops this way: "Farmers would then be willing to use even more of the weed killers," it explained, "safe in the knowledge that their crops won't be damaged."

Calgene and other companies are now hard at work "building" new strains of crop plants resistant to the chemical poisons that would otherwise kill them. For example, the herbicide bromoxynil, as advertised, kills the broad-leaf weeds that bedevil cotton plants. Unfortunately, it also kills the cotton. This spring, Calgene started tests in 12 states on a million and a half "transgenic" cotton plants engineered to be resistant to bromoxynil. The company hopes to be able to market its brave new seeds by 1993—at two to three times the current price. Also standing to profit handsomely is the French chemical company Rhone-Poulenc, which manufactures bromoxynil under the trade name Buctril and co-funded Calgene's research. According to National Wildlife Federation estimates, adoption of poison-proof cotton on half this country's present cotton acreage would double

sales of Rhone-Poulenc's product.

Like many companies today, Calgene promotes its project as being "in the best interests" of the environment. "The whole idea is to reduce the use of pesticides," maintains Salquist. "The herbicides being used on cotton today are much uglier, and are used in much larger quantities." Current practice is to use large amounts of herbicide on the soil to prevent weeds from emerging at all. Widespread use of his transgenic cotton plants, claims Salquist, would allow farmers using relatively low doses of bromoxynil to kill the weeds after they start to grow, reducing herbicide use by millions of pounds a year.

Bromoxynil may not be the worst pesticide to which cotton is subjected —it degrades fairly rapidly and does not persist in food—but it is hardly benign. Last year Rhone-Poulenc was forced to withdraw one of its bromoxynil products after new tests showed that simple application of the chemical to the skin of rats resulted in deformed offspring. Remaining formulations now carry EPA-mandated warnings to pregnant farmworkers, and recommend that anyone applying them wear "coveralls over a long-sleeve shirt and long pants, clean gloves and chemical-resistant shoes." Bromoxynil is also incredibly toxic to fish, killing trout at a concentration of only 50 parts per billion. (By comparison, the herbicide Ordram, which has been responsible for massive fish kills, is lethal at 1.3 parts per *million*.)

Jane Rissler of the National Wildlife Federation calls pesticide-resistance technology a "quick fix" for agribusiness and a "deadly wrong solution" for its substance-abuse problem. "Bromoxynil is a toxic chemical whose use should be discouraged rather than encouraged," she wrote in a challenge to Calgene's field-test plans. "Industry and the USDA should be developing nontoxic approaches to weed control—not finding new uses [for] and increased applications of old toxic chemicals."

Some biotech innovations *do* offer hope for actually eliminating environmental poisons. For instance, a cotton plant being engineered by Monsanto is lethal to caterpillars, making repeated applications of insecticide unnecessary. Sadly, however, such projects are as rare as blue roses. Monsanto is also currently trying to develop cotton plants resistant to Roundup, a persistent weedkiller the EPA considers a "possible human carcinogen." Roundup is Monsanto's largest seller.

While Rhone-Poulenc is paying Calgene handsomely for its research, the United States Department of Agriculture is performing a similar service for free. This spring the USDA's Western Regional Field Station began tests on genetically altered potatoes resistant to bromoxynil and to 2,4-D, a known carcinogen that was one of the ingredients in Agent Orange. So far, government scientists are excited by their success. "By golly, they work!" enthuses USDA plant physiologist William Belknap, who indignantly denies that the USDA is helping chemical companies develop new markets. Their research, he says, is meant only to provide potato farmers with an alternative herbicide should weeds become resistant to Metribuzin, the current poison of choice. "Down the pike we're going to want something like this," says Belknap. Of course, the weeds may eventually become resistant to 2,4-D—but by that time, the USDA hopes, it will have come up with something else.

The Agriculture Department's enthusiasm has spread to the Forest Service, which has spent $2.8 million in an attempt to develop herbicide-resistant trees. Senator Patrick Leahy (D-Vt.), chair of the Senate Agriculture Committee, calls the USDA's research "short-sighted and misguided"; he is introducing legislation that would ban the use of public funds for herbicide-resistance research. Little is being done, however, to regulate private research, where biotechnology has become just another tool on the chemical farm. ■

PAUL RAUBER *is an associate editor of* Sierra.

How much are we really paying for oil?

Photograph ©Geoffrey Orth/SIPA Press

We're paying too much. And the price is getting even steeper. At any moment, the pristine lands of the Arctic National Wildlife Refuge may fall prey to overzealous oil and gas development – even though there is less than one chance in five of finding oil worth extracting.

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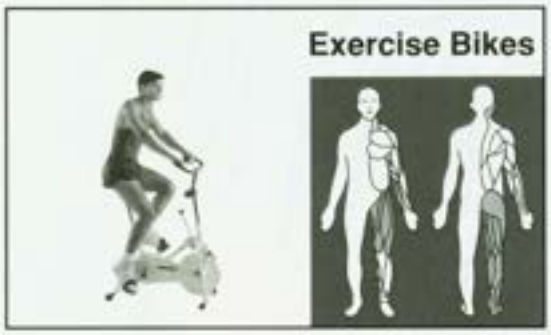

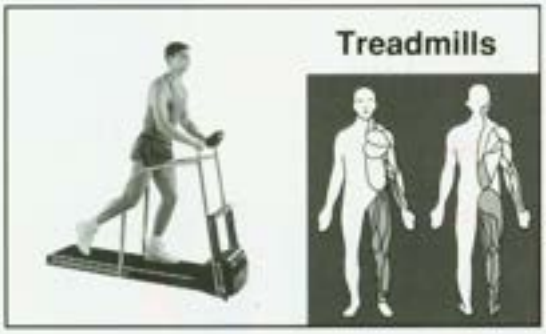

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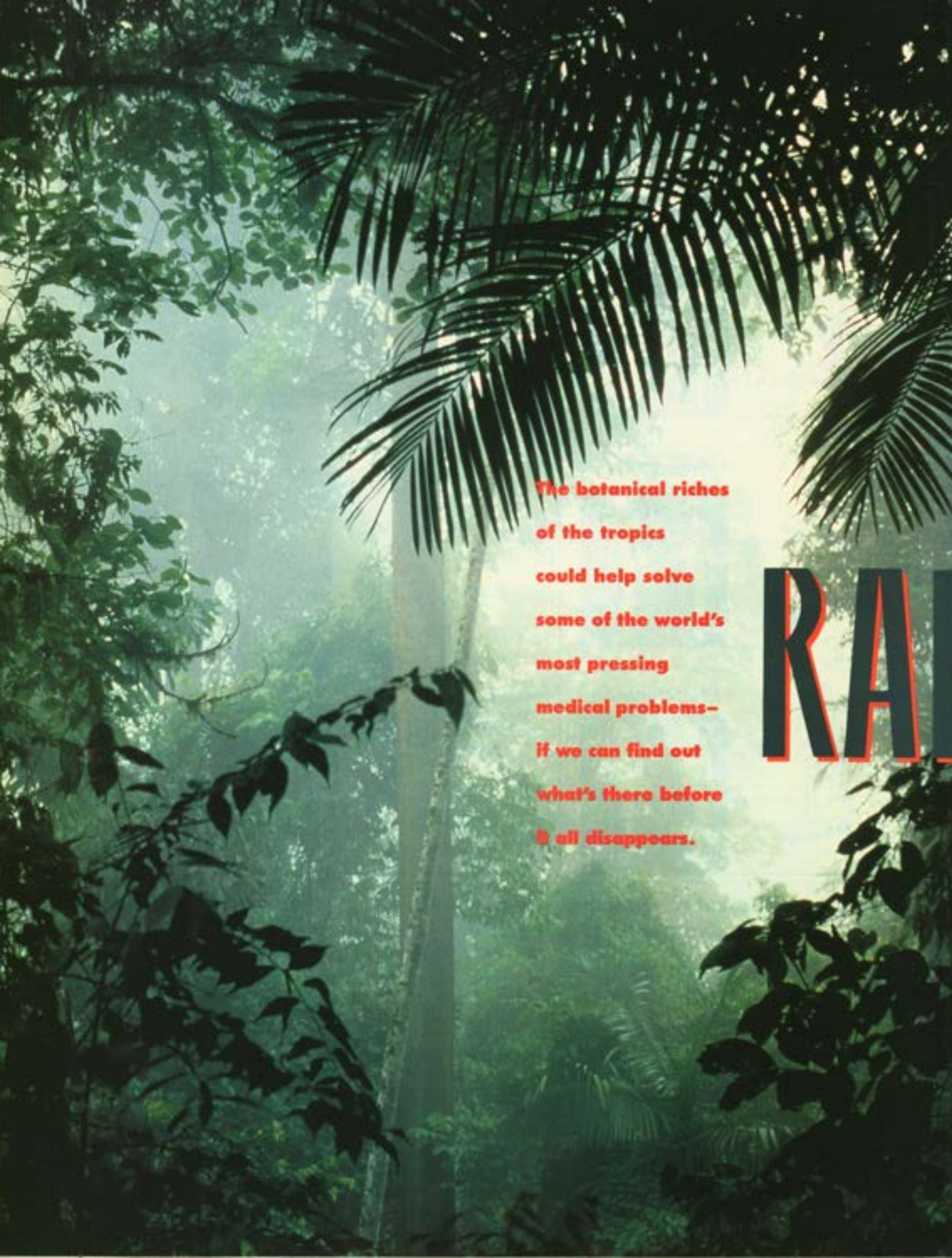

The botanical riches
of the tropics
could help solve
some of the world's
most pressing
medical problems–
if we can find out
what's there before
it all disappears.
RA

NFOREST Rx

By Joseph Wallace

COURTESY OF THE NATIONAL CANCER INSTITUTE

NEARLY TEN YEARS LATER, THE MIXTURE OF excitement and trepidation that ethnobotanist Walter Lewis felt on his first visit with the Jivaro people still echoes in his voice.

"We were hoping to spend more than a month living in a village in the rainforests of northern Peru, but we didn't know if the Jivaro would welcome us," Lewis recalls. "They distrust even peaceful outsiders, and with good reason. Most white visitors show up to sell them either God or goods."

Yet Lewis had traveled hundreds of miles by transport plane, army helicopter, dugout canoe, and foot neither to convert the Jivaro nor to convince them to buy blue jeans or infant formula. He hadn't come to observe the local fauna, or to study the daily routines of a traditional tribe in the Amazon Basin.

What he wanted was a guided tour of the plants the Jivaro use to treat everything from athlete's foot to hepatitis. "The Jivaro, like most indigenous peoples, use dozens of different plants for medicinal purposes," Lewis says. "These plants have the potential to treat a host of diseases, possibly including cancer and AIDS."

Lewis and his wife, medical microbiologist Memory Elvin-Lewis, are two of a growing number of researchers on the same quest. The search for medicines from plants is under way in the rainforests of Latin America, Asia, and Africa; at multinational drug companies; and at the National Cancer Institute, host to the most ambitious plant-testing program yet unveiled.

Without exception, the researchers involved believe that medicinal plants will eventually yield important new weapons in the age-old battle against disease. But these plants may accomplish even more: They may provide a means of preserving the dwindling rainforest itself, as well as the indigenous tribes struggling to survive there.

"Developing even a few medicines from rainforest plants —and then returning some of the profits to the local people —could help make the forest more valuable to preserve than to destroy," says ethnobotanist Mark Plotkin, vice-president for plant conservation at Washington-based Conservation International. "We shouldn't need an economic reason to save tropical forests, but clearly we do."

SITTING IN HIS CLIMATE-CONTROLLED OFFICE, which is decorated incongruously with finely wrought wooden blowguns and spears, Plotkin seems filled with impatience and barely restrained energy. He spent years in the forests of Suriname and other tropical countries learning the medicinal lore of local shamans. The knowledge he gained has made him a spokesman for preservation of the tropics' diverse plant life.

That diversity is astonishing: Tropical forests contain the vast majority of the world's 250,000 flowering-plant species. Yet only about one percent of them have been thoroughly examined for medicinal properties, says Plotkin; he's concerned that valuable plants may be exterminated before they are ever studied.

Despite their superficial study, scientists have already reaped a valuable harvest—about 120 plant-derived medicinal chemicals from about 100 species. Today, Plotkin points out, nearly a quarter of all prescription drugs contain ingredients derived from plants—including many known to folk wisdom for centuries. Whenever you take an aspirin, for example, you're ingesting a chemical found in the bark of willow trees—and sharing an ancient medical tradition with Native Americans. Travel to a tropical country, and it's possible you'll carry an antimalarial medication containing quinine, extracted from the bark of the cinchona tree of South America and first introduced to the developed world by the Jivaro in the early 17th century. And foxglove, a common European plant originally described in the first century, has been touted for centuries for its ability to combat rapid pulse, dropsy, and many other conditions. More recently researchers learned that the same plant also contains digitoxin, the source of digitalis, a potent weapon against heart failure.

"You'd think that such successes would have major research institutions and drug companies collecting and testing plants with all their resources," Plotkin says. "But interest in plant-based medicines has been dwindling for much of the 20th century."

In the 1950s and '60s scientists became proficient at synthesizing drugs in the laboratory. They soon developed an attitude that chemist Gordon Cragg of the National Cancer Institute describes as "anything nature can do, we can do

DAVID JOLLEY

better." Most research institutions neglected medicinal plants, yet they couldn't synthesize many of the complex chemicals found in them. Even when they could recreate natural substances, they often discovered that chemicals made in the lab were far more expensive than those extracted from a plant.

Meanwhile, individual researchers continued to identify, collect, and test plants. Though few in number, these scientists made important contributions to medical knowledge. They found, for example, that a kind of wormwood (*Artemisia annua*) contains artemisinin, a chemical the Chinese have used to combat malaria for nearly 1,000 years. Scientists who recently confirmed artemisinin's efficacy believe that it can successfully combat the skyrocketing number of malaria strains that have grown resistant to quinine-based medicines.

Native Americans and the early European settlers who learned from them relied on the root of the mayapple (also known as the American mandrake) to treat venereal warts, parasites, and other conditions. During the past decade etoposide (derived from a chemical found in the root of the mayapple) has become a potent, widely used treatment for testicular and lung cancers.

The most publicized—and by far the most influential—discovery of the past 30 years is the rosy periwinkle, a plant native to Madagascar (and long used medicinally by local people), the leaves of which contain the alkaloids vincristine and vinblastine. Vincristine alone has quadrupled the survival rate for children with leukemia, and both drugs have become important weapons against Hodgkin's disease.

"Each year, sales of vincristine and vinblastine combined exceed $100 million," says Cragg. "The possibility that more such money-makers exist is a powerful incentive to continue the search for medicinal plants."

WOLFGANG KAHLER

The Jivaro use blowgun arrows spiked with a paralyzing poison made from curare to capture wild game.

FRANS LANTING, MAGNUM PICTURES

Baskets of medicinal plants fill one corner of a Madagascar market.

WALTER LEWIS AND MEMORY ELVIN-LEWIS aren't necessarily expecting to find a new rosy periwinkle in the Peruvian rainforest. But they do think the Jivaro pharmacopoeia can provide outsiders with effective medicines. "We've had tremendous preliminary results from several plants with anti-hepatitis B activity," Lewis says.

Elvin-Lewis found she had access to information unavailable to her husband. "The men would tell Walter what plants they thought the women used for contraception," she recalls. "The Jivaro women and I would listen, nod, and remain quiet. Then the men would take Walter off into the forest, and the women would start to smile. They'd say to me, 'Those men don't know anything. We'll show you what we really use.'" The researchers learned that several species in the sedge family, rarely used medicinally by Jivaro men and neglected by most ethnobotanists, are prized by local women. They cultivate the plants, take them along when the tribe moves, and rely on them for a variety of pediatric, gynecological, and contraceptive uses.

Even as they uncovered the medical secrets of the Jivaro, Lewis and Elvin-Lewis realized that their efforts and those of a handful of other individuals were not enough to sample and test rainforest plants adequately. "The entire field needed some larger institutional support," Walter Lewis says. "Luckily, the National Cancer Institute stepped in."

With a yearly budget of $2 million, the institute's Natural Products Branch in Frederick, Maryland, has injected new vigor into the effort to develop medicines from plants and other natural substances. It did not initially focus on rainforest plants, however; during the decade after its founding in 1975, the branch concentrated on screening plants native to the United States and other temperate regions. It broadened its focus to the tropics in 1986, and began to look for anti-AIDS as well as anticancer activity in 1988.

Thus far, the temperate-region search has produced several promising leads, as well as one significant success: taxol, a substance in *Taxus brevifolia*, the Pacific yew. Now in final testing stages, taxol has already proven to be one of the most effective treatments yet found for ovarian cancer (which

ILLUSTRATIONS BY ELIZABETH MORALES-DENNY

A Floral Pharmacopoeia

In and outside the rainforest, plants have provided the world with powerful medicines. A few notable examples are shown below.

Rauvolfia

The roots of this Southeast Asian shrub (Rauvolfia serpentina) *have long been used as a tranquilizer. More recently they have also proven effective in combatting high blood pressure.*

Rosy Periwinkle

A native of Madagascar, the rosy periwinkle (Catharanthus roseus) *is used to treat Hodgkin's disease and childhood leukemia.*

Foxglove

A European herb that grows up to four feet high, the foxglove (Digitalis purpurea) *yields digitalis, a drug used to treat heart failure.*

Chondrodendron

A woody South American vine with leaves up to 11 inches long, Chondrodendron *sp. supplies curare, a muscle relaxant used during surgery.*

Cinchona

The quinine in this South American tree (Cinchona *sp.*) *has saved the lives of thousands of malaria victims. Quinine is also used in tonic water.*

Who Owns the Rosy Periwinkle?

PHOTO: FRANS LANTING, MINDEN PICTURES

A Malagasy woman prepares a traditional herbal remedy. Researchers and the pharmaceutical industry are discussing how to give her knowledge monetary value.

Historically, rainforest plants have been available to anyone enterprising enough to pluck them. Indigenous peoples have rarely attached monetary value to their local flora or to the herbal lore they share with researchers slogging through their forests. But now some cultural anthropologists and advocacy groups are arguing that the botanical wisdom stored in collective tribal memories must be given economic value. Otherwise, they contend, that knowledge—along with the plants themselves—will continue to disappear.

"It's a matter of intellectual property rights," says attorney Janet McGowan of Cultural Survival, a Massachusetts-based organization that helps indigenous peoples preserve their traditional lifestyles. "Information collected over a long history is being used and manipulated, often with no return to native peoples." Cultural Survival and other organizations are exploring ways to give rainforest peoples legal control over what's taken from their lands.

While everyone from the United Nations Food and Agriculture Organization to international trade negotiators wrestles with this issue, some research agencies are already devising one-on-one agreements. "We're very concerned about providing up-front benefits to the rainforest people," says Douglas Daly of the New York Botanical Garden, which has collected plant samples in 13 countries for the National Cancer Institute. The NYBG's earliest agreements simply guaranteed sharing the results of all NCI plant research with the governments of countries of origin and payment of royalties should a marketable drug be developed. Increasingly, NYBG deals directly with tribal federations and indigenous organizations, drawing up formal contracts, sending field and lab equipment to native collectors, and setting up scientific exchanges.

A year-old California company, Shaman Pharmaceuticals, also promises to pay native peoples a percentage of profits if a rainforest plant turns into a medicinal moneymaker. When it can, Shaman responds to immediate local needs; for instance, company vice-president Stephen King brought a physician to Ecuador to provide emergency care during a recent whooping-cough epidemic. Shaman's affiliated nonprofit foundation, the Healing Forest Conservancy, is developing forest-conservation plans and programs to assist native peoples in marketing rainforest products. King, formerly an ethnobotanist for The Nature Conservancy, believes that "corporations have to have the will and intent to help native peoples, and then figure out the logistics."

Efforts to compensate indigenous peoples are more the exception than the rule, but with so much at stake, observers caution against asking the pharmaceutical industry for too much too soon. "Collecting rainforest plants for medicines is a big conservation issue with great potential for tropical economies," says Sarah Laird, director of the Rainforest Alliance's Periwinkle Project, which promotes the sustainable use of tropical medicinal plants. "But the case [for compensation] still has to be made within the drug companies."

The Rainforest Alliance believes that resolution of this issue will go a long way toward preserving both the rainforests and native cultures. For Laird, the ultimate goal is to see the medicines manufactured in the rainforest countries. "Why," she asks, "should rosy periwinkles have to be grown on a plantation in Texas?"—***Noreen Parks***

claims 12,000 lives a year in the United States alone), and may combat several other types of cancer.

"We had been testing a small number of rainforest plants submitted by Walter Lewis and other scientists all along," explains Gordon Cragg, the branch's director. But once the National Cancer Institute intensified its rainforest efforts in September 1986, it awarded five-year contracts totaling more than $2.5 million to three organizations already skilled at collecting tropical flora: the New York Botanical Garden (for samples from Latin America and the Caribbean), the Missouri Botanical Garden (Africa), and the University of Illinois at Chicago (Southeast Asia). During the life of its contract, each group must identify and deliver 1,500 samples a year to the branch's laboratories.

A few large drug companies—including Glaxo, Eli Lilly, and Merck Sharpe & Dohme—are analyzing plant samples as well, screening them for antiviral, antibacterial, and anticancer activity. Merck's 30-person Natural Products Chemistry department, for example, examines 500 plants a year donated by the New York Botanical Garden. Its staff tests soil organisms and molds as well as plants, and attempts to synthesize promising natural products in the laboratory.

Given the ongoing deforestation of the Amazon and other tropical forests, though, these efforts may not be proceeding quickly enough. "Our best estimates indicate that 50 to 150 plant species will become extinct every day during the next 20 years," says Brian Boom of the New York Botanical Garden. "Most of them are found in the tropics, and most will never have been studied or collected. Who knows what invaluable medicines are contained in plants we'll never even know existed?"

A Yanomamo discusses a Venezuelan plant with U.S. ethnobotanist Mark Plotkin.

RUSSELL MITTERMEIER

As their homelands are destroyed by deforestation, rainforest peoples are also disappearing; in Brazil alone, more than 90 tribes have dispersed (or succumbed to disease) since the beginning of this century. Those that survive are sometimes moved to distant reservations, where the plants are unfamiliar and the tribe's healing arts wither.

Even when their homelands remain intact, native peoples are subject to the incursions of industrialized societies. In 1982, when Walter Lewis and Memory Elvin-Lewis first visited the Jivaro, they found that a process of acculturation had already begun, even in the most remote villages. "The healers were all growing old, but the younger members of the tribe were expressing little interest in inheriting their wisdom," Lewis says. "Where once a healer was the most respected man in the village, now the Jivaro were beginning to prefer prepackaged medicine from the United States."

Conservation International's Mark Plotkin has seen similar signs of cultural deterioration elsewhere. "In Suriname, many of the shamans are already more than 70 years old, yet few have found apprentices," Plotkin says. "When one of these shamans dies without passing his arts on to the next generation, the tribe—and the world—loses hundreds of years of irreplaceable knowledge."

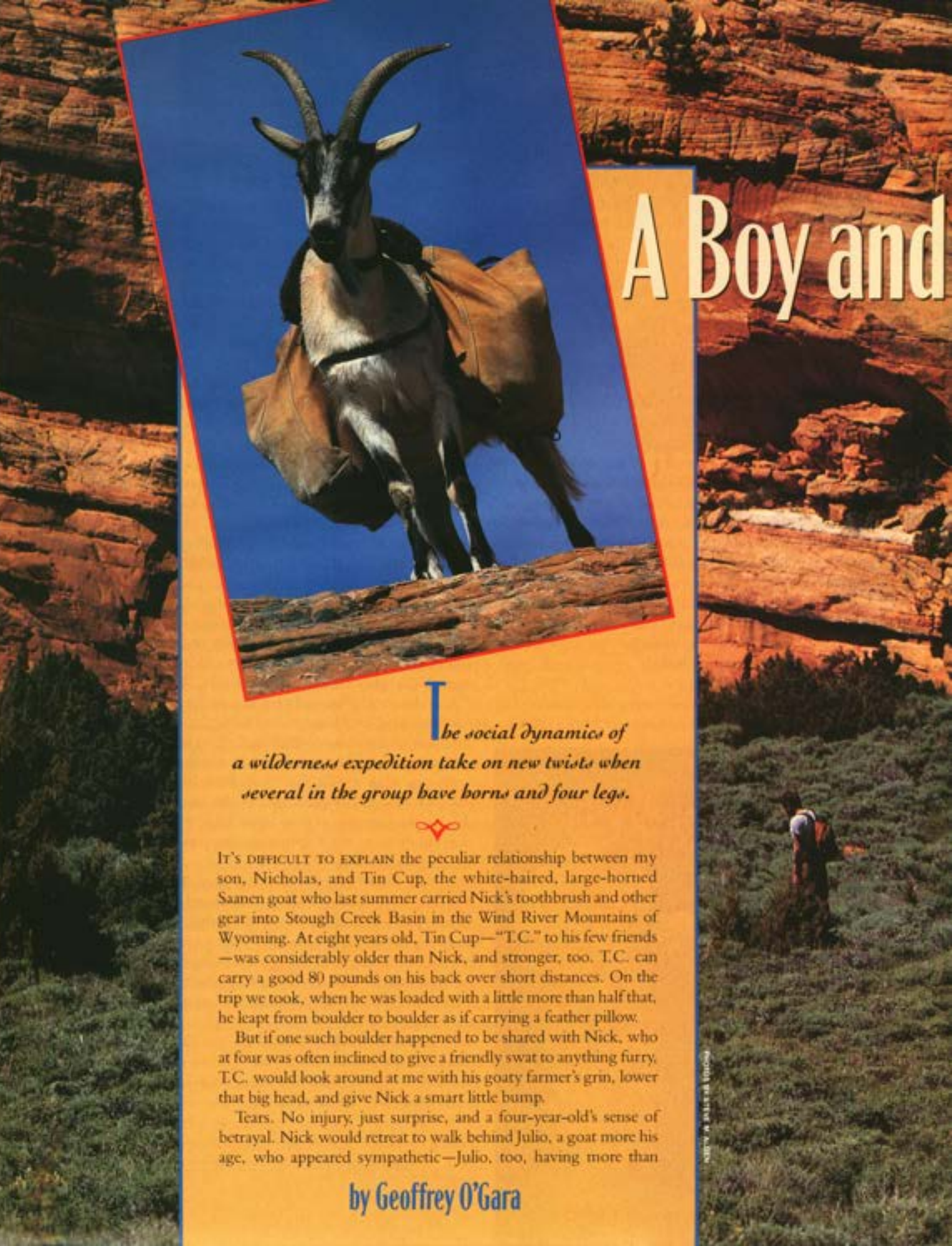
While Western medicine can supplement native knowledge and help people live longer and healthier lives, it's no substitute for their own healing arts. The World Health Organization estimates that 80 percent of the world's population depend on traditional preparations for their health-care needs. "No matter how much they crave medicine that comes out of a box, they'll never be able to afford to buy enough to replace their herbal medicines," Plotkin says.

In an attempt to forestall a health-care catastrophe among rainforest peoples, Conservation International has made the sustainable harvesting of medicinal plants (as well as foods, oils, pigments, and other forest products) the cornerstone of a ten-year plan it calls the "Rainforest Imperative." The plan, announced last year, aims to save tropical forests and the cultural integrity of their inhabitants by working with host countries to make the forests more profitable to preserve than to destroy.

As they visited the Jivaro over the years, Walter Lewis and Memory Elvin-Lewis witnessed firsthand the ever-intensifying pace of acculturation. But on their later visits, toward the end of the decade, they noted a countercurrent: a rebirth of interest in traditional medicine among younger members of the tribe, a rebirth that Lewis believes was at least partly because of the researchers' obvious respect for the village healers.

"The Jivaro would tell us, 'You are like babies in the rainforest, but we will teach you,'" Lewis recalls. "During the next few years, we'll find out if we're smart enough to learn what they have to teach." ■

Joseph Wallace *is a freelance writer based in Pleasantville, N.Y., who specializes in natural history and environmental issues.*



A Boy and

The social dynamics of a wilderness expedition take on new twists when several in the group have horns and four legs.

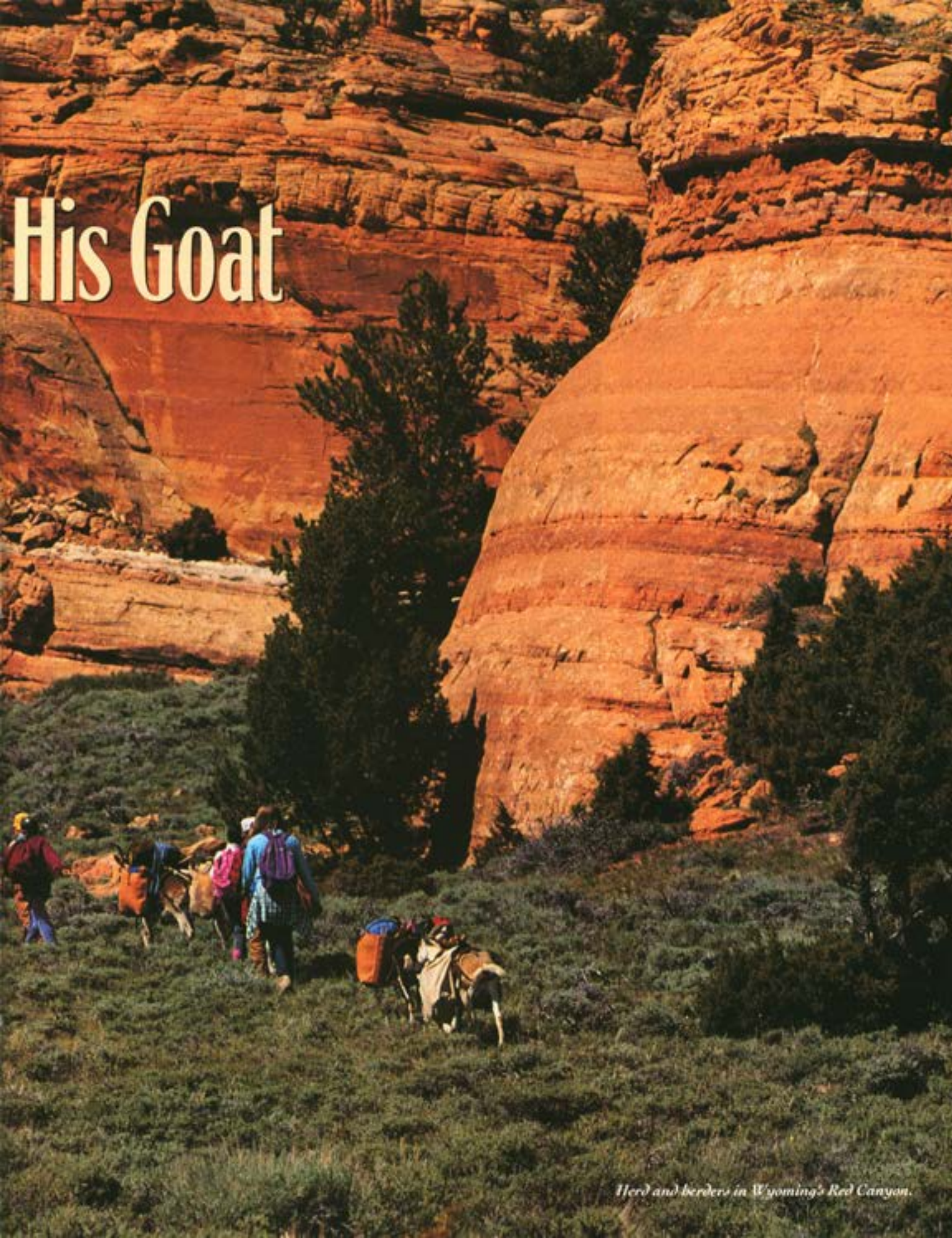
IT'S DIFFICULT TO EXPLAIN the peculiar relationship between my son, Nicholas, and Tin Cup, the white-haired, large-horned Saanen goat who last summer carried Nick's toothbrush and other gear into Stough Creek Basin in the Wind River Mountains of Wyoming. At eight years old, Tin Cup—"T.C." to his few friends—was considerably older than Nick, and stronger, too. T.C. can carry a good 80 pounds on his back over short distances. On the trip we took, when he was loaded with a little more than half that, he leapt from boulder to boulder as if carrying a feather pillow.

But if one such boulder happened to be shared with Nick, who at four was often inclined to give a friendly swat to anything furry, T.C. would look around at me with his goaty farmer's grin, lower that big head, and give Nick a smart little bump.

Tears. No injury, just surprise, and a four-year-old's sense of betrayal. Nick would retreat to walk behind Julio, a goat more his age, who appeared sympathetic—Julio, too, having more than

by Geoffrey O'Gara

His Goat



Herd and herders in Wyoming's Red Canyon.

once been on the receiving end of T.C.'s curmudgeonly bludgeonings.

For a few days that summer, T.C. had me worried. He was one of a flock of worries I herded before me on a five-day goatpacking trip, my first. I worried about my children, ages four and seven, and whether they could handle hiking at 10,000 feet. I worried about the usefulness and temperament of goats. I worried about the food, which I was supplying for my kids, myself, and our friend Cyndy Boyhan. I worried about the far-famed *parfum du chèvre*. And I worried about whether packhorses passing us on the trail would snicker at our entourage in that snide way horses sometimes do.

On all counts except the food, my worries were unfounded.

"There's a lot of anti-goat prejudice," said John Mioncynski as he rushed around the porch of his cabin outside Atlantic City, Wyoming, on the morning of our departure, trying to balance packs. (John was our tripleader and is perhaps the nation's leading proponent of goatpacking.) "Goats can be really tough in towns, and they're usually banned, along with pigs. They're hard to fence in, and they love to eat ornamental trees."

John smiled conspiratorially at his goats, gathered behind a fence just north of his cabin watching him work. They grinned back—but then, goats are always grinning, their expressions immutably and inscrutably amused. I put my hand on the neck of Alpie—a handsome, chocolate-brown French Alpine goat—and looked hard at him, our eyes inches apart. Horses get nervous when you come that close; llamas may spit at you or pull away; any self-respecting dog will lick you. Alpie chewed his cud calmly and sized me up with a deadpan grin, then leaned, almost imperceptibly, against my knee.

It was obvious to me, as it soon would be to Nick, that goats express themselves primarily with body language. Especially, our expert said, with their eyes: "Watch the way they lower their eyelids," said John.

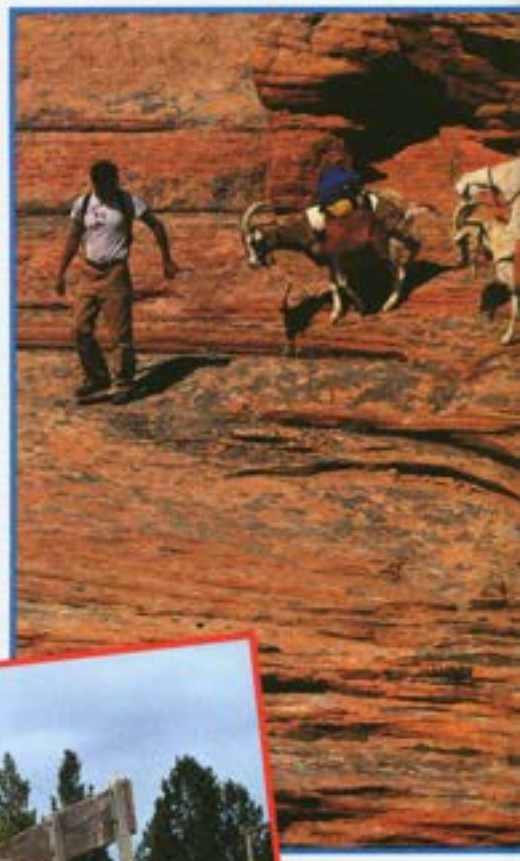
Demurely, sweetly . . . and with those big ears cocked forward, how could you not like goats? The answer eludes me, yet I know there are detractors out there: Nicholas, for instance, after his first encounter with T.C.; the officials of Yellowstone National Park; and, as I discovered, Christianity. Of the three, only Nick shows signs of shaking the commonly held prejudice against *Capra aegagrus*.

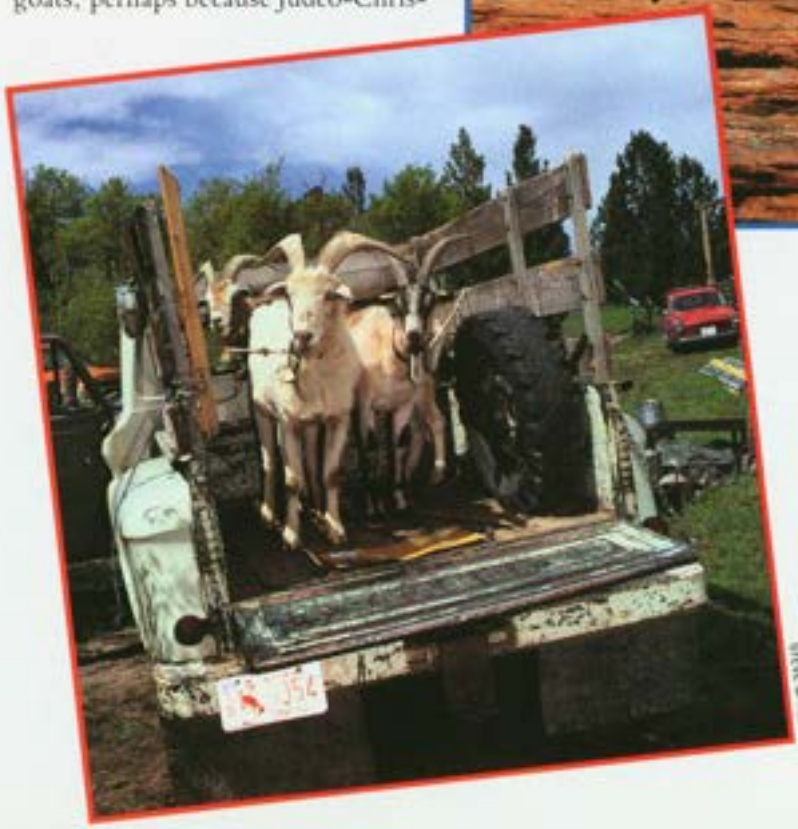
For centuries goats have been the target of laughter and abuse, called the "poor man's cow," blamed for everything from the unscheduled pruning of a neighbor's ornamental boxwood to the desertification of the Middle East. The adaptable goat has a way of turning up at the end of civilization's party, when the landscape is badly battered and human detritus is all around. But goats didn't munch down the cedars of Lebanon, and they don't litter the world with tin cans (or eat them—it's the glue on the labels they go for).

The goat was more highly regarded in ancient times. Zeus was raised in a Cretan cave on goat's milk, and the Greeks gave Capricorn a place of honor in the constellations and in the zodiac. In *The Golden Bough* Sir James Frazer described the corn spirit of prehistoric Europe as a harvest goat.

But the Bible takes a hard line on goats, perhaps because Judeo-Christians had to compete with goat-related deities like Athena and Dionysus and his cloven-hoofed son, Pan. In the Old Testament, the Hebrews banish a goat to the desert with all the sins of the tribe loaded on its back (the scapegoat ritual, found in other cultures as well). And according to the New Testament, when Jesus returns for the Last Judgment He will separate the sheep (the good) from the goats (the bad).

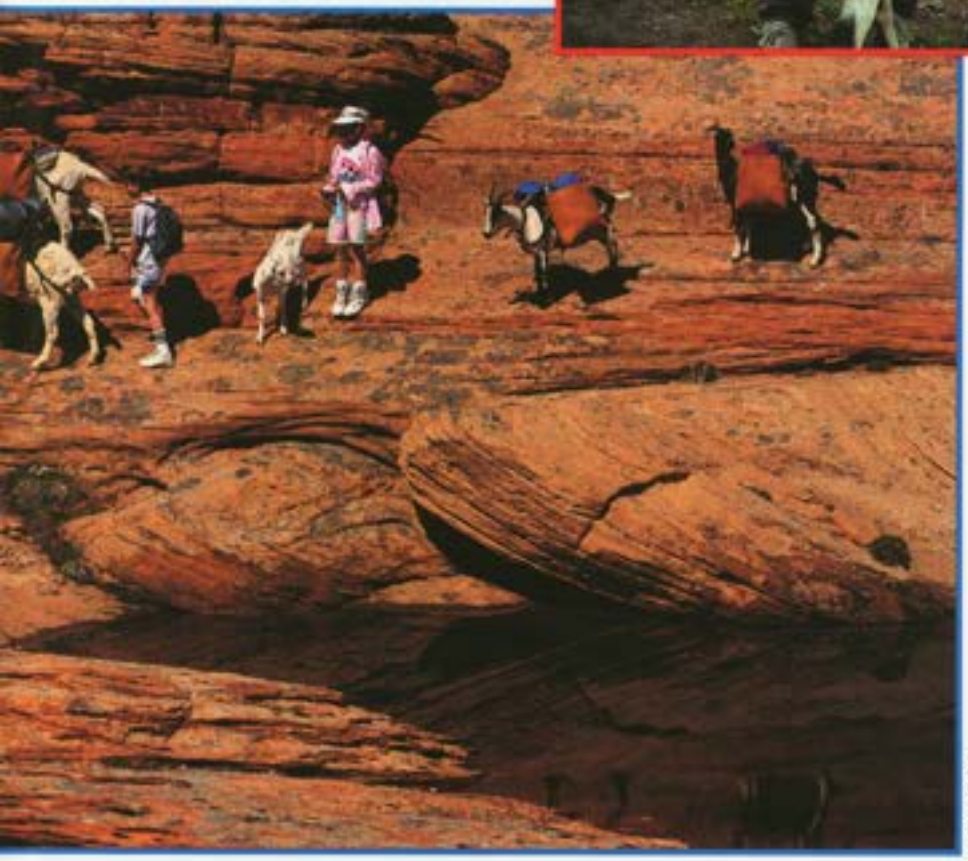
Goats may have survived such cal-





umny because they are improvisers, contemptuous of fences and as curious as in-laws. "Domesticated habits sit lightly on the goat," wrote the late David MacKenzie in my favorite caprine treatise, *Goat Husbandry*. But they are domestic enough to submit to a bit of pushing and pulling and scrunching, as we found when we loaded six of them (Alpie, T.C., Brownie, Julio, Swee'pea, and Chauncey) into the back of John's ancient pickup truck. A favorite female, Penny, was stuck at home with the chore of minding the kids (goat variety), so our lineup was all male—well, formerly male.

JAY C. BUCKEY



STEVE W. ALDEN

Cheek-by-jowl goats won't complain (left). A saddled goat can carry up to a third of its weight in cargo (top).

With 20-plus goats in the Mioncynski flock, you would think the names and personalities would have run together, but that didn't seem to happen. Almost immediately the characters of our half-dozen goats became apparent, from the leaderly qualities of Brownie to the capriciousness of Julio.

Horses are distinct and personable too, of course. But whereas a packstring of horses can be viewed as a bunch of individuals arranged nose-to-flyswatter, a group of goats has its own complex internal organization, with a leader, an enforcer, an organizer, and other ranks and positions.

Inevitably, I found myself making comparisons throughout the trip: goats to horses, goats to llamas, goats to other load-bearing domestic animals, including my own children. I could make a case that goats are superior; my opening argument would deal with transportation. We were able to carry the entire packstring in the back of a pickup, something even a single horse would not tolerate.

The goats clumped together cozily as we snaked into the mountains on a washboarded dirt road. The aspens were fluttering, the sky was mounded with clouds, and John's aged truck seemed to be making do without tie-rods. I put some new handholds in the dashboard, but the woozy ride along the steep road edges didn't bother the goats, who kept their balance and their grins.

At the trailhead, the goats browsed untethered, Nicholas and my daughter Rosaleen joyously conducted formal introductions with each goat, and I anxiously lifted the panniers. Clearly there was not enough weight in them, not enough food. As an occasional horsepacker I know the pleasure of bringing fresh steak and chicken and an extra-large whiskey flask into the backcountry, but the prospect of goats carrying our goodies had triggered my parsimonious backpacker instincts. You need at least two goats to carry the same weight a horse can handle. We had pasta and Kool-Aid and jerky, optimism about fishing, and probably not enough of anything.

To keep the goats nearby, John needed to control only one: Brownie, a French Alpine, the leader of the pack. When Penny, the flock's female, is working, the dynamics of the packstring seem to mimic scientists' descriptions of wild goat flocks. In the wild there is a boss billy goat, an "utterly egocentric" character, in MacKenzie's words, who leads and defends the flock, and mates prodigiously with the females. The boss billy wears himself out with courage and courtship, so

day-to-day leadership falls to the "flock queen," who chooses the forage, decides when to move on, and splits the flock when it gets too large, all the while appearing to defer to the chief.

As leader, Brownie did not necessarily go first in line—he was sometimes more comfortable bringing up the rear. In the absence of flock queen Penny, Alpie played the organizer role, counting heads and braying anxiously if anyone fell behind. T.C. was the "enforcer," as Nick can attest. John took on some of the attributes of boss goat, too.

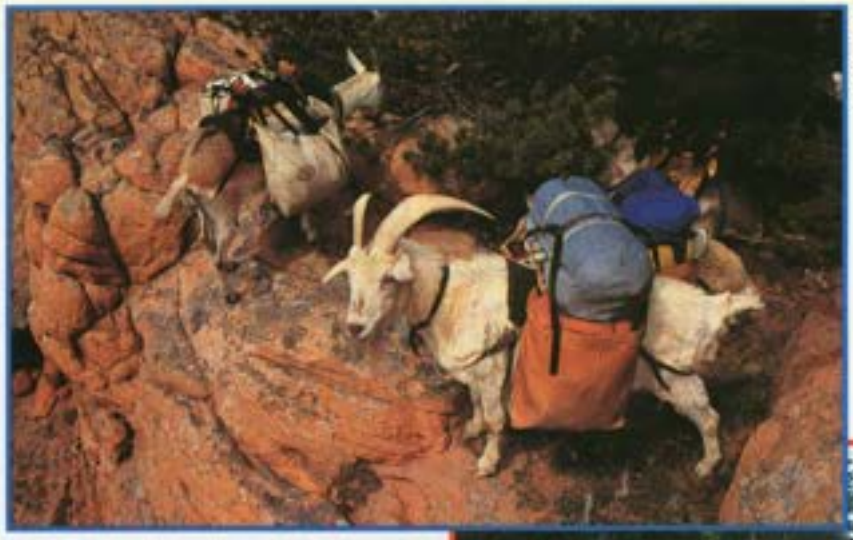
We got off to a late start, and camped just a few miles from the trailhead at the outlet of Roaring Fork Lake. Normally it isn't necessary to tether goats, but we did that afternoon, because of our proximity to a trail much used by horsepackers.

The only worry the U.S. Forest Service has about goats, in the few areas where goats are used as pack animals, has been prompted by outfitters who run horses. "The one complaint I've heard was from a guy who said a goat spooked his horse on the trail," said Skip Shoutis, a wilderness ranger with the Lander District of Shoshone National Forest. "The goat was just curious, standing on a rock. But the rock was higher than the horse's head."

Goats are indeed rock jocks, and our gang proved it the next day when we decided to take a shortcut over Roaring Fork Mountain, the crest of which bends in a horseshoe around Stough Creek Basin. Rather than hike around the foot of the mountain, we elected to climb above timberline and shoot for a pass at about 10,600 feet that would drop us right into the basin.

The goats had no trouble hopping through boulder fields. We had roped them together on the trail to avoid scaring horses, but once we hit the big rocks we untied them. Each moved at his own pace, and when one of the young ones fell back, Alpie would call. If ever one dropped out of sight, we had only to wait a few minutes.

In *Goat v. Horse, et al.*, our shortcut might be marked "Exhibit B." Large boulder fields intermixed with brief parks, scree slopes, then more boulders—this was a route no horse could have handled without time-consuming detours. Nor, according to John, could a llama have crossed the exposed ridges. It was the kind of high country he favors—when he isn't in the desert—and that's why he turned to goats.



STEVE W. ALTEN

Goats excel on cliffs, enrage in streams, and endear in camp.

In 1972 the Forest Service asked him to monitor transplanted bighorn sheep in a canyon near his home, and he needed a pack animal that could carry his equipment along the narrow ledges in steep-sided Little Popo Agie Canyon. He tried slinging saddlebags on his first pack goat, Weathervane, but the leather dug into her ribs. Then he rigged his first makeshift packsaddle with leather strips and a couple of boards. Now his goat saddles are a sideline. The design is uncomplicated, with molded wood sides, a breast strap and cinch, and pommels crossing on top to hold the pannier straps.

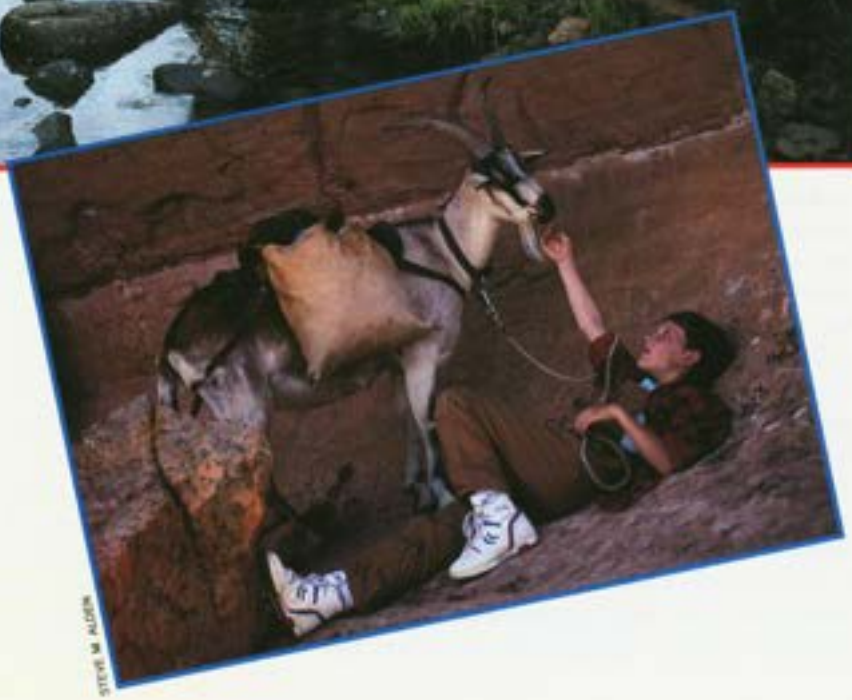
We made a few saddle adjustments as we bounded among the boulders, but lost no packsaddles, and certainly experienced no "rodeo" of the kind horses put on when a pannier shifts—a bucking packhorse in the Teton Wilderness the year before cost me a borrowed graphite rod, and landed underwear and tomato paste high in the trees. A goat is more likely to stand still and bleat when a load slips.

But as we began the last steep climb toward the pass, it was not the goats who were complaining. Rosaleen found impressive reserves of stamina, but Nicholas was wearing down from the altitude, wind, and cold. So I became the seventh goat—Nick was bundled in a warm coat and tossed up on my shoulders. I put my head down and tried not to think, letting Alpie, in front of me, choose the stable rocks and most sensible path. By the time we reached the top of the pass, thunder

was banging off the granite around us and lightning crackled behind the ridge. The goats walked on with fixed grins. I watched Alpie and tried to stay as calm as he was.

Nick shouted into the wind that he'd rather be riding a goat than me. Their gaits were surely less jolting than mine, but it takes a special goat to carry a young cowboy, and that special goat, Penny, was not along on our trip. It added to Nick's doubts about goats generally—he'd been promised a ride on one, and here he was instead atop his leadfooted dad, dragging up the pebbly brown back of a cold, cloudy mountain.

But the tired, fretful mood of the struggle up to the pass gave way the moment we reached the top, where the blooming sky pilot and alpine avens implied a kinder climate. Ahead of us, the cirque of granite held amethyst lakes, green forest that looked as thick as grass from our vantage, and white dabs of lingering snowfields.



My legs and nerves were exhausted; a few hundred yards off the pass I stopped and sat down. Nick lay back between my legs, instantly asleep. I stretched and closed my eyes, tiredly letting my left arm drop where I knew it would find Rosaleen; then I dropped my right arm, and it, too, unexpectedly found a warm body—Swee'pea's.

We stumbled down the mountainside and camped that night on a terrace above the outlet of a small, unnamed lake. Rosaleen spotted the wet stain of springwater on the side of a cliff east of us and set off with containers to fill, while I set up the tent. The goats were never far from Nick's mind, and he would inevitably veer in their direction. The tired loadbearers, though, had just feasted on alfalfa pellets and rolled oats, and they kept a respectful distance from my wild would-be goatherd . . . except, of course, for old T.C. He stood his ground until Nick was right beside him. Then he swung his head slightly and gave Nick another meaningful nudge.

Later, as we sat in the lee of a large tree trunk drinking hot chocolate and brandy, the Worried Father asked John why he didn't cut the goats' horns, as so many goat dairymen do, to protect against punctured udders and bruised children.

"I leave the goats' horns on for the same reason I leave the fingers on my hand," he said simply. Horns are a goat's tools, and it uses them to defend against predators. (A serious problem anywhere: Penny the flock queen was killed by local dogs after our trip.)

That night in the tent Nick told me that T.C. was a mean old goat. "I only like Polio."

"That's *Julio*," corrected Rosaleen.

"He's not really mean," said Wise Old Dad. "He's afraid of you."

"I'm afraid of him. He's a stupid goat."

"He likes you. He's smart and he's stubborn, and he just wants to show you the right way to do things."

A lightbulb went on above Rosaleen's sleeping bag. "T.C. is the

wrong name, you know? I'm going to call him *Grampa!*"

And that was the moment when I stopped worrying about Nick and goats, and realized the obvious. There was nothing hostile in what T.C. had done—he had never hooked Nick with those massive horns, only shoved at the boy with the flat plane that swept up from his forehead. T.C.'s efforts with Nick were instructive as well as disapproving, just what you might expect from a stubborn, gruff grampa trying to teach a new kid the old rules of the flock.

Just how stubborn a goat can be was demonstrated the next morning, when we moved farther into the basin and had to cross a rushing stream. Faced with running water, the steely goat nerves that had just ho-hummed at thunder appeared to jellify. Brownie stood paralyzed on the shore, while John pulled and I pushed. Goats like Brownie and T.C. weigh up to 250 pounds, and when they put down their anchors there is not much hope of budging them.

Here we must concede a point in the great goat-horse comparison. Where horses will clop mindlessly through water up to their withers, goats face a shallow, negligible stream with the trepidation of a two-year-old human having a first look at roaring ocean surf. They much prefer to leap from rock to rock than to get even an inch of hoof wet.

After a lengthy struggle with Brownie, the soft-spoken Mioncynski cracked. He threw a temper tantrum, called Brownie names, heaped contempt on his pedigree, questioned his marketplace value. I was at the wrong end to see whether Brownie's eyelids sagged, but his resistance surely snapped, and he wet his dainty feet at last. Pushing and pulling and slapping seem less effective with goats than a stern father-knows-best voice.

Goats' natural timidity about water can be overcome if you train them early, before they're six months old, according to John. The seriousness of the problem depends, too, on the personality of the goat. Personality, not size, is the first thing a goatpacker has to look for in choosing his animals.

We set up a new camp on a rise between two of the basin lakes, well shielded from wind by a rock outcropping to the north. The hard work was over, the weather had fixed itself, it was time for some fishing and reading, and everybody relaxed, including the goats. They disappeared among the rocks and trees, following their curiosity until John would shout: "Goats! Let's go, *goats!*"

Public-lands managers agree that goats are easy on the landscape, as long as they remain small (they will) and few (which depends on their human owners). They are browsers rather than grazers, so shrubs and seedling trees take the brunt of their foraging. In our ongoing four-legged litigation, mountain meadows would testify against horses, but have little to say about goats.

The National Outdoor Leadership School now uses goats on several wilderness-skills courses in Wyoming. Goats, according to NOLS instructor Willie Cunningham, can find browse in the mountains early in the summer, when the horse feed is just sprouting and the meadows are fragile. The school has tried llamas, too, but found goats "easier to manage, on the trail and in the camp," says Cunningham. "Plus, they have so little impact. Their tracks and their droppings look just like a deer's."

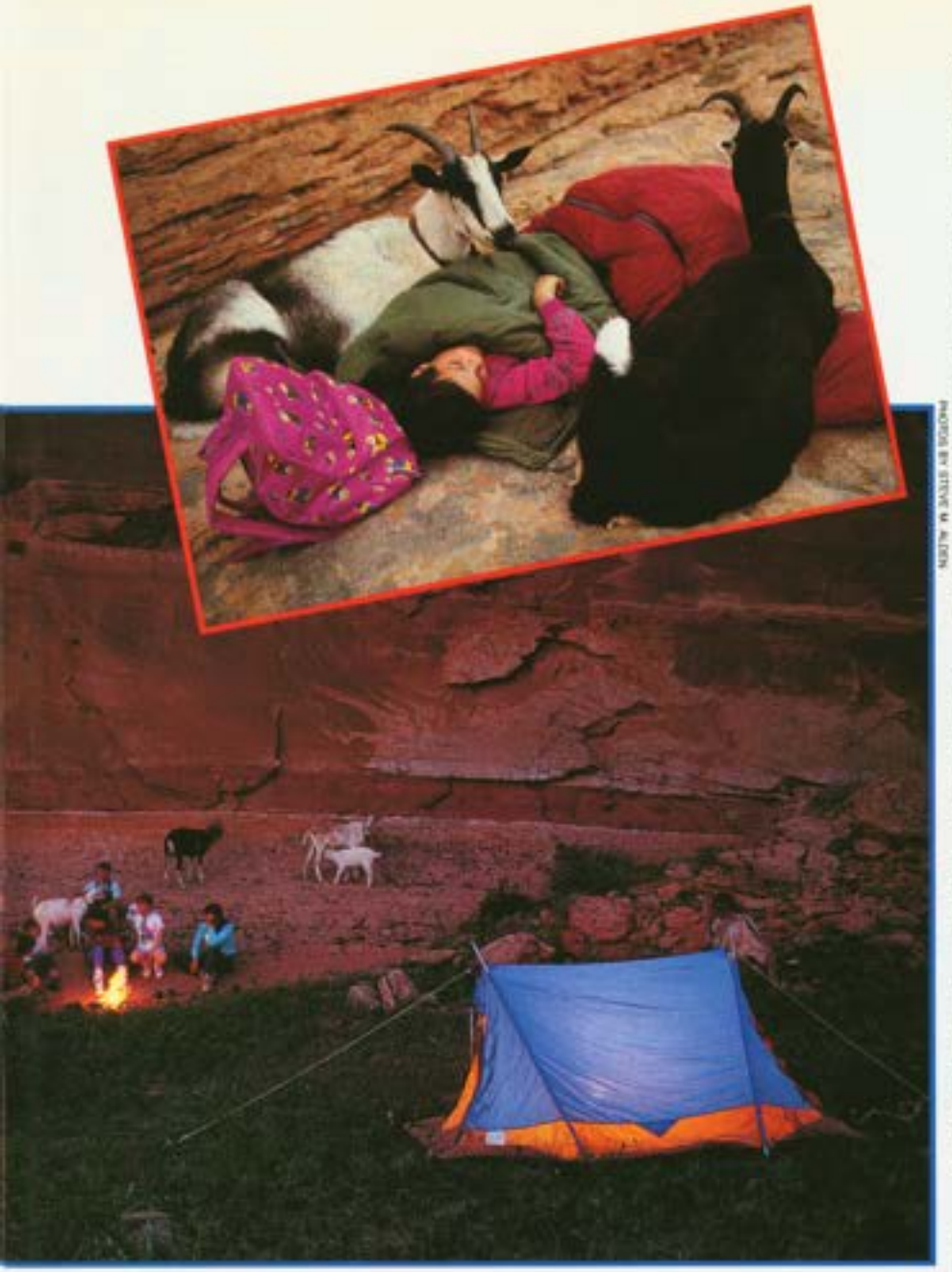
Only one institution I contacted, Yellowstone National Park, has taken an Old Testament view of goats in the backcountry. According to park spokesperson Joan Anselmo, fear of feral goats and diseases that might spread to bighorn sheep has led the park to deny goatpacking permits.

The Yellowstone officials are a cautious lot, but their objections might eventually succumb to good sense should the puny goat lobby put on a little muscle. Gelded goats, after all, are not likely to propagate in the park or anywhere else. And an investigation by Tom Thorne, a biologist with Wyoming's Fish and Game Department, found that "there are not many diseases goats harbor that could affect our wildlife or domestic livestock." He suggests that agencies require health certificates for goats as part of an outfitter's special-use permit.

One moonlit night I awoke to find a hoof at our tent door and a curious nose pressed against the wall. I touched the nose through the fabric with a cool water bottle, and it pulled back, snorted, and pressed in again. I

By trip's end, the occasionally cantankerous goats have settled in and made themselves part of the family.

touched with my fingers, with the same result, but a more musical snort; then I reached around and offered a butterscotch candy, then a few other things, and each time the nose pressed a little harder, with a more intimate comment. The goats' individual behavior had become so familiar in a few days that I could tell in the dark that



PHOTOS BY STEVE W. NICK

this was Julio, and after a bit of this fun, I remembered that Julio likes to clamber atop shed roofs back home in Atlantic City. On a NOLS trip, he once got carried away and tried to leap atop a tent's fly sheet. I shooed him away. One must not get *too* chummy with the employees.

In the end, one's choice of pack animals derives from an odd mix of practicality and friendship. My children and I had developed strong attachments to horses on previous packtrips —Rosaleen, at four, once provided us excellent bear protection on a ride into the Absaroka Mountains by singing, in her lilting voice, a beautiful love song to a mount named Dutch. But we have also slogged through meadows trampled into knee-high muck by strings of packhorses. And there is the memory of that splintered graphite rod . . .

During the past year my daughter has become even more adamant than her parents about the wrack and ruin of the environment, but that was just one of the reasons why she had become a strong goat advocate by the time we topped Roaring Fork Mountain on our way out. The curious and comic nature of goats had entertained us from beginning to end. And if you don't mind walking—if you, in fact, prefer it—then who needs the gargantuan horse?

Well, Nicholas, perhaps. Because at four, he did *not* prefer walking over tall mountain passes, and the distractions of marmots and blooming phlox and the glint of sunlight on lakes were not quite enough to make him forget. Plus, he was hungry, having disdained the meal of cutthroat trout and butterscotch balls that scraped the cupboard bare the night before.

On top of the pass, John called a break, and we wandered about letting the sweat dry while he fiddled with Swee'pea's pack. Then he called Nick over. "You ready to ride?" he asked.

In a moment Nick was aboard, and the goat was picking his way across the rubble, Nick swaying side to side, his eyes wide, with a small smile that was half joy and half trepidation. This was to be a short ride, because Swee'pea was a bit under the weather. But smaller children can indeed ride on properly saddled goats for longer distances, as John has proved on other trips.

In Nick's case, the last barrier between goat and kid had been breached, and when the ride was over, he leaned forward and put his head on the goat's neck. It was a gesture of trust and affection that prompted me to look south along the ridge to where T.C. stood.

T.C. was browsing among the rocks for a green morsel, looking up now and then to see where John was, unmoved by the sentimental display of guileless goat-boy.

He remained businesslike about his duties as a goat, quite unaware of my wistful hope that he and Nick would be reconciled, and quite unwilling to assume the anthropomorphic grampa role we'd devised for him. This time, though, he made no effort to separate Nick from the other goats. He gave me a hard-eyed look, warning me not to make anything of it. And, of course, he was grinning, as was I. ■

GEOFFREY O'GARA *is a writer in Lander, Wyoming.*

VISIONARIES & CASSANDRAS

Number-crunchers, monkeywrenchers, and ecstatic nature worshippers have vied for the attention of literate environmentalists over the past several decades. Here's one observer's roster of the books that built a movement.

SINCE WELL BEFORE OUR TIME, ENVIRONMENTAL WRITERS HAVE BEEN wrestling with the question of limits—of the planet and of its most inventive and rapacious species, *Homo sapiens*. Idealists, alarmists, spoilsports: By whatever name conservationists are called, they have dared to question humanity's spendthrift ways, thereby earning the ire of those who believe in the primacy of unbridled personal freedom. But they've also earned the respect and admiration of those whose gut feeling is that life at the top of the food chain entails certain obligations.

On the first Earth Day in 1970, my undergraduate bookshelf sported two books on the environment: Paul Ehrlich's *The Population Bomb* (because my brother had pressed it on me) and Wesley Marx's *The Frail Ocean* (because a year before I had spent spring break in Santa Barbara, California, where the coastline was awash in spilled oil). My collection has grown steadily ever since. When *Sierra* invited me to assemble a list of what I consider to be among the environmental movement's most notable books of the past 30 years, I had been working in eco-publishing for more than 15 years, had edited or contributed to some 30 books on natural resources, energy, and ecology, and had read hundreds more.

Textbooks, meditative essays, technical studies, nature writing, fiction: All are represented among environmentalism's greatest hits. The list even includes a few government and think-tank reports. The qualities that make for true standouts are universal: some combination

BY KATHLEEN COURRIER

of originality, timeliness, clarity, breadth, and vision. Beyond that, many of these books have also been immensely popular—suggesting, perhaps, that the public's wardrobe includes a hair shirt (or, more likely, that people recognize a crisis when they see one). Most striking, though, is how many of these books, by getting at that nagging question of human and ecological limits, have changed people's minds—and even, albeit rarely, government policies.

Early Forecasters

The destructive underside of postwar industrial and economic growth was first documented in such works as Fairfield Osborn's *Our Plundered Earth* (Little, Brown, 1948) and Harrison Brown's *The Challenge of Man's Future* (Viking, 1954). By the 1960s environmental concern had deepened: The pesticide alert sounded by Rachel Carson in *Silent Spring* (Houghton Mifflin, 1962) was soon followed by broader warnings about pollution at levels greater than ecosystems could tolerate, and about impending shortages of everything from topsoil and anchovies to wilderness and elbow room.

Several books published in the late 1960s and early 1970s created a fissure in American complacency about environmental limits that may never again close. Paul Ehrlich's bestseller, *The Population Bomb* (Ballantine, 1968), predicted various crises that have not come to pass, like a global meat shortage, India's demise, and widespread food rationing, but also some that have, such as deepening erosion problems in the U.S. breadbasket and the worldwide buildup of pesticide resistance.

Ehrlich's intellectual roots trace back to Thomas Malthus, the late-18th-century economist who warned of the hardship and famine that would eventually hit humanity (whose numbers are increasing geometrically) when it overtaxed its food supply (which is increasing only arithmetically). Straight-line neo-Malthusian projections earned the young Ehrlich a reputation in some circles as an analyst who oversimplified to press a point. But *The Population Bomb* also introduced a statistics-shy public to a growing body of sobering demographic and environmental facts. The doubling time for the world's population, people learned, is fast growing shorter and shorter.

By 1971 it was abundantly clear to many Americans that they were paying a hefty ecological price for their high living standard. That year saw publication of Barry Commoner's *The Closing Circle* (Knopf). A serialized version of the book warned readers of *The New Yorker* (which had also introduced *Silent Spring*) that "after millions of years of harmonious co-existence . . . the relationships between living things and their earthly surroundings [have] begun to collapse" and that "any living thing that hopes to live on the earth must fit into the ecosphere or perish." Far more concerned about pollution than resource depletion, Commoner claimed that economic growth itself is not the problem so much as *how* growth is achieved. He suggested that our use of inappropriate technologies started us headlong down the gardenless path.

Barry Commoner acquainted Americans and millions of others with the four ecological laws that govern nature's machinery: Everything is connected to everything else, everything must go somewhere, nature knows best, and there is no free lunch.

Commoner acquainted Americans and millions of others around the world with the four ecological laws that govern nature's machinery and cycles. Everything is connected to everything else, he counseled, everything must go somewhere, nature knows best, and there is no free lunch. To design our production systems with these maxims in mind, said Commoner, requires relinquishing our blind faith that technology can cure all ills.

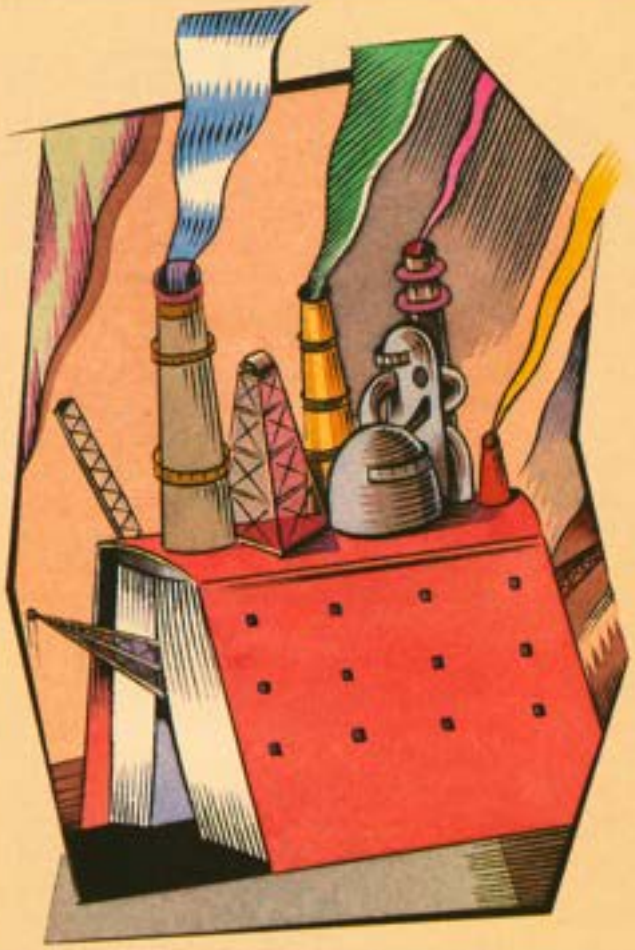
A year after *The Closing Circle* came out, an independent group of 30 scientists and visionaries who called themselves the Club of Rome issued *The Limits to Growth* (Universe Books, 1972). The authors of the report amassed far more information on natural resources and population growth than either Commoner or Ehrlich had, and used it as the basis for far more sophisticated calculations.

Steeped in systems analysis, which meshes the knowledge of different academic disciplines, this team plotted the ways that population, agricultural development, natural-resources use, industrialization, and pollution influence both one other and human well-being, spinning out numerous scenarios based on differing rates of increase for population and consumption. Their model, replete with feedback loops that revealed how various scarcities and excesses would offset or reinforce each other, unsettled readers by demonstrating that, on its current track, humankind had about 100 years before industry would collapse for want of raw materials, and human population would contract dramatically along with its food supply.

A stick-to-the-numbers, computer-assisted attempt to lift the future's veil, *The Limits to Growth* could hardly have been expected to sell the more than 4 million copies it eventually did. But this frog

prince of the publishing world was well-timed: Environmentalism was gathering momentum among the general public, computer modeling was boosting long-range forecasting, and two oil shocks were on the way to lend credence to the report's worst-case projections.

The surprise popularity of *Limits* did not save its authors from a chastening round of rebuttals. The Club of Rome's energy analysis was attacked (partly for using incorrect figures for U.S. coal production), and even otherwise sympathetic reviewers complained that some of the relationships among the variables were faulty, that some data sets were lumped together crudely, and that the authors erred in ignoring the impact of market scarcity on physical supply. Still, the Club of Rome brought the concept of limits to growth into relatively common currency and made purely qualitative inquiries into the human animal's environmental destiny seem suspect.



One book that managed to avoid arousing suspicion was *Only One Earth* (Norton, 1972) by Barbara Ward and René Dubos. Written to mark the United Nations Conference on the Human Environment held in Stockholm in 1972, this investigation of the impacts on natural resources of worldwide population growth and increasing affluence proved to be a model of "background" reporting that has yet to be matched for grace and erudition. It plumbed deep into industrial society's psyche, combining earnest soul-searching with dispassionate assessments of such strictly scientific issues as the changing composition of the atmosphere and the sewage-absorption capacity of lakes.

To political economist Ward and microbiologist Dubos, the greatest environmental danger was not Earth's fragility, but humanity's hubris. Evoking Prometheus and Faust, they warned that scientific arrogance is the dark side of technological optimism, and bade us use science not just to decipher "nature's parts" but to cultivate healthy respect for the unknown and the unknowable.

Committees of Sleuths

The burst of environmental warnings three decades ago came largely from visionaries and a few inspired scientists who were bent on elucidating theretofore unaddressed problems. By 1980 a small corps of environmental economists, lawyers, and other researchers had taken the next steps, monitoring the planet's health with ever-greater precision and trying to save the patient by influencing policy-making.

In 1984 the Washington-based Worldwatch Institute launched its *State of the World* series—annual progress (or, more often, regress) reports on population control, soil conservation, pollution abatement, energy efficiency, reforestation, and human health and employment. Two years later the World Resources Institute began an even more ambitious biennial series, *World Resources*, which assesses conditions and trends in global natural-resource use and offers hundreds of data tables, essays about pressing problems, and thoughts about what to make of so much information.

One impetus for these periodic looks at how the planet is holding up came from a study completed in mid-1980 by the Council on Environmental Quality (CEQ) and the State Department. *The Global 2000 Report*, buttressed by more than a thousand pages of technical documentation, represented the U.S. government's best reading of probable changes in world population, natural resources, and the environment through century's end. The prognosis did not look good. If trends then in force continued, the report predicted, the world of 2000 would be "more crowded, more polluted, less stable ecologically, and more vulnerable to disruption" than it was in 1980. More specifically, the report contained a new batch of sobering projections: World population would increase by 2.35 billion in just 25 years; the poor nations would fall farther and farther behind the rich; sub-Saharan Africa would face famine; food and fuel prices would rise; 40 percent of the world's remaining tropical forests would fall; and, partly as a result, 20 percent of all species on Earth would perish.

Released in the waning months of

President Carter's term, *Global 2000* had its political life cut short. For six months, CEQ and the State Department worked with 19 federal agencies to translate the report's implicit imperatives into an action plan. But their recommendations, summed up in *Global Future: Time to Act*, came off the government press stillborn—within days of President Reagan's inauguration. The new administration hurriedly buried the report.

Though *Global 2000* dead-ended in Washington, it kicked up a stir elsewhere. Worldwide press coverage was heavy, and *Time* magazine hailed it as a high-impact study whose conclusions were the more believable because "muted." The report was soon translated into seven languages, selling 400,000 copies in Japan and even more in Germany. It spawned national studies (*China 2000*, for instance) and a nonprofit center (the Institute for 21st-Century Studies) headed by the research director of the original effort.

Global 2000 also prompted two analysts with rosier views of the future, physicist-turned-futurist Herman Kahn and economist Julian Simon, to marshal all the statistical evidence they could find to prove that any limits to what Earth and humankind can together produce are but so many mind-forged manacles. Their rebuttal, *The Resourceful Earth: A Response to 'Global 2000'* (Blackwell, 1984), begins: "If present trends continue, the world in 2000 will be *less* crowded (though more populated), *less* polluted, *more* stable ecologically, and less vulnerable to resource-supply disruption than the world we live in now."

Although the Reagan administration embraced *The Resourceful Earth*, the book's influence pales beside that of *Global 2000*, and not simply because bad news travels faster and farther than good. At just over the midpoint between *Global 2000*'s publication in 1980 and its turn-of-the-century target date, most of the earlier report's predictions have held up well enough. World population has increased by 840 million people in the past decade, and 959 million more are expected in the 1990s; the gap between the richest and poorest countries has widened as both the debt crisis and environmental deterioration deepen in the developing world; recent reports suggest that annual tropical-deforestation rates may be close to 80 percent higher today than in 1980; and estimated species losses now stand at about 100 a day—an extinction rate high enough to wipe out a fifth of all the species living in 1980 right on schedule.

Inevitably, a few of the report's projections were miles off. For instance, following the Persian Gulf war, gasoline prices (adjusted for inflation) were at a 39-year low in the United States, and food expenditures as a percentage of income in this country were on the decline. But regardless of what judgment history passes on the report's numbers, the intramural process that led to *Global 2000*, the weight of the world's most powerful government even briefly behind it, and the size of its eventual readership worldwide (with 1.5 million copies in circulation) meant that the concept of limits would soon pass into environmental dogma.

Abbey and Berry are fundamentally in accord in that both have lived the life they have written about. Both men followed the ecologist's desideratum that you can't save what you don't love, and you can't love what you don't understand.

If *Global 2000* was written for (and largely ignored by) Americans, the decade's other major "official" report reached out for (and was embraced by) a multinational audience. In 1987 the United Nations–sponsored World Commission on Environment and Development (commonly called the Brundtland Commission in honor of its chair, Norway's Prime Minister Gro Harlem Brundtland) released *Our Common Future* (Oxford University Press), a summary of what 22 environmental leaders learned about planetary resources after nearly three years of public hearings around the world and consultations with resource economists and other development experts.

A "coming of age" report, *Our Common Future* differed from previous readings of the planet's vital signs. Its authors accepted the growing consensus of opinion on what's wrong, and got down to the politically difficult business of suggesting ways to reverse the trends that imperil the planet. Under the banner of "sustainable development"—defined in the report as economic development that "meets the needs of the present without compromising the ability of future generations to meet their own needs"—the Brundtland Commission called for a revival of rapid economic growth, the fruits of which should be extracted more gently from the earth and distributed more fairly among its peoples.

Our Common Future received widespread media attention, led to national studies along the same lines as the report, and spawned its own nonprofit center, charged with keeping up the study's political momentum. As of late 1989 some 500,000 copies were in print in roughly 20 languages. Interest in the report remained so high three years after its release, especially in Europe, that in 1990 the Center for Our Common Future came out with a book-length review of the

many steps taken by government, business, consumers, international agencies, and citizens' groups in its aftermath (*Signs of Hope* by Linda Starke, Oxford University Press).

Supporters of *Our Common Future* have far outnumbered detractors, partly because in the ten years since *Global 2000* was published environmental degradation has become more visible and harder to explain away. Yet critics have taken issue with the report's assumption that worldwide economic growth can and must increase by fivefold to tenfold over the next 50 years to relieve poverty and accommodate population growth. Even if repeating this century's economic performance is technically possible (and it is morally indefensible to deny a billion or more hungry people a shot at material sufficiency), can expansion be achieved, they ask, without further aggravated assault upon the environment? Aren't there real limits to how far and how fast our species can go?

Land Lovers

While trendsetters romance their computers, a few writers with bloodlines to Thoreau have taken a backcountry-road approach to describing the land and its limits. Their message is that only a deeply felt connection to a place —be it a family farm or a remote wilderness—can instill the wisdom and courage needed to pull back from the brink of both environmental and human degradation.

Among the many American writers in this camp—Annie Dillard, Gary Snyder, Barry Lopez, and Wallace Stegner among them—two with strikingly different styles and outlooks embody the genre's extremes: Edward Abbey and Wendell Berry. The 14 books of essays and fiction Abbey wrote before his death in 1989 established him as a mouthpiece for whatever vestiges of the hunter-gatherer remain buried in our advertising-and-politics-soaked brains, a champion of wilderness for its own sake, an advocate of environmental action at any cost short of human life, a larger-than-life individualist propelled by an irreverent sense of humor—and, for the record, a die-hard cow-hater.

Berry's essays, novels, and poetry, in contrast, are pastoral. He writes from his Kentucky farmstead in the same sense that one writes from the heart. He cultivates crops as well as literature for a living, worships work, admires the Amish, preaches salvation through good works and community involvement, and believes the wild needs the domesticated every bit as much as the domesticated needs the wild.

Abbey's best-known nonfiction work is *Desert Solitaire* (McGraw-Hill, 1968), the chronicle of his three summers as a disgruntled ranger in Arches National Monument near Moab, Utah. But his most influential book is almost certainly *The Monkey Wrench Gang* (J. B. Lippincott, 1975), a sequel to which —*Hayduke Lives!* (Little, Brown, 1990)—he finished just before his death.

The members of Abbey's Monkey Wrench Gang—eco-saboteurs who burn billboards, decommission earth-moving equipment, and dream of blowing up Glen Canyon Dam—are grievously and hilariously flawed. But collectively they embody the bedrock survival traits that Abbey prizes most: beauty and love of beauty (Bonnie Abbzug), brains (Doc Sarvis), guts (George W. Hayduke), and practical know-how (Seldom Seen Smith).

In Abbey's comic world, human limitations are glaring and nature is perfect, though vulnerable. In *The Monkey Wrench Gang*, even a voluptuous, forever-young heroine can't hold a candle to the beauty of southern Utah. And in *Hayduke Lives!* the protagonist finds it "harder and harder to feel any respect, or even much sympathy, for the human race."

To the increasingly prickly Abbey ("Cactus Ed" to his friends), agriculture looked like civilization's biggest mistake, but Berry sees small-scale farming as a crucible. Like monkeywrenching, it calls on all the knowledge, technical skills, and intuition that the human animal possesses. But unlike monkeywrenching—a solitary and late-night pursuit, the renegade's way of weeding the land of tractors, dams, and fences—family farming is satisfying largely because it connects households and generations

in a tradition; it produces cohesive communities along with milk, meat, and crops.

Berry's complaint is that there are no longer enough small-scale farmers (or people like them) in the United States. If we were all as self-reliant and attuned to nature as the family farmer, he claims in *Home Economics* (North Point Press, 1987), our obsession with consumption and price would give way to an understanding of value and a deeper sense of responsibility for the land and its bounty.

Above all, Berry suggests, the family farmer has a keen sense of limits that most of the rest of us lack. He contends that whatever is taken from the earth must be returned through careful stewardship, and that if Americans don't take care of things it's because it's not in their "economic" interest to do so when labor, time, money, and just about everything else are more expensive than raw materials, "the stuff of creation." As individuals, we have lost our connection to the land, the best defense against our own excesses.

Perhaps nothing distinguishes Abbey and Berry as much as how they view their protagonists. Hayduke, the outcast as hero, eventually finds himself holed up in a cave with a rattlesnake for a companion and FBI agents on his trail. For Berry the local hero is the good neighbor, someone who helps another farmer bring in the crop or takes on extra chores with no thought of who owes what to whom.

One author urges caution and continuity, the other spurs action and personal risk-taking. Yet Berry and Abbey are fundamentally in accord in that both have lived the life they have written about. Both men followed the ecologist's desideratum that you can't save what you don't love, and you can't love what you don't understand. And while Berry is a sedentary sort and Abbey is a nomad, neither looks very far beyond national boundaries, exemplifying the relative indifference of Americans to environmental problems not in their own backyards.

Radical Reformers

Abbey and Berry can cast the writer's spell on the indifferent, but the contemporary environmental movement also has a self-appointed vanguard whose books are read mainly by the politically committed. These writers —theorists, tacticians, and guerrillas— don't necessarily agree on what the human animal's rights and limitations are, and their visions of an environmental future worth waiting for fit no single mold. But all are sure that the planet is sick, and that there will be no bringing it back to health without radical action.

Perhaps the most influential of these iconoclasts is long-time social critic and political historian Murray Bookchin. In *Remaking Society: Pathways to a Green Future* (South End Press, 1990), Bookchin consolidates a lifetime's work into a primer on "social ecology"—a synthesis of ecology and social criticism grounded in a historical understanding of how the current environmental crisis came about.

To Bookchin, "nearly all ecological problems are social problems"; the abuse of nature stems from the domination of one sex, class, nation, or race by another, and environmental degradation will continue as long as rigid social hierarchies last. He damns capitalism for reducing citizens to mere taxpayers, education to training, and nature to granary and mine. If capitalism can't be greened, says Bookchin, neither can Marxism: Both systems are materialistic, and each has the marketplace's lipstick on its collar.

To Bookchin, "nearly all ecological problems are social"; the abuse of nature stems from the domination of one sex, class, nation, or race by another, and environmental degradation will continue as long as rigid social hierarchies last.

Although Bookchin believes that humanity has never achieved its full potential, he finds some hope for the species and for nature in the history he thinks Americans have ignored at tremendous peril. Features of his remade society can be found in ancient Athens (strong civic-mindedness and a basically urban way of life), revolutionary France (a deep commitment to both liberty and justice), and the political counterculture of the late 1960s (one person/one vote and a healthy balance between work and pleasure) before its New Left leaders were beguiled by Mao.

Bookchin's utopia is, above all, highly civilized. But for a growing number of environmental radicals and wilderness advocates, the streets of heaven aren't paved. They question not only the current political system, but also the centrality of the top carnivore's enterprise itself.

In *Confessions of an Eco-Warrior* (Harmony Books, 1991), Earth First! co-founder Dave Foreman makes the deep ecologist's case that "all living beings have the same right to be here." In the world as it should be, he says, a grizzly and an MBA would be on an equal footing, and biodiversity would be embraced as the planet's be-all and end-all.

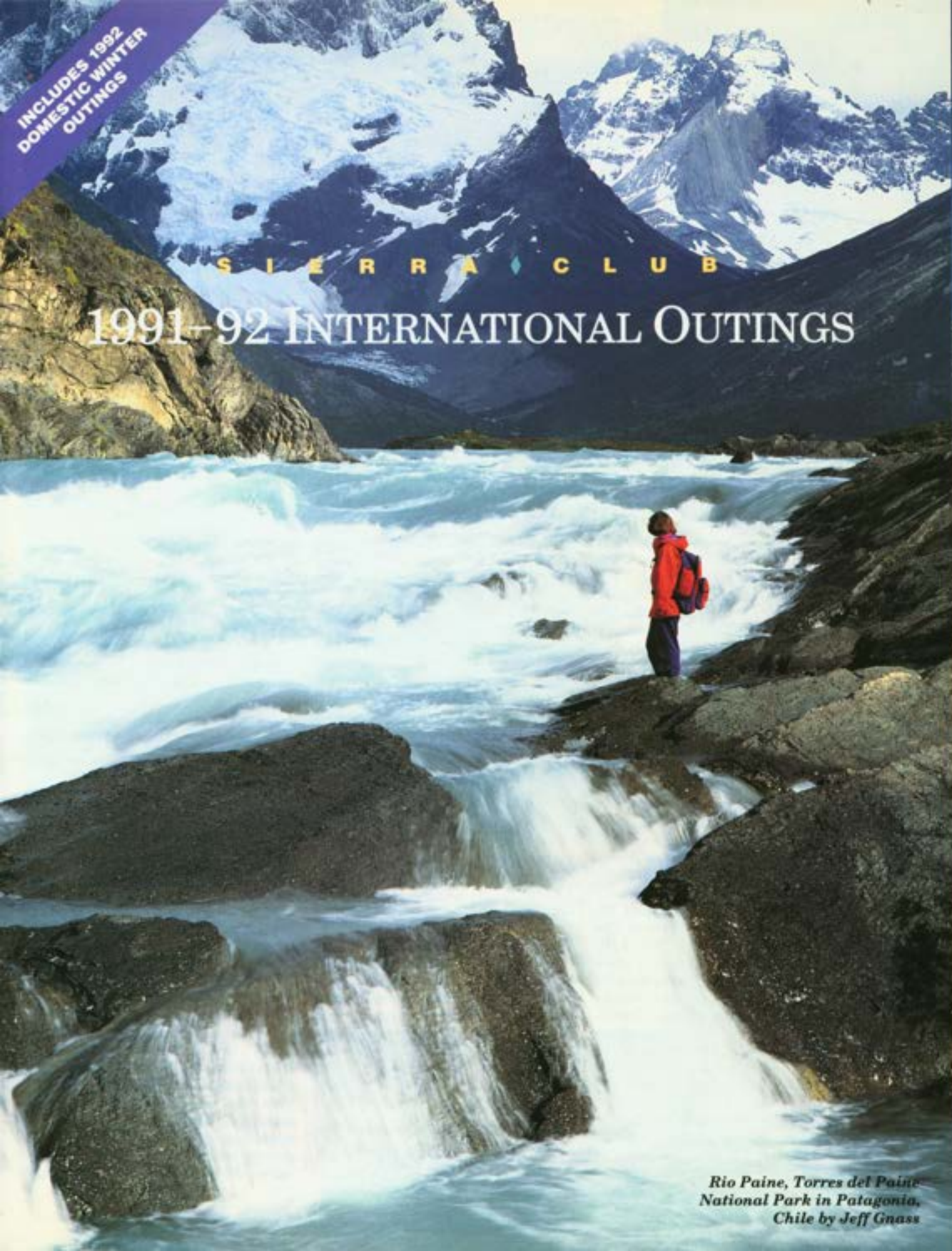
If we are to preserve our precious diversity, Foreman contends, we must part with the notion that our attitude toward a redwood or a whale is more important than the

Continued on page 69

INCLUDES 1992 DOMESTIC WINTER OUTINGS

SIERRA CLUB

1991–92 INTERNATIONAL OUTINGS



Rio Paine, Torres del Paine National Park in Patagonia, Chile by Jeff Gnass

1991–92 International Outings

Viewing endangered wildlife in Madagascar, hiking among the "trolls" in Norway, sailing in the British Virgin Islands, or building a trail near the Soviet Union's Lake Baikal; these are just some of the options that await you on Sierra Club International Outings this year and next. ♦ Enjoy the camaraderie of an exciting adventure with fellow Club members who share your enthusiasm for the outdoors, your interest in conservation issues, and your appreciation of other cultures. Your trip will be led by an experienced and competent volunteer leader who will be sensitive to your needs as well as to those of the host culture and natural environment. ♦ On some trips you may camp in remote areas; on others your accommodations will be comfortable guesthouses or quality-conscious hotels. Be sure to read the trip description and brochure to determine which outing is for you. To order a brochure, use the coupon on page 66. To apply for a trip, use the form on page 64. ♦ Leader approval is required for all international trips. Please note that international trips are tier-priced; see page 67 for an explanation of tier-pricing.Trip prices do not include airfare. ♦ Our **1992 Domestic Winter Outings** are listed on page 65.

AFRICA

Kenya Coast and Wildlife Safari: From Lamu to the Maasai Mara—February 7–20, 1992. This multifaceted trip offers much more variety than the usual safari. We will explore the attractions of Nairobi, Mombasa, and ancient Islamic Lamu, which has retained its historic character. Our experiences will include gameviewing and birdwatching at Tsava, Shimba Hills, and Maasai Mara; snorkeling and dhow sailing on the Indian Ocean, and taking the overnight train on the colorful "lunatic express" from Mombasa to Nairobi. *Leader: Ruth Dyche. Price: $3,605 (10–12) / $3,840 (9 or fewer); Dep: $200.* **[92548]**

Madagascar Revisited—April 16–May 3, 1992. Often referred to as "The Mysterious Island at the End of the Earth," Madagascar is a land of stark contrasts: rainforests, thorny deserts, pristine beaches, magnificent barrier reefs, and lush, grassy plains. Traveling by plane, train, bus, and outrigger canoe, we will visit the habitat of the endangered lemurs, distant relatives to monkeys, apes, and humans. We will also encounter rare birds, bats with three-foot wingspans, and beautiful orchids found nowhere else on Earth. We'll stay in first-class hotels as well as primitive, backcountry accommodations. Come prepared for it all! *Leader: Patrick Colgan. Price: $3,735 (12–15) / $3,990 (11 or fewer); Dep: $200.* **[92590]**

Vervet monkey, Kenya

Portrait of Kenya: A Leisurely Photo Safari—June 22–July 4, 1992. Kenya's abundant and diverse wildlife, hospitable people, and dramatic scenery provide an idyllic setting for our African safari. Photo opportunities are limitless as we travel from Nairobi off the beaten path for a unique exploration of the premier game preserves of Samburu, Nakuru, Maasai Mara, and Mt. Kenya National Park. Accommodations will be in field camps or lodges. Prior photographic experience is not necessary, and no strenuous hiking is planned. *Leader: Carolyn Castleman. Price: $3,230 (12–15) / $3,485 (11 or fewer); Dep: $200.* **[92625]**

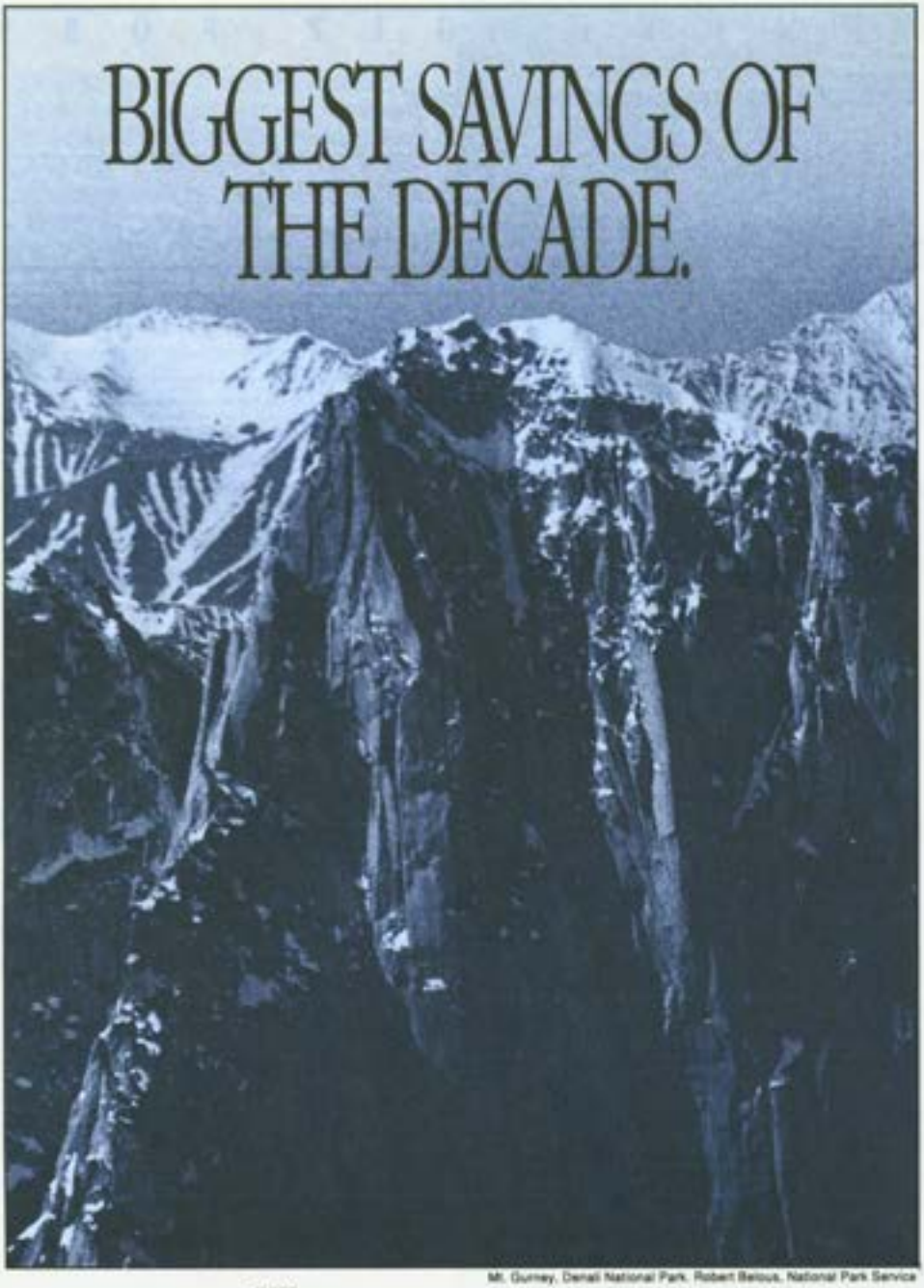
Aardvarks to Zebras: A Safari to Kenya's Game Parks and Preserves—July 25–August 9, 1992. Extraordinary wildlife in dramatic settings will be the focus of our trip to Kenya, where we will also enjoy meeting hospitable people. Starting our safari in Nairobi, we'll take in many prime game preserves, including Maasai Mara, Lake Nakuru, Maralal, Lake Turkana, and Samburu. Tribespeople and a naturalist will help us learn about Kenya's fauna, flora, history, and culture. Accommodations will be in campgrounds, and no strenuous hiking is anticipated. *Leader: J. Victor Monke. Price: $3,475 (12–15) / $3,730 (11 or fewer); Dep: $200.* **[92640]**

TRIP PRICES DO NOT INCLUDE AIRFARE.

ASIA

Rajasthan Desert Kingdoms, India—September 14–October 2, 1991. This trip to the fascinating Indian state of Rajasthan could be your adventure of a lifetime. We'll combine touring with a four-day camel safari across the remote dunes of the Thar

BIGGEST SAVINGS OF THE DECADE.



Mt. Gurney, Denali National Park. Robert Belous, National Park Service

With the passage of the Alaska National Interest Lands Conservation Act, nearly 104 million acres of pristine wilderness have been saved. These lands have escaped exploitation. And will continue to be home to the caribou, the grizzly and the dreams of generations to come.

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Desert. Then we'll visit the enchanting cities of Jaipur and Jodhpur, the desert citadel of Jaisalmer, and the luxurious lake city of Udaipur. Our trip begins and ends in New Delhi. *Leader: Bob Madsen. Price: $2,360 (12–15) / $2,610 (11 or fewer); Dep: $200.* **[92501]**

Happy Birthday, Confucius! China Walking and Study Tour—September 25–October 14, 1991. The focus of our fascinating tour is the celebration of Confucius' 2,542nd birthday in Qufu, his hometown and the center of Confucianism, the heart and soul of Chinese philosophy and culture. We'll also visit the Great Wall and the Forbidden City, and have the option to climb Tai Shan, the holiest of mountains. Among many exciting attractions, perhaps what we'll enjoy most are honest, open discussions with the Chinese people—even during today's trying times. *Leader: Phil Gowing. Price: $2,605 (12–15) / $2,860 (11 or fewer); Dep: $200.* **[92505]**

Annapurna Circuit, Nepal—October 5–31, 1991. Three features make this one of Nepal's finest treks: unsurpassed alpine scenery, 16,000 vertical feet of distinct life zones, and remarkable cultural diversity. In 23 trekking days we will pass subtropical jungle, a frozen lake, villages, and two great Himalayan gorges while the 26,000-foot peaks of the Dhaulagiri and Annapurna massifs tower above us. *Leader: Jerry Clegg. Price: $2,175 (12–15) / $2,385 (11 or fewer); Dep: $200.* **[92515]**

Kangchenjunga: Guardian Spirit of the Great Snows, Nepal—November 4–December 4, 1991. From afar, Kangchenjunga (28,168 feet) resembles a frozen jewel gleaming in bright, cold light. Inaccessible to foreigners for many years, the remote massif offers some of the best trekking in the Himalaya. We'll approach it through rugged canyons knifed by turbulent rivers, dense rhododendron forests, steep ridges, and high yak pastures. Our leisurely paced, moderate trek gives us time to visit villages along the way. *Leader: Patrick Colgan. Price: $2,560 (12–15) / $2,795 (11 or fewer); Dep: $200.* **[92520]**

Clockwise from top: Mt. Cholatse, Nepal; Kaven tribeswoman, Thailand; Phuctal Monastery, Zanskar, India; Zanskar, India

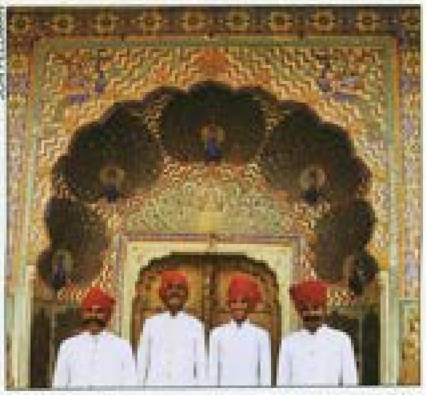
Langtang Holiday Trek, Nepal—December 21, 1991–January 3, 1992. Just south of the Tibetan border is Nepal's Langtang National Park, site of our trek among high Himalayan peaks (Langtang Lirung is 23,770 feet), deep valleys, glaciers, and Buddhist villages. We'll encounter Tibetans and make friends with our native staff. Our highest camp is at Kyangin *gomba* (12,200 feet). We will also explore the temples, shrines, squares, narrow lanes, and markets of Kathmandu. This mysterious city and our trek make for an unforgettable holiday experience. *Leader: Kern Hildebrand. Price: $1,355 (12–15) / $1,520 (11 or fewer); Dep: $200.* **[92535]**

A Journey to Thailand: Temples, Hills, and Beaches—February 11–27, 1992. Thailand is an enchanting Buddhist kingdom with an abundance of attractions: palaces, temples, archaeological wonders, markets, mountains, beaches, and tribal cultures. After experiencing the palaces and temples of Bangkok, we'll head north to Chiang Mai to trek among the hill tribes and stay in villages. We'll conclude our trip in the south, where we'll swim and hike on the islands of Phuket and Phi Phi. *Leader: Wayne Martin. Price: $2,230 (9–11) / $2,490 (8 or fewer); Dep: $200.* **[92550]**

Annapurna Chitwan Trek, Nepal—March 2–20, 1992. Spring comes early to Nepal, and Nepal's national flower, the rhododendron, will be in full bloom during our moderate trek along the southern slopes of the Annapurna Himal. We'll enjoy close-up views of some of the most extraordinary mountains on Earth. After the trek, we will visit Royal Chitwan National Park for three days of elephant safaris and jungle walks. Time has been scheduled to explore the wonders of the Kathmandu Valley. *Leader: Peter Owens. Price: $1,710 (12–15) / $1,900 (11 or fewer); Dep: $200.* **[92570]**

Japanese Alps and Country Inns—April 6–18, 1992. Head west to the "Land of the Rising Sun," where the cherry blossoms should be in full bloom and the alps still snowcapped. We will travel from Tokyo via train and bus to Nikko, Mt. Fuji, and across the alps to Takayama and Kanazawa on the Sea of Japan. Picturesque Kyoto will be our final stop before we bid *sayonara*. Accommodations will be in inns, a hot springs resort, and a 650-year-old temple. *Leader: Carolyn Castleman. Price: $3,370 (12–15) / $3,625 (11 or fewer); Dep: $200.* **[92580]**

Manaslu Circle Trek, Nepal—May 9–June 5, 1992. From the dramatic and precipitous gorge of the Buri Gandaki River to the snows of 17,000-foot Larya La Pass, our trail travels through some of the most spectacular terrain in the Himalaya. Beginning in Gorkha and ending in Pokhara, we will circumambulate the great Manaslu massif, crowned by its beautiful 26,510-foot namesake. Our 25-day trek passes very close to the Tibetan border and through Buddhist villages rarely seen by Westerners. *Leaders: Cheryl Parkins and Peter Owens. Price: $2,310 (12–15) / $2,535 (11 or fewer); Dep: $200.* **[92600]**



City Palace guards, Jaipur, India

Batura Glacier and Nanga Parbat Treks, Pakistan—July 12–August 6, 1992. Our trip to the northwest frontier of Pakistan will include two 8-day treks. The first explores the 30-mile-long Batura Glacier in upper Hunza, which offers unforgettable views of the 25,000-foot Batura peaks. The second trek starts in the Astore Valley beneath the sheer face of 26,600-foot Nanga Parbat, the world's ninth-highest peak. Between our two treks we will visit remote Hunza Valley, a real "Shangri-La" renowned for its long-lived inhabitants. Rakaposhi, at 25,500 feet, rises majestically above the valley's many apricot orchards. *Leaders: David Horsley and Peter Owens. Price: $2,705 (12–15) / $2,960 (11 or fewer); Dep: $200.* **[92635]**

TO APPLY FOR A TRIP, USE THE APPLICATION FORM ON PAGE 64.

Southern Dolpo: Pokhara to Jumla, Nepal—October 5–November 7, 1992. At the edge of the Tibetan Plateau in the Himalayan rain shadow lies beautiful Dolpo—the legendary "Hidden Land," closed to trekkers for years. Our journey into this wild and crystalline landscape begins as we head west from Pokhara. Crossing the Dhaulagiri range at Jang La (14,800 feet), we gain access to a world of rugged people and remote monasteries—including Ringmo *gomba* on the shores of unearthly Phoksumdo Lake. Our highest elevation will be 16,800 feet at Kagmara Pass. *Leader: Cheryl Parkins. Price: $2,805 (12–15) / $3,060 (11 or fewer); Dep: $200.* **[92665]**

Annapurna Sanctuary and Royal Chitwan Park Jungle Safari, Nepal—November 11–December 3, 1992. Begining our trip in the magical city of Kathmandu, we'll explore its fascinating temples and bazaars. Then our moderate trek will take us into the wondrous Annapurna Sanctuary, where we will be surrounded by 26,000-foot peaks. Our highest camp will be at 13,000 feet when we hike to the Machhapuchhare and Annapurna base camps. Our adventure concludes with a visit to Royal Chitwan National Park, where we'll enjoy elephant rides in search of rhinos and tigers. *Leader: Laurie-Ann Barbour. Price: $2,100 (12–15) / $2,325 (11 or fewer); Dep: $200.* **[92675]**

Lamjung Holiday Trek, Nepal—December 19, 1992–January 1, 1993. Come spend the holiday season on this moderate 11-day trek through the charming Gurung villages located on the eastern slopes of the Annapurna range. Our route in this seldom-visited region takes us very close to Annapurna IV, Annapurna II, and Lamjung peaks. This trip emphasizes interaction with local people and our Nepalese staff. Many of our evenings will offer opportunities to join in local singing and dancing. Maximum elevation reached will not exceed 13,000 feet. *Leader: Peter Owens. Price: $1,435 (12–15) / $1,605 (11 or fewer); Dep: $200.* **[93700]**

EUROPE

England's Coast to Coast Walk: From the Irish Sea to the North Sea—May 31–June 13, 1992. Join us on a walk across the breadth of England through three of the country's most scenic national parks—the Lake

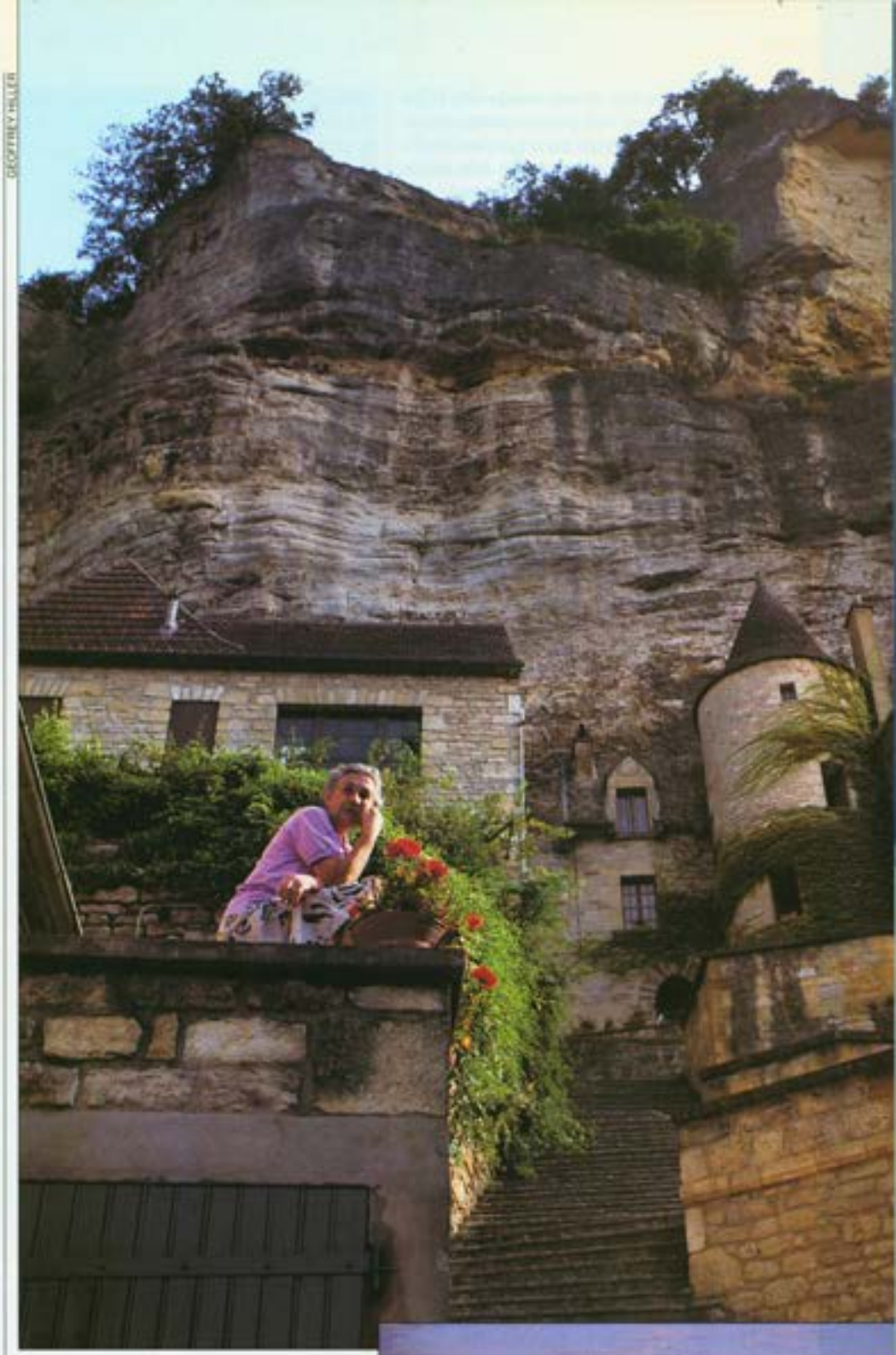
District, the Yorkshire Dales, and the North York Moors. Our moderate daily hikes will take us to the towns of Grasmere, Keld, and Robin Hood's Bay—pastoral England at its finest! Our luggage will be transported by a minibus to our overnight accommodations in comfortable lodges and bed and breakfasts, where we'll meet fellow hikers from around the world. *Leader: Lou Wilkinson. Price: $2,495 (11–14) / $2,775 (10 or fewer); Dep: $200.* **[92610]**

CENTENNIAL TRIP

***To celebrate the Sierra Club's Centennial in 1992, the National Outing Program is sponsoring special outings. Look for more Centennial Trips in the 1992 Outings Catalog to be published in the January/February issue of* Sierra.**

John Muir's Scotland—May 10–23, 1992. Enjoy two marvelous weeks exploring the Scottish Highlands, beginning at John Muir's birthplace, Dunbar, on Scotland's rolling east coast. We will travel west to the John Muir Trust Preserve on the rugged west coast's Knoydart Peninsula, where we will be treated to splendid views. Accompanied by the Preserve's delightful director and naturalist, Dr. Terry Isles, we'll visit Skye and other Inner Hebrides isles by launch. Our accommodations will be in charming small hotels, transport will be by minibus, and hikes will be varied and moderate. A special feature is an optional, strenuous hike up Ben Nevis (4,406 feet), Scotland's highest peak. Come and be bagpiped to dinner, hike in the Black Woods of Macbeth, sing and dance in a *ceilidh*, and retrace John Muir's faded footsteps across the East Lothian dunes! *Leaders: John and Jane Edginton. Price: $3,420 (12–15) / $3,675 (11 or fewer); Dep: $200.* **[92605]**

Adventure in Iceland: Hiking the Western Peninsula—June 24–July 8, 1992. Come to Iceland, country of volcanic fire, remote fjords, and glacial ice! We'll visit the western peninsula of Skagi, home to Iceland's legendary trolls. Proceeding by foot and minibus,



Clockwise from top: Dordogne, France; Robin Hood's Bay, England; an abandoned chalet in Breheimen, Norway

we combine two 3-day knapsack trips with dayhikes and an excursion to see Lake Myvatn's rich bird life. Iceland's geological history comes to life when we climb the crater Grabrok and hike to remote fjords. Lodging is in mountain huts and country inns. *Leader: Ellie Strodach. Price: $2,920 (9–11) / $3,180 (8 or fewer); Dep: $200.* **[92630]**

Trolls and Fjords of Norway—August 17–27, 1992. Our adventure begins with an eight-day hiking trip through the "Home of the Trolls"—the mountainous Trollheimen region in west-central Norway. Daypacks can be light because well-staffed mountain huts will supply comfortable beds and hearty Norsk food. We'll end our hike with a visit to the jewel-like valley of Innerdalen, then travel by bus and boat through fjord country, where towering peaks plunge to narrow waters. Hikers in moderately good condition are welcome. *Leader: Kathie Brock. Price: $2,010 (12–15) / $2,260 (11 or fewer); Dep: $200.* **[92645]**

Mountains of Contrast: The Diverse Dolomites, Italy—August 31–September 13, 1992. The Dolomites offer a multitude of contrasts—geological, cultural, and scenic—from towering peaks to peaceful meadows and photogenic hamlets. Our walks, averaging seven miles each, will include vigorous mountain hikes as well as casual village rambles. Accommodations in family-run hotels and *refugios* and quiet moments to sketch a favorite view or sip a cappuccino complete this special mountain journey. *Leader: Wayne Martin. Price: $2,620 (12–15) / $2,875 (11 or fewer); Dep: $200.* **[92655]**

The Dordogne: Its History, Culture, and Ecology, France—September 7–17, 1992. As guests of an environmental education center at Sireuil (near Les Eyzies), we will leisurely explore the history and culture of the fabled Dordogne region on foot and by minibus. We'll visit cave dwellings to see prehistoric painted figures and sculptures; tour fortified villages, riverbank chateaux, farms, markets, and cottage industries; and sample some of the valley's fine restaurants. A special treat will be an overnight canoe trip on the Vézère River. Environmentalists will meet with us to discuss local concerns. *Leader: Elaine Adamson. Price: $2,120 (12–15) / $2,375 (11 or fewer); Dep: $200* **[92660]**

Romania's Fall Colors—October 5–17, 1992. Romania's variety of fall colors is rivaled only by its kaleidoscope of cultures: Roman, Turkish, and Hungarian. We'll visit Bucharest before traveling to Transylvania, where we'll tour ancient castles and take a ski lift to 7,000 feet for three days of hut-to-hut hiking (we'll need to carry only daypacks). Then we'll travel by train to Constanta, where we'll relax on the beaches and take a short evening cruise. *Leader: Jim Halverson. Price: $1,835 (11–14) / $2,080 (10 or fewer); Dep: $200.* **[92670]**

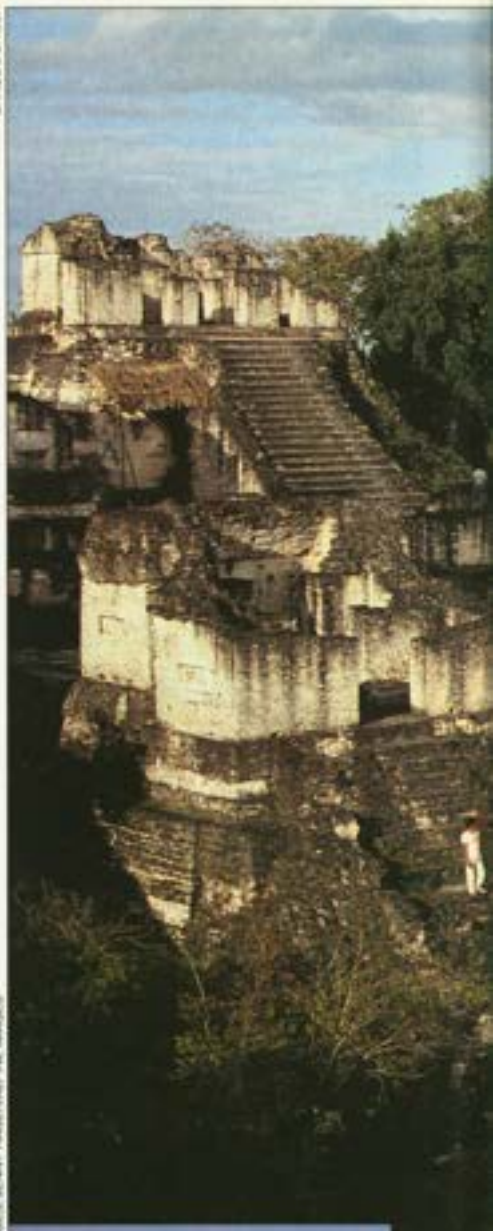
LATIN AMERICA

Brazil's Amazon Basin and Pantanal: Nature's Wonders—September 19–28, 1991. Our adventure begins in Manaus, heart of the Amazon River Basin. Here we'll explore the jungle waterways by canoe and hike on trails to observe the flora. We'll spend a night in Brasilia before continuing to the Pantanal, rich in wildlife and home to more than 600 species of birds. From our lodge, we'll travel through the area by boat, horseback, and on foot. A highlight is a visit to the nesting place of thousands of birds. *Leader: John Garcia. Price: $2,265 (12–15) / $2,520 (11 or fewer); Dep: $200.* **[91870]**

River Rafting, Jungle, and Beach Adventure, Costa Rica—October 20–26, 1991. Whitewater rapids, deep jungle canyons, and clear, inviting pools are yours to enjoy on an exciting three-day raft trip on the Rio Pacuare. Then we fly to Manuel Antonio National Park for hikes in the rainforest to observe the wildlife. Pacific beaches invite us to sun, swim, and snorkel. In San Jose we'll visit museums and a nearby volcano. A naturalist will accompany us. *Leader: J. Victor Monke. Price: $1,835 (12–15) / $2,075 (11 or fewer); Dep: $200.* **[92513]**

Discover the End of the Earth: Patagonia and Tierra del Fuego, Argentina—November 12–28, 1991. Patagonia, at the southern tip

PLEASE READ THE RESERVATION AND CANCELLATION POLICY ON PAGES 66-67 BEFORE SENDING IN YOUR APPLICATION.



CAROL DENGLER

Left to right: JENNY HAGER/ALPINE IMAGES; BUD BOLLOCK; JENNY HAGER/ALPINE IMAGES; JENNY HAGER/ALPINE IMAGES

of South America, is a land of windswept pampas, jagged Andean peaks, and deep glacial fjords. We'll view southern right whales and Magellan penguins at Peninsula Valdez, marvel at surging Moreno Glacier and the Fitzroy Massif in Glacier National Park, and enjoy birdwatching in Tierra del Fuego, where we'll explore the Beagle Channel by sea kayak or canoe. Dayhikes are leisurely to moderate. Except for three nights of camping, we'll stay in hotels. Small boat experience is required. *Leader: Carol Dienger. Price: $3,125 (12–15) / $3,380 (11 or fewer); Dep: $200.* **[92525]**

Thanksgiving in Belize: Reef and Ruins, Central America—November 23–December 2, 1991. Using a ranch as our base, we'll explore Belize's lush interior and visit the magnificent ruins of Tikal in neighboring Guatemala. Moving to the Caribbean coast, we'll stay on a palm-studded island near a fascinating barrier reef. There we'll snorkel in clear water, learn about local conservation issues, and feast on fresh seafood! *Leader: Margie Tomenko. Price: $1,800 (12–15) / $2,025 (11 or fewer); Dep: $200.* **[92530]**

Holidays in Belize: Reef and Ruins, Central America—December 22–31, 1991. See description for trip #92530 above. *Leader: Peter Owens. Price: $1,800 (12–15) / $2,025 (11 or fewer); Dep: $200.* **[92540]**

Holiday Kayaking in the Sea of Cortez, Baja California, Mexico—December 23–29, 1991. Espíritu Santo and Partida islands lie in the Gulf of California north of La Paz. We'll explore sandy coves and inlets (excellent fishing and snorkeling), hike hidden canyons, enjoy fascinating geology and desert vegetation, and spend a day visiting Los Islotes, a sea lion rookery. Beginning to expert paddlers are welcome. Instruction will be provided, and a support boat will accompany us. Weather may be variable. *Leader: Harry Neal. Price: $1,220 (11–14) / $1,300 (10 or fewer); Dep: $200.* **[92545]**

Clockwise from top: Tikal, Guatemala; red poison dart frog, Costa Rica; sea lion, Los Islotes, Mexico; Sally Lightfoot crab, Galápagos Islands; sea-kayaker, Espíritu Santo, Mexico

Belize: Reef and Ruins, Central America—February 15–24, 1992. See description for trip #92530 above. *Leader: Lola Nelson-Mills. Price: $1,865 (10–12) / $2,085 (9 or fewer); Dep: $200.* **[92553]**

Magdalena Bay Whale-Watching, Baja California, Mexico—February 16–22, 1992. Imagine yourself in a 12-foot sea kayak paddling in the midst of a pod of California gray whales as they play, rest, and calve in their winter home. Explore mangroves and hunt for shells along the dunes and shoreline of the bay's barrier islands. This trip is suited for both novice and expert paddlers. Basic paddling instruction is provided. *Leader: Jon Kangas. Price: $1,295 (11–14) / $1,375 (10 or fewer); Dep: $200.* **[92555]**

The River of Ruins: An Archaeological Adventure by Paddle-Raft, Mexico—March 14–24, 1992. Come explore ancient Mayan ruins in a verdant jungle setting. Before setting foot in our paddle-rafts for a trip down the fabled Usumacinta River, we'll marvel at Palenque's ancient splendor and view the famous murals at Bonampak. At Yachilan, we'll enjoy an evening in an old Mayan courtyard lit by a full moon and thousands of fireflies. How can we help but feel the presence of Mayan spirits? We will be accompanied by an archaeologist. *Leader: John Garcia. Price: $2,710 (12–15) / $2,965 (11 or fewer); Dep: $200.* **[92575]**

A Sailing Sojourn in the British Virgin Islands for Artists and Photographers—April 16–23, 1992. Come sail among the mountainous British Virgin Islands aboard a 50-foot yacht, with time scheduled to photograph or draw the remarkable scenery. We will also hike through tropical forests, snorkel over coral reefs, and relax on white sand beaches. Our trip starts on the main island of Tortola; we'll explore a different island each day and anchor in coves at night. No sailing experience is necessary. *Leader: Chuck Blouin. Price: $2,205 (6–8) / $2,625 (5 or fewer).* **[92585]**

Costa Rica: River Rafting, Jungle and Beach Adventure—April 18–25, 1992. Because of its ecological diversity and national conservation consciousness, Costa Rica is a naturalist's paradise. We'll raft the Pacuare and Reventazon rivers for three days, enjoying whitewater, waterfalls, and jungle wildlife. Then we journey south to Manuel Antonio National Park, where jungle and the Pacific meet. Here we'll hike in the rainforest to observe the extraordinary wildlife and snorkel in the warm ocean waters to see the myriad tropical fish. *Leader: Carolyn Braun. Price: $1,935 (12–15) / $2,190 (11 or fewer); Dep: $200.* **[92595]**

Important Information on Sierra Club Outings

1. All reservations, including those confirmed pending leader approval, are subject to the reservation/cancellation policy of the Outing Committee.

2. A signed liability release is required for all international trip participants.

3. All participants age 12 and over must be Sierra Club members to attend an outing.

4. Your address may be released to other trip participants for purposes of ride-sharing or other trip-related purposes.

5. Not all trips can accommodate special dietary needs or preferences. Contact the leader for this information before applying.

6. Applications for trip space will be accepted in the order they are received at the following address:

Sierra Club Outing Dept.
Dept. #05618
San Francisco, CA 94139

7. Please do not send Express Mail to this address. Doing so will delay your application.

Outing Reservation Form

MEMBERSHIP NUMBER	TRIP NUMBER	TRIP NAME	DEPARTURE DATE

YOUR NAME	HAVE YOU RECEIVED THE DETAILED TRIP BROCHURE? YES ❑ NO ❑
STREET ADDRESS	YOUR HOME PHONE: ( )
CITY STATE ZIP	YOUR WORK PHONE: ( )

PLEASE PRINT YOUR NAME AND THE NAMES OF OTHER PEOPLE IN YOUR PARTY	MEMBERSHIP NUMBER	AGE	RELATIONSHIP	NUMBER OF OUTINGS YOU'VE BEEN ON: CHAPTER	NATIONAL	YEAR OF LAST NATIONAL OUTING
1.			SELF			
2.						
3.						
4.						

PER PERSON COST OF OUTING:	TOTAL COST OF THIS APPLICATION:	DEPOSIT ENCLOSED:	FOR OFFICE USE ONLY:

PLEASE MAKE CHECK PAYABLE TO SIERRA CLUB
MAIL TO: SIERRA CLUB OUTING DEPARTMENT, DEPT. #05618, SAN FRANCISCO, CA 94139

Endangered Forests of Costa Rica and the Ecuadorean Amazon—June 1–14, 1992. This trip is a special opportunity to experience the variety and wonder of three endangered tropical ecosystems. In Costa Rica, we'll visit the cloud forest at Monteverde and a unique Pacific dry forest. Then we fly to Ecuador and camp in an Amazon rainforest at the Cuyabepo Nature Reserve. Skilled guides will help us identify the flora and fauna and describe local ecology. We'll also observe and discuss the impact of the human population on these areas. *Leader: Wheaton Smith. Price: $2,890 (12–15) / $3,225 (11 or fewer); Dep: $200.* **[92615]**

A Holiday Adventure: Rio de Janeiro and the Rainforests of Brazil—December 20–31, 1992. Discover the magnificence of Rio de Janeiro's natural beauty on Ilha Grande—an island paradise set in a turquoise sea—and in mountainous Itatiaia, Brazil's oldest national park, famed for its granite peaks. We'll camp on Ilha Grande's isolated white sand beaches and take moderate hikes through remnants of Brazil's coastal rainforest. We'll also camp in Itatiaia, where we'll stroll in 8,000-foot meadows. Christmas will be spent in Paraty, an exquisite Portuguese colonial town, and New Year's Eve on exotic Copacabana beach. *Leader: Gail Solomon. Price: $2,800 (12–15) / $3,055 (11 or fewer); Dep: $200.* **[92680]**

MEDITERRANEAN

Egypt and the High Sinai—October 12–26, 1992. Our two-week trip to Egypt includes visits to the great antiquities of the Nile Valley as well as a trek in the high desert mountains of the Sinai. Highlights include tours of Luxor, Aswan, and the Pyramids; a felucca sail on the Nile; wandering through the Cairo bazaar; snorkeling in the Red Sea; and a tour of the Santa Catarina Monastery beneath Mt. Sinai. Bedouin guides and camels will accompany our Sinai trek. *Leader: Ginger Harmon. Price: $2,465 (12–15) / $2,715 (11 or fewer); Dep: $200.* **[92510]**

SOVIET UNION

Backdoor to the Silk Road, Soviet Union and China—September 19–October 8, 1991. Explore the exotic, ancient, and rarely visited cultures of Dzhambul, Chimkent, and Turkestan on the northern Silk Road that passes through Soviet Kazakhstan. At Alma Ata we'll enjoy hiking through Tien Shan's majestic alpine vistas before we continue across the Chinese frontier to Urumchi on the southern Silk Road route. Kashi's Sunday market, as in caravan days, is dominated by colorful traders from afar. Our gateway to this journey is Moscow, where sightseeing and theater complement our grand adventure. *Leader: Bud Bollock. Price: $3,345 (12–15) / $3,600 (11 or fewer); Dep: $200.* **[92500]**

The Soviet Far East—August 18–September 6, 1992. By charter boat and specially arranged hikes in the taiga, we'll explore the ecological diversity of Lake Baikal, the second largest lake in the world. We'll also delight in the charms of Irkutsk, where the Decembrist exiles wedded Slavic and Siberian cultures. We'll see how the dynamic entrepot of Kahabarovsk is coming of age on the Pacific Rim. Boarding the Trans-Siberian Railway, we'll travel to fascinating Birodizian, home to many Soviet Jews. Accommodations include campgrounds and comfortable hotels. *Leader: Bob Madsen. Price: $3,720 (12–15) / $3,975 (11 or fewer); Dep: $200.* **[92650]**

SOVIET EXCHANGE TRIP

Lake Baikal Service Trip, Soviet Union—June 9–28, 1992. This is a first-time-ever, sterling opportunity for Club members to participate in an exchange service trip near Lake Baikal in southwestern Siberia. We will be hosted by the Irkutsk Ecological Center, and our project includes trail building, fodder-stand and salt-site renovation for wild animals, and campsite cleanup. We will have ample time to socialize with our hosts, not only at work but also in their homes. Together, we'll hike, attend festivals and ecological seminars, and enjoy a short cruise on Lake Baikal. By taking part in this trip, Club members will enable eight Soviet citizens to come to the United States and join a service trip in the High Sierra. *Leader: Bud Bollock. Price: $1,635 (not tier priced); Dep: $200.* **[92620]**

1992 Domestic Winter Outings

Everglades Park Family Trip, Florida—December 28, 1991–January 2, 1992. Come enjoy the "River of Grass": We will canoe through dense mangrove, man-made canals, muddy lakes, and sawgrass prairie, and hike on jungle trails. Whether canoeing or hiking, there will be much wildlife to observe in this unique ecosystem. Suitable for children six years of age and older. Leader approval required. *Leader: Martin Joyce. Price: adult $295, child $200; Dep: $100 per family.* **[92470]**

Cross-Country Skiing in Copper Country, Michigan—February 2–9, 1992. Ski the Midwest's finest—the rugged hills and woodlands of the Copper Country at the tip of Keweenaw Peninsula on Lake Superior. The annual snowfall here is about 250 inches, and there are wilderness trails in this remote winter wonderland for all levels of skiers. We'll delight in skiing from the front doors of our modern cabins. Leader approval required. *Leader: Donna Small. Price: $520; Dep: $100.* **[92471]**

Gunflint Trails, Boundary Waters Canoe Area Wilderness/Superior Forest, Minnesota—February 9–14, 1992. Glide through the silence and sparkle of a Northwoods winter on the rugged edge of the Boundary Waters, where the snow comes early and lingers late. Groomed trails lead from our cabins into the heart of the lake country. Enjoy the optional challenge of camping out overnight—then indulge yourself in a sauna. This trip is for intermediate skiers and adventurous novices. Leader approval required. *Leader: Sarah Reinke. Price: $550; Dep: $100.* **[92472]**

Florida Trail Odyssey: Ocala Forest—February 23–29, 1992. Warm days and cool nights make this moderate winter hike a perfect cure for cabin fever. Expect variety on this 65-mile trail: We'll pass by ponds, cross cypress and gum swamps on boardwalks, traverse longleaf-pine forests and clusters of dwarf liveoaks, and see wildlife from songbirds to black bears. Leader approval required. *Leader: Carolyn Williams. Price: $345; Dep: $50.* **[92473]**

Reservation & Cancellation Policy

Eligibility: Our trips are open to Sierra Club members, applicants for membership, and members of organizations granting reciprocal privileges. You may include your membership application and fee with your reservation request.

Children must have their own memberships unless they are under 12 years of age.

Unless otherwise specified, a person under 18 years of age may join an outing only if accompanied by a parent or responsible adult or with the consent of the leader.

Applications: One reservation form should be filled out for each trip by each person; spouses and families (parents and children under 21) may use a single form. Mail your reservation, together with the required deposit, to the address below. No reservations will be accepted by telephone.

Reservations are confirmed on a first-come, first-served basis. However, when acceptance by the leader is required (based on applicant's experience, physical condition, etc.), the reservation is confirmed subject to the leader's approval, for which the member must apply promptly. When a trip is full, later applicants are put on a waitlist.

Give some thought to your real preferences. Some trips are moderate, some strenuous; a few are only for highly qualified participants. Be realistic about your physical condition and the degree of challenge you enjoy.

The Sierra Club reserves the right to conduct a lottery in order to determine priority for acceptance in the event that a trip is substantially oversubscribed shortly after publication.

Reservations are accepted subject to these general rules and to any specific conditions announced in the individual trip brochures.

Deposit: A deposit is required with every trip application. The amount of the deposit varies with the trip price, as follows:

Trip price per person	*Deposit per person*
Up to $499	*$50 per individual (with a maximum of $100 per family on family trips)*
$500 to $999	*$100 per individual*
$1,000 and above	*$200 per individual*

The deposit is applied to the trip price when the reservation is confirmed. All deposits and payments should be in U.S. dollars.

Payments: Generally, adults and children pay the same price; some exceptions for family outings are noted. You will be billed upon receipt of your application. Full payment of trip fee is due 90 days prior to trip departure. Trips listed in the "International" section require additional payment of $300 per person six months before departure. Payments for trips requiring the leader's acceptance are also due at the above times, regardless of your status. If payment is not received on time, the reservation may be canceled and the deposit forfeited.

No payment (other than the required deposit) is necessary for those waitlisted. The applicant will be billed when placed on the trip.

The trip price does not include travel to and from the roadhead or specialized transportation on some trips (check trip brochure). Hawaii, Alaska, and International trip prices are all exclusive of airfare.

Transportation: Travel to and from the roadhead is your responsibility. To conserve resources, trip members are urged to form carpools on a shared-expense basis or to use public transportation. On North American trips the leader will try to match riders and drivers. On some overseas trips you may be asked to make your travel arrangements through a particular agency.

Infrequently the Sierra Club finds it necessary to cancel trips. The Club's responsibility in such instances is limited in accordance with the Trip Cancellation Policy. Accordingly, the Sierra Club is not responsible for nonrefundable airline or other tickets or payments or any similar penalties that may be incurred as a result of any trip cancellation.

Confirmation: A reservation is held for a trip applicant, if there is space available, when the appropriate deposit has been received by the Outing Department. A written confirmation is sent to the applicant. Where leader approval is not required, the confirmation is unconditional. Where leader approval is required, the reservation is confirmed subject to the leader's approval. If there is no space available when the

For More Details on Outings

Outings are described more fully in trip brochures, which are available from the Outing Department. Trips vary in size, cost, and the physical stamina and experience required. New members may have difficulty judging which trips are best suited to their abilities and interests. Don't sign up for the wrong one! Ask for the trip brochure before you make your reservations to save yourself the cost and inconvenience of changing or canceling a reservation. The first three brochures are free. Please enclose 50 cents apiece for extras. Write or phone the trip leader if any further questions remain.

NAME_____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

❑ Please send me brochures for the following trips (order by number):

#_____ #_____ #_____

Enclosed is $_____ for extra brochures at 50 cents each.

DO NOT MAIL CASH. #3

Clip coupon and mail to: **Sierra Club Outing Department,** 730 Polk St., San Francisco, CA 94109

application is received, the applicant is placed on the waitlist and the deposit is held pending an opening. When a leader-approval trip applicant is placed on the waitlist, the applicant should seek immediate leader approval so that in the event of a vacancy the reservation can be confirmed. When a person with a confirmed reservation cancels, the person at the head of the waitlist will automatically be confirmed on the trip, subject to leader approval on leader-approval trips. The applicant will not be contacted prior to this automatic reservation-confirmation except in the three days before trip departure.

Refunds: You must notify the Outing Department directly during working hours (weekdays 9–5; ph. 415-923-5630) of cancellation from either the trip or the waitlist. The amount of the refund is determined by the date that the notice of cancellation by a trip applicant is received at the Outing Department. The refund amount may be applied to an already-confirmed reservation on another trip.

A cancellation from a leader-approval trip will be treated exactly as a cancellation from any other type of trip, whether the leader has notified the applicant of approval or not.

The Outing Committee regrets that it cannot make exceptions to the Cancellation Policy for any reason, including personal emergencies. Cancellations for medical and other reasons are often covered by traveler's insurance, and trip applicants will receive a brochure describing this type of coverage. You can also obtain information regarding other plans from your local travel or insurance agent. We encourage you to acquire such insurance.

Trip leaders have no authority to grant or promise refunds.

Transfers: For transfers from a confirmed reservation made 14 or more days prior to the trip departure date, a transfer fee of $50 is charged per application.

Transfers made 1 to 13 days prior to the trip departure date will be treated as a cancellation, and the Cancellation Policy will apply. No transfer fee is charged if you transfer from a waitlist.

A complete transfer of funds from one confirmed reservation to another, already-held, confirmed reservation will be treated as a cancellation, and will be subject to cancellation fees.

Medical precautions: On a few trips, a physician's statement of your physical fitness may be needed, and special inoculations may be required for international travel. Check with a physician regarding immunization against tetanus.

Emergency care: In case of accident, illness, or a missing trip member, the Sierra Club, through its leaders, will attempt to provide aid and arrange search and evacuation assistance when the leader determines it is necessary or desirable. Costs of specialized means of evacuation or search (helicopter, etc.) and of medical care beyond first aid are the financial responsibility of the ill or injured person. Since such costs are often great, medical and evacuation insurance is advised, as the Club does not provide this coverage for domestic trips. Participants on international outings are covered by limited medical, accident, and repatriation insurance. Professional medical assistance is not ordinarily available on such trips. Be sure your insurance covers you in the countries involved.

The leader is in charge: At the leader's discretion, a member may be asked to leave the trip if the leader feels the person's further participation may be detrimental to the trip or to the individual.

Please don't bring these: Radios, sound equipment, firearms, and pets are not allowed on trips.

INTERNATIONAL TRIP TIER-PRICING

International Outings are tier-priced. This means a trip's price is dependent on the number of participants. Two prices are listed for a trip, showing the signup levels associated with each.

Final billing is based on the signup level at 90 days prior to the trip departure date. If the signup level goes up sufficiently between the billing and departure dates, the lower tier price will apply, and refunds will be issued after the trip is over.

Cancellations from trips where the tier price has changed are subject to our reservation and cancellation policy. All regular cancellation fees will apply.

Time or event of cancellation	Amount forfeited per person	Amount refunded per person
1) Disapproval by leader (once leader-approval information has been received) on leader-approval trips	None	All amounts paid toward trip price
2) Cancellation from waitlist, or the person has not been confirmed three days prior to trip departure	None	All amounts paid toward trip price
3) Trip canceled by Sierra Club	None	All amounts paid toward trip price
4) Cancellation from confirmed position or confirmed position subject to leader approval		
a) 90 days or more prior to trip departure date	$100 or amount of deposit, whichever is less	All amounts paid toward trip price exceeding forfeited amount
b) 60–89 days prior to trip departure date	Amount of deposit	As above
c) 14–59 days prior to trip departure date	20% of trip fee, but not less than the amount of deposit	As above
d) 4–13 days prior to trip departure date if replacement can be obtained from waitlist	30% of trip fee, plus $50 processing fee, but in no event more than 50% of total trip fee	As above
e) 4–13 days prior to trip departure date if replacement *cannot* be obtained from waitlist (or if there is no waitlist at the time of cancellation processing)	40% of trip fee, plus $50 processing fee, but in no event more than 50% of total trip fee	As above
f) 0–3 days prior to trip departure date	Trip fee	No refund
g) "No-show" at the roadhead, or if participant leaves during trip	Trip fee	No refund

Mail checks and applications (excluding those sent by express mail) to:
Sierra Club Outing Department
Dept. #05618, San Francisco, CA 94139

Mail all other correspondence (including express-mail applications) to:
Sierra Club Outing Department
730 Polk St., San Francisco, CA 94109

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VISIONARIES AND CASSANDRAS

Continued from page 56

redwood or the whale itself. We must discard our self-centeredness and "re-inhabit" the land, bending ourselves to nature's curves instead of making it bow to ours. And, most important, we must stand ready to "delay, resist, and subvert" the destruction of nature by corporations, bureaucracies, and rapacious people on every rung of the economic ladder.

To Foreman, who was arrested in 1989 by the FBI on what he claims was a set-up (an alleged conspiracy to sabotage the transmission lines from a nuclear-power reactor in Arizona), what may look like vandalism or even terrorism traces back to the Boston Tea Party, the Underground Railroad, and other deliberate acts of lawbreaking by good citizens. For eco-warriors, he asserts, the chance of being misunderstood is outweighed by the certainty that priceless ecosystems are in trouble, by the right to protect one's spiritual home, and by a critical political need to make the tactics and demands of more mainstream environmental groups look moderate by comparison.

Along with the dos and don'ts of monkeywrenching (keep a low profile, no telltale bumperstickers, no loose lips, no media stunts, no avoidable violence, etc.), Foreman serves up grand plans for preserving roadless areas and rehabilitating hard-used lands, and offers a biting insider's analysis of the legal battle to save the U.S. wilderness. He also counsels would-be monkeywrenchers on the dangers of illegal action and on the poisonous effects of self-righteousness within the ranks. Older, wiser, and a tad battle-weary, Foreman winds up his rambling, good-natured confession with a call for more humor and more vision within the environmental movement, ground rules for de-programming yuppie eco-careerists in Washington, and a look back at ten years on the

front lines with Earth First! He also reveals that he has left Earth First! because it has been taken over by those who identify "more with the left than with the conservation movement," and who are "inspired more by the writings of Abbie Hoffman than those of Edward Abbey."

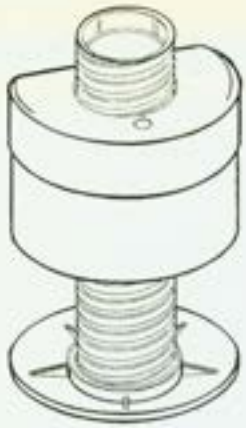
To Foreman, the question of limits involves getting fed up with wilderness destruction and deciding how far to go in battling its destroyers. To Bookchin, a progressive intellectual steeped in European history, there is no going back to the forest primeval: Saving nature means collectively greening society through municipal politics. The two men agree on what's wrong with the environment, but not on how to make changes.

We the Readers

All living things, including ourselves, have limits, and exploring them in the context of a blue-green planet that is fast turning brown has an end-of-the-millennium rightness about it. But more important is how far questions about ecological limits have already crept into the work of some of our most prominent social critics. Economist Robert Heilbroner and historian Christopher Lasch, for instance, have both recently said that it no longer makes sense to talk about the future of economic and social systems without taking environmental limits into account.

Any comprehensive syllabus of environmental literature would of course include many books not discussed here, and in the future entirely new genres will likely bloom. Green themes will continue to seep from academic writings into mainstream thought, and anyone putting together an environmental booklist 20 years from now will find the pickings even more eclectic than they are today. In the struggle to heal the planet's wounds, that's good news. ■

Kathleen Courrier *is publications director of the World Resources Institute in Washington, D.C., and co-editor of Beacon Press/WRI Guides to the Environment.*



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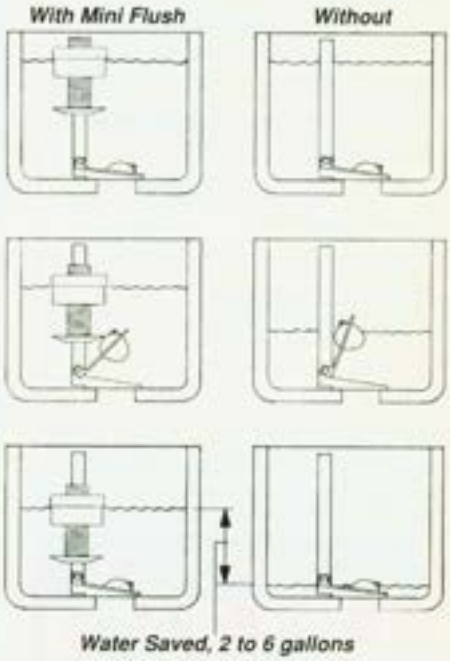

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A sign of distress in Wallace, next stop on Louisiana's Chemical Corridor.

A Town Fights for Its Life

WALLACE, LOUISIANA

FOR 85 MILES along the eastern bank of the Mississippi River between Baton Rouge and New Orleans, Louisiana's River Road skirts old plantations, predominantly black communities, and petrochemical factories, one after another. Some of the plantations have gone to seed, as have many of the towns along the road, where smoke-belching, stink-emitting, toxics-dumping plants have swept aside entire communities.

Welcome to Chemical Corridor. Here you will find impoverished people on both sides of the Mississippi whose chief claim to fame is that they have the highest rates of lung and stomach cancers in the nation. That statistic is now of particular concern to the mostly poor people of Wallace, a tiny black community on the river's west bank. In one way, Wallace appears fortunate, situated as it is on the only sizable expanse of agricultural land along the River Road corridor that hasn't been destroyed by heavy industry. But while the people here go about their business of working in the cane fields or laboring at maintenance and construction jobs, they have begun to worry about their future. The reason? A Taiwanese company, Formosa Chemicals & Fiber Corporation, has purchased one of the plantations flanking Wallace. The company, whose factories in Taiwan, the United States (including one in Baton Rouge), and elsewhere around the world are renowned polluters, plans to construct a $700-million rayon factory on its new property, and probably a giant petrochemical plant as well.

For many Wallace residents, especially those closest to the proposed site, having a new industrial neighbor would mean one of two things: either Formosa would buy them out cheaply, or they would be forced to live with constant noise, foul odors, and toxics-contaminated soil, water, and air.

"They say we can still live here," says Samuel Jackson, who was born in Wallace and lives with his family on the riverfront about 300 yards from Formosa's proposed complex, "but there would be pipes running all around us, and waste facilities in back of us."

What the operation means for the region's ecology is equally serious: The rayon plant would consume some 8,000 tons of hardwood chips per day.

Those chips might come from felled tupelo, gum, oak, bald cypress, and other trees in the already threatened bottomland hardwood swamps of the Deep South.

With some 50 percent of the nation's hardwood wetlands located in Louisiana (including some national wildlife refuge areas), the impact on the state could be severe, says Michael Caire of East Monroe. Some of the wood for the rayon plant's pulping operations could come from old-growth trees on public lands throughout the Mississippi Delta region, while perhaps the bulk would come from private lands in Louisiana that are unprotected by any reforestation law or forest-management act. "We've already lost a phenomenal amount of this wetland ecosystem," Caire says, "more on a percentage basis than has disappeared from the world's tropical rainforests."

The fear that Formosa's operations will contaminate the region and cause wetlands destruction has aroused a concerted grassroots response. The Sierra Club's Delta Chapter, the Gulf Coast Tenants Association, the National Toxics Campaign Fund, and other groups—along with people in Wallace—have made it clear to politicians and bureaucrats that the facility should be killed, not just subjected to environmental controls, which have proved inadequate elsewhere.

Activists have charged St. John the Baptist Parish officials and Louisiana Governor Buddy Roemer with railroading the Formosa project through over the objections of Wallace residents and against the advice of environmentalists. They also are angered that the Environmental Protection Agency has apparently accepted Formosa's claim that it does not intend to construct a petrochemical plant on its new site. Such plans are only speculative, the company contends, and therefore do not require an environmental impact statement. But opponents say an environmental study is necessary because the company's long-term goal has been known for some time: to use 80 percent of its site for the manufacture of PVC (a type of plastic used for pipe and food wrap), the production of which releases vinyl chloride and a host of other highly toxic chemicals. They add that the EPA's leniency with respect to the PVC facility is especially disturbing in light of Formosa's record as a "world-class environmental outlaw." In March, the EPA fined Formosa more than $3.3 million—the most ever levied against a polluter—for violating hazardous- and solid-waste laws at its plastics plant in Point Comfort, Texas, where the Sierra Club's Lone Star Chapter is fighting the company's continuing expansion.

For Samuel Jackson, a former plant worker who fears he will have to move away from the land his family has lived on for more than 100 years, it is politics as usual. "They say that it will be good for the economy," says Jackson. "But when you put in a chemical plant, the town doesn't grow. It dies."

—Hal Dean

Coal Power for the People?

HALFMOON, NEW YORK

In the 1970s, something began killing the fish in hundreds of lakes throughout New York's Adirondack Mountains. The mysterious visitor turned out to be acid rain and snow, created largely by airborne pollutants from coal-fired power plants in the Ohio River Valley. New Yorkers complained bitterly about the damage being done to their favorite fishing holes, and their elected representatives soon began fighting to force the energy industry to clean up its act.

But now New York officials are nodding approvingly at plans for a string of coal-fired power plants in their own backyard. The state government's change of heart is unfortunate, say northeastern environmental activists, because acid rain is now recognized as only a part of the fallout from such facilities.

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"Coal-burning produces hundreds of contaminants," says Grace Morton of the Sierra Club's Hudson Mohawk Group in Albany, New York. She and fellow activists from the Club's Atlantic and New England chapters cite ozone, radon, lead, mercury, arsenic, and cyanide among the hazardous effluents from such combustion. In addition, coal-fired plants release carbon dioxide (CO_2), one of the main chemical contributors to the global greenhouse effect.

For the past two years, Morton has been leading opposition to the state's first new coal-fueled power plant, a 210-megawatt installation proposed for the community of Halfmoon, some 11 miles north of Albany. If approved by the state, the facility would be constructed by Inter-Power of New York, a private firm. Activists fear that New York may authorize the company's plans even though there is no convincing evidence of a need for new electricity in the state, and despite the fact that Inter-Power has not scrutinized possible alternatives to coal.

Instead of approving new power plants, Club activists say, New York should be pursuing a comprehensive program of conservation and alternative energy. They point to a study concluding that the state could reduce its electrical consumption 45 percent through energy-efficiency measures.

Arguments for and against Inter-Power's Halfmoon plant have been aired—sometimes acrimoniously—at public hearings and in a costly media campaign. Throughout the fray, Inter-Power's constant refrain has been "state-of-the-art technology." Its new plant, the company says, would replace smokestack scrubbers with fluidized-bed combustion, a less expensive system that traps sulfur dioxide (SO_2). That compound, along with nitrogen oxides (NO_X), is formed during fossil-fuel burning, and is among the principal causes of acid rain.

Sierra Club activists aren't impressed by Inter-Power's claims. Morton points out that, far from being "clean," the plant would release 5.28 million pounds of SO_2, 3.25 million pounds of NO_X, and 4 million pounds of carbon monoxide annually. Although these emissions fall within Clean Air Act limits, they would nonetheless further affect the Adirondacks, the Berkshires in Massachusetts, and Vermont's Lye Brook Wilderness, forested areas that have already been weakened by acidification.

But of all the arguments Inter-Power is using to gain support for its plant, one of the most misleading, say activists, is its claim that Halfmoon will be a cogeneration facility. While this is technically true, only 10 percent of the energy from Halfmoon would be used to provide steam for a nearby General Electric factory. According to the Sierra Club attorney in the matter, such a ratio is too small to justify a 210-megawatt plant. While state and federal laws rightly favor cogenerators, the Club notes, they are designed to encourage limited, localized power producers—not behemoths dressed in "small-is-beautiful" garb.

As they struggle to prevent Inter-Power from building its Halfmoon facility, environmentalists feel obligated to cover all bases. While quick to reiterate that no new power plant is needed in New York in the first place, they nonetheless fault Inter-Power for failing even to assess natural gas as an alternative. A gas-fired plant would be preferable to one fueled with coal, they say, because it would emit less of the pollutants, especially less CO_2. The Clean Air Act of 1990 directs the EPA to consider the best choice of fuels before permitting a power plant to operate, Morton says, but EPA officials deny that the agency is *required* to do so, and point out that Inter-Power's permit application was filed before the new act became law. Still, environmentalists insist the EPA and the state have no choice but to quash the coal-fired plant and send the company's planners back to their drawing boards.

—Susan Borowitz and Mark Mardon

Staying Sharp on the Trail

It's those little tweezers that separate man from beast.

Reed McManus

OF ALL THE ITEMS on a backpacker's "short list," only the knife carries the weight of myth and legend. Outdoorspeople rarely develop a devotion to a favorite flashlight or a special brand of waterproof matches. But pore over the Victorinox Company's 192-page opus *The Knife—and Its History,* or flip through a cutlery catalog until you come across the rosewood-and-brass-handled, handpainted and etched blades commemorating this or that great battle, and it's obvious that knives are aimed (figuratively) at the wilderness lover's heart as much as her wallet.

If the year were 1867, I'd be less cavalier about knives. In a pinch, I'm sure I could've grabbed my eight-inch Bowie and kilt me a bar, skinned a moose, or chopped down a tree, thereby saving Ma and the young 'uns. But like most hikers today I call on my knife to perform such tasks as slicing cheddar and cutting cord. If I'm feeling particularly virile, I might try removing a splinter.

It's the exceptional uses, I was told, that warrant a more somber appreciation of knives. So I plowed through a pile of *Robinson Crusoe*–like "survival" books looking for things one could fabricate with a blade and a will to live. They're all there: a "toggle trip-release deadfall trap" for catching rabbits, underwater corrals that round up unsuspecting trout, and a variety of elaborate, painstakingly knife-hewn shelters.

But somewhere between the extremes of thin-sliced salami and backwoods tracheotomies are potentially helpful, not immediately obvious uses for knives. By shaving small, downed branches, you can create effective kindling called "feather sticks." If you're out of matches, you may be able to create a spark by scraping your knife across the flint of a waterproof matchbox. If you're caught in snow without sunglasses or goggles, you can carve a slit in a piece of bark and string it around your head to protect yourself from snow blindness. You can hew branches into splints, sharpen sticks into tent pegs, and dig "cat holes" in the woods.

Hikers and backpackers have made their top choice the multipurpose pocket knife. These are generically known as Swiss Army knives, although only knives made by two Swiss companies, Victorinox and Wenger, are emblazoned with the "official" Swiss cross. (Wenger knives are also sold as "SwissBucks" by a U.S. company, Buck Knives.) Sporting as many as 19 tools with 29 functions, Swiss Army knives can perform, with varying degrees of success, all the real and imagined tasks noted above. At a little more than two inches long, the main blade is too petite to satisfy hunter-killer aspirations, but what this knife lacks in brawn it makes up for in practical nerdiness. You may never know what some of those tools do, but you'll have them, *just in case.*

JOHN CUNEO

To be of use to campers, a pocket knife should have one large blade and a pair of scissors (for cutting moleskin). The tools usually piggybacked with these may come in handy, but perhaps not in wilderness settings: a small screwdriver/can opener, a large screwdriver/bottle opener/wire stripper combination, a corkscrew, a reamer, a toothpick, and removable tweezers (which usually disappear within weeks of purchase). Screwdrivers (both standard and Phillips) will be useful for cyclists and boaters, probably less so for hikers. A knife like this should weigh three ounces or so and cost about $30; a bare-bones model with just a few tools will cost approximately $15.

Keep upgrading and you may find yourself carrying a combination nail file/metal saw, a magnifying glass, a

Woody Woodpecker–size serrated saw, a tiny screwdriver for repairing eyeglasses, pliers (although serious pliers-users should consider the far heftier Leatherman Pocket Survival Tool), a ballpoint pen (!), a combination fish scaler/hook remover/ruler, and several other tools with interesting shapes but without easily discernible functions. A deluxe jackknife-of-all-trades will weigh around seven ounces and cost about $60.

I won't say you shouldn't have it all, because someday you may be struggling to construct a toggle trip-release deadfall trap, ruing your decision to pinch pennies. (For inspiration, there's the retired Texan who built a three-bedroom house using his Swiss Army knife. "It's just slow going because the tools are so small," he said.)

If you don't need gadgets, consider a locking knife with one to three blades. These are the less-obnoxious cousins of fixed-blade hunting knives. Their advantage over Swiss Army knives is that the blades are much larger. Like those of other pocket knives, the blades fold into the handle, but they also lock in place when open. One of these knives weighs about six ounces and costs from $25 to more than $100, depending largely on whether the handle is made of plastic or a combination of endangered hardwood, precious metal, and plundered staghorn.

A well-made knife needs little care. The blades of name-brand knives are made of (nearly) stainless steel blended with carbon (so the knife holds a sharp edge) and chrome (for corrosion resistance). This leaves you with minimal responsibilities: Wipe the blades clean before closing them, never throw them into the ground or a tree, and sharpen them when they're dull.

Although you may use your knife more often to peel oranges than to carve a buck into chops and chuck, you'll benefit from a tool that's ready and waiting should the need arise. And then there's that four-bedroom house you've always wanted to build . . . ■

REED MCMANUS *is a senior editor of* Sierra.

Homilies From on High

Mountains of the Great Blue Dream
by Robert Leonard Reid
North Point Press
$21.95

Mark Mardon

ANY CONTEMPORARY WRITER attempting to link mountaineering experiences to such broad themes as death or human domination of nature runs the risk of appearing outdated. Gone are the heroic days when high-altitude exploits by the likes of Edward Whymper (who in 1865 became the first to climb the Matterhorn) or Edmund Hillary (who scaled Mt. Everest in 1953) could capture the world's imagination, when climbers were looked to for fresh insights into the human predicament. While many writers continue to emulate John Muir by going to the mountains for inspiration, few can claim to break new ground in doing so. Yet even as climbing takes on more and more commercial, crowd-pleasing characteristics—witness the sport's new indoor gyms and big-money competitions—some writers persist in using their mountain perches as pulpits from which to expound on the meaning of life.

Twenty-year climbing veteran Robert Leonard Reid is one such preacher from the craggy heights. In *Mountains of the Great Blue Dream*, his first book, Reid recounts some of his hundreds of wilderness ramblings and mountain ascents in North America.

While the central motif of the book is the idea of coming home to the wilderness, a near-obsession with death permeates the writing, even beyond a chapter devoted to the topic. For Reid, mountaineering and loss of life are entwined: "Mountaineers climb because they love the mountains, yes; but they climb too because climbing prepares them boldly and tenaciously for death." The best climbers, he postulates, are those who completely accept the possibility that they might die on a mountainside.

Reid's own career ended when the thought of such a death overwhelmed him. He recalls Art, a friend with whom he had climbed for a decade: "He walked me off the Grand Teton the day I quit, the day I decided that twenty years was enough, that, because I was afraid, I must never tie a rope around my waist again." Art attempted to console Reid by recounting his own fears, telling him of "quaking knees at the tough spots, the midnight premonitions that the next mountain would be his last." A few months later, while Art was climbing at Pinnacles National Monument in California, his waist harness became disengaged and he fell 100 feet to his death.

Mountains of the Great Blue Dream is a somewhat disconcerting mix of autobiography, philosophical inquiry, Western pioneer history, and adventure. At times the voice is poetic, as when Reid describes growing up in northwestern Pennsylvania, where in summer people "spoke wistfully of October as though it were a fond friend off dallying on a slow trip around the world." At other times the tone grows sentimental. Reid tells of his elderly mother near the end of her life, helpless and unable to speak. At night, as she and her husband lay in their separate beds, she was linked to him by a length of cord extending from her wrist to his—a tug would rouse him if necessary. "Naturally," Reid writes, "I saw this lifeline . . . as an echo of the rope that connects two climbers."

Reid allows his thoughts to wander far and wide within the boundaries of his chosen themes. Indeed, in a chapter on science versus myth, set in New

Mexico, Reid skips about at random, and we do not always get a clear understanding of where he's going. He describes the Land of Enchantment's ghostly mountain peaks and "tumbleweed-haunted" uplands contrasting sharply with missile-dotted sand dunes and mesas littered with weapons labs. (The schizophrenic vistas, he writes, "provide interesting tests of the body's ability to absorb irony.") But rather than form his insights into a kind of morality play, the author leaves them fragmented, and the reader must make the connections.

For all his thoughtfulness, Reid seems overly dependent on the ideas of others to draw meaning from what he sees around him. By continually referring to writers he admires—in various places he trots out Descartes, Pascal, Nabokov, Wendell Berry, Rachel Carson, and Aldo Leopold, among a great many others—he unnecessarily obscures his own voice. And while the bulk of Reid's writing ranges from capable to eloquent, patches of it are embarrassingly antiquated, as when he addresses us directly as "gentle reader," or when he becomes excited by the thought of certain mountains and tells us, apparently in all seriousness, "Nay and verily, my loins seek them out."

Why, if the book has so many weaknesses, should anyone bother reading it? Because in all of Reid's meanderings through the realms of ideas and alpine imagery, in his pauses to look out over a landscape and then dreamily imagine a vast continent filled long ago with the cacophonous wailing, warbling, and trumpeting of countless animals (he envisions pelicans as "ditzy wing-slappers, rising by the hundreds like a clatter of pots and pans. . . ."), in all of that can be found a reflection of what great climbers are made of. Mountaineers are spiritual nomads who seek remote crags in order to have hour upon hour of unfettered time to reflect upon the nature of the universe. They are romantics who carry around with them a childlike curiosity about who might have come before them, or who might follow. In Reid's work we see something of the mendicant friar rendering his confession and seeking absolution. His nearly stream-of-consciousness writing gets away from the concrete details of particular climbs (a handhold here, a toehold there) and plunges instead into the heart of the sport—its religion. In this respect, Reid is a bit like a St. Augustine of the mountaineering world, intellectualizing his way toward his soul's salvation, not in heaven, but on Earth's cloud-capped summits.

MARK MARDON *is an associate editor of* Sierra.

BRIEFLY NOTED

Some love Los Angeles, while others aren't quite so favorably disposed toward it, but one thing is certain: The sprawling metropolis has its share of environmental problems. Now Tricia R. Hoffman and Nan Kathryn Fuchs have written ***Save L.A.*** (Chronicle Books; $8.95, paper), a comprehensive "what you can do" manual for Angelenos who want to conserve energy, reduce solid waste, and generally work to wipe some of the tarnish from that otherwise sparkling desert ornament. . . . California isn't the world, but it's a big chunk of it economically; if it were a nation, it would be the world's eighth-richest. Which is excuse enough for us to mention ***California: An Environmental Atlas & Guide*** (Bear Klaw Press, 926 Plum Lane, Davis, CA 95616; $19.95, paper) by Bern Kreissman. Not a fancy book (the simple line illustrations have a low-budget look), it nonetheless contains maps, historical notes, and addresses galore, making it a valuable guide to the state's natural resources, recreation and protected areas, and environmental bureaucracy. . . . Along the same lines but far more colorful and expansive is ***Atlas of United States Environmental Issues*** by Robert J. Mason and Mark T. Mattson (Macmillan; $80). Its multitude of graphics and statistics, along with concise text, cover topics ranging from air quality to wetlands. . . . As indigenous peoples are almost always the staunchest defenders of their homelands, a key to

protecting rainforests is to support those who dwell in them. Toward this end, the Rainforest Action Network (RAN) and the Amazonia Film Project have published ***Amazonia: Voices From the Rainforest*** (RAN, 301 Broadway, Suite A, San Francisco, CA 94133; $8.50 plus $1.50 shipping; paper). This resource guide provides the names, addresses, and goals of many South American tribal organizations working to protect native lands and cultures. It also lists environmental groups in Europe, North America, Asia, and the Pacific that share those peoples' concerns. . . . Soon to celebrate her 86th birthday, and busy planning an expedition into the jungles of Belize, U.S.-born ethnobotanist Nicole Maxwell has scoured the Amazon rainforests for more than 40 years, searching for plant medicines previously known only to native shamans. The story of her search, ***Witch-Doctor's Apprentice: Hunting for Medicinal Plants in the Amazon,*** first appeared in 1961 and has recently been reissued in an updated version by Citadel Press ($12.95, paper). . . . Activists working to protect the Northwest's remaining old-growth trees will appreciate The Wilderness Society's ***Saving Our Ancient Forests*** (Living Planet Press, 558 Rose Ave., Venice, CA 90291; $5.95, paper). Seth Zuckerman's book is a primer on the issues surrounding one of North America's most complex conservation battles. Examined are basic forest ecology, current timber-industry practices, and efforts to reform logging methods. . . . Corporations are increasingly under pressure to lessen their environmental impacts; they would do well to consult ***50 Simple Things Your Business Can Do to Save the Earth*** (Earth Works Press, 1400 Shattuck Ave., Box 25, Berkeley, CA 94709; $6.95, paper). The book's ideas range from the simple (such as switching to less-toxic cleaners, as the Sheraton Grande Hotel in Los Angeles did) to the ambitious (recycling wastewater, as Polaroid Corporation did, thereby cutting its water use by 80 percent and saving $30,000 a year). —***M.M.***

SIERRA NOTES

Sierra Club members re-elected incumbent Michele Perrault of Lafayette, California, to the organization's Board of Directors in April. Kathy Fletcher of Seattle, Washington, Mark Gordon of Buffalo, Wyoming, Duncan Stewart of Goodlands, Manitoba, and Jean R. Packard of Fairfax, Virginia, were also elected. Each will serve a three-year term.

At its May meeting in San Francisco, the Board elected Phillip Berry to a one-year term as Sierra Club president. The Board also elected Edgar Wayburn, vice-president; Ann Pogue, treasurer; Anthony Ruckel, secretary; and Rebecca Falkenberry, fifth officer.

The Sierra Club Annual Dinner was held May 11 at the Sheraton Palace Hotel in San Francisco. The featured speaker was Wangari Maathai of Nairobi, Kenya, coordinator of the internationally acclaimed Green Belt Movement, which has planted more than 10 million trees in Kenya. She is the recipient of numerous awards, including a 1991 Goldman Prize for grassroots environmental activism.

Sierra Club volunteers, chapters, and friends received the following awards for 1991:

- The John Muir Award (for leadership in national conservation causes) to Celia Hunter and Ginny Hill Wood for decades of service in protecting Alaskan wilderness.
- The William E. Colby Award (for leadership, dedication, and service to the Sierra Club) to former Club Director Shirley Taylor.
- The Edgar Wayburn Award (for service to the environmental cause by a person in government) to Representative Henry A. Waxman (D-Calif.).
- The David R. Brower Environmental Journalism Award to Barbara Pyle of Cable News Network.
- The William O. Douglas Award (for contributions in the field of environmental law) to Deborah Reames of the Sierra Club Legal Defense Fund.
- The Walter A. Starr Award (for continuing support of the Club by a former director) to Lawrence Downing.
- Susan E. Miller Awards (for exceptional contributions to chapters by individual Sierra Club members) to Lynn Frock of the Ohio Chapter, Annette Ka'ohelauli'i of the Hawaii Chapter, and Judith Lamare of the Mother Lode Chapter.
- The Denny and Ida Wilcher Award (for work in membership development or fundraising) to the Sierra Club of Eastern Canada and the Lone Star Chapter.
- The Ansel Adams Award (for superlative use of still photography to further the conservation cause) to Stephen Trimble.
- The Oliver Kehrlein Award (for outstanding service to the Club's outing program) to Richard "Dick" Monges of the San Francisco Bay Chapter.
- A Special Achievement Award (for strong and consistent commitment to conservation over an extended period of time) to Isaac "Ike" Eastvold of the Rio Grande Chapter.
- A Distinguished Achievement Award to Senator Harry Reid (D-Nev.).
- Special Service Awards (for efforts of singular importance to conservation or the Club) to Victoria "Vicky" Hoover of the San Francisco Bay Chapter, Jim Dodson of the Angeles Chapter, and to Ron Burchell for leadership in founding the Eastern Canada Chapter of the Sierra Club.
- A Distinguished Service Award to Margaret Owings for her efforts to save sea-otter and mountain-lion habitats, and to Kristin Berry for advocacy leading to the protection of desert-tortoise habitat.
- The Chapter Newsletter Award (for exceptional creativity and impact in a chapter publication) to Windell M. Smith of *The Georgia Sierran*.
- The Earthcare Award (for international environmental protection) to Professor Wangari Maathai of Kenya. ■

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What causes "new car smell"? Is it bad for you? (Kay Grundy, South San Francisco, California)

What you smell when you open the door of that shiny new automobile is the subtle bouquet of fuming petrochemicals—plastics releasing molecules into the air in a process called outgassing.

New-car breath isn't the only sign of plastic's presence in the auto atmosphere. A greasy film often forms on the insides of the windows and on the steering wheel; this gunk is also generated by outgassing synthetics.

According to the Center for Auto Safety, the principal culprit is polyvinyl chloride (PVC), which gives off the phthalate esters used as plasticizers in its manufacture. Spare tires and seat-protecting sprays may also add to the peculiar perfume.

Outgassing may cause health problems for some: "We've gotten complaints from people who've had allergic reactions to fumes coming from seats and dashboards, or from ventilation systems," says a CAS staffer; headaches and nausea are commonly reported symptoms.

While some compounds present in auto air are known carcinogens, the EPA has judged the emission levels too low to pose significant health risks. In spite of this, you might feel better keeping the windows of your new car wide open for a while; the fumes will have spent themselves in a couple of months.

Is there any way (besides recycling) to make paper without cutting down forests? (Esther Sandrof, Jersey City, New Jersey)

We don't have to turn trees into tissues or forests into french-fry bags; paper can be made from a slew of shrubs and grasses.

Before the 1880s much paper was made from hemp, a sturdy weed whose flowering top is called marijuana. Latter-day proponents want to bring hemp back as a cheaper, less environmentally damaging source of commercial fiber. Hemp produces four times as much fiber per acre as wood does, needs no pesticides, and requires far less energy and fewer chemicals to process into paper.

Although commercial hemp contains insignificant amounts of narcotic resin, it remains illegal to grow in the United States, so only a small amount of imported fiber is available for papermaking here. Some foreign mills use hemp to make low-grade-paper products such as gift wrap and cigarette papers, but high-quality hemp paper remains a pipe dream.

Another promising tree-substitute is a tall plant called kenaf. Kenaf grows quickly, and produces a stronger, whiter fiber than wood does. Kenaf International in McAllen, Texas, is now building a mill that will produce newsprint made of kenaf and recycled paper.

Since virgin wood pulp remains inexpensive and widely available, most paper mills are sticking with trees. But large-scale conversion to nonwood fiber may come about if consumers demand their paper and their forests too.

Is desertification a problem in the United States? (Jim Vasco, St. Louis, Missouri)

Desertification is not confined to North Africa and Asia; more than 225 million acres of land in this country have been affected, mostly in the arid West. According to *Desertification in the United States* by David Sheridan (Council on Environmental Quality, 1981), "the actual acres *threatened* by severe desertification . . . are almost twice that amount."

Desertification can result in destruction of native vegetation, extensive soil erosion, dune formation, lowering of water tables, drying up of lakes and streams, and salinization of topsoil. Major causes include water diversion for agricultural, mining, or urban use; excessive plowing; and overgrazing by livestock (see "Thoroughly Cowed," September/October 1990).

Deserts themselves can become "desertified" when natural ecosystems become imbalanced by misuse. Overgrazing or off-road vehicle use, for instance, can lead to heavy erosion, preventing new growth and leaving arid lands truly barren. ■

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