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WILD EARTH



E.O. Wilson
Eileen Crist
Harry Greene
Reed Noss
Charles Bowden

*Facing the
Serpent*

The Journal of the
Wildlands Project
SUMMER/FALL 2003

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WILDLANDS PROJECT



reconnect restore rewild

WE ARE AMBITIOUS. We live for the day when grizzlies in Chihuahua have an unbroken connection to grizzlies in Alaska; when wolf populations are restored from Mexico to the Yukon to Maine; when vast forests and flowing prairies again thrive and support their full range of native plants and animals; when humans dwell on the land with respect, humility, and affection.

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Wild Earth—the quarterly publication of the Wildlands Project—inspires effective action for wild Nature by communicating the latest thinking in conservation science, philosophy, policy, and activism, and serves as a forum for diverse views within the conservation movement.

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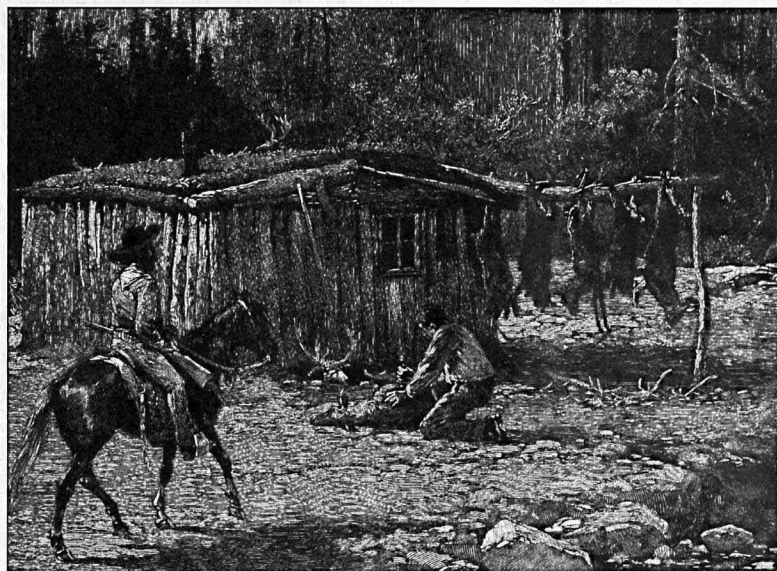
NOTE TO READERS

Wild Earth is mailed to Wildlands Project supporters as a membership benefit, to non-member institutional/agency subscribers, and sold on the newsstand. For wholesale distribution, our seasonal convention is behind the times. With this dual summer/fall issue, we recalibrate our editorial calendar to be consistent with other periodicals on the newsstand, and, hopefully, increase single-copy sales. Members and institutional subscribers need fear not; they will receive the same number of issues with their annual membership, and can get an early start on autumn reading.



ON THE COVER

Cottonmouth (*Agkistrodon piscivorus*), gouache by David Williams, ©2003



The Dark Side of American Populism

TO UNDERSTAND today's anticonservation movement, we must first understand the populist right in American history. The populist right is diverse, ranging from a sensible suspicion of elites and intrusive government to irrational, violent paranoia. Its stream mixes three currents: 1) common man individualism and mistrust of government (heavily influenced by Scots-Irish frontier folkways); 2) anti-elitism and anti-intellectualism; and 3) paranoid conspiracy fears. Not all right-wing populists are believers in vast conspiracies, but fear in some sense underlies all these currents. I call it fearful populism. Here I will only look at the role of common man individualism in fearful populism.

In a sense, fearful populism is the modern version of the age-old war of the city against the country, of civilization against barbarism. Within the courtyard of British history, today's militia and county rights rebels come out of the centuries of warfare and raiding on the Scottish-English borderlands.

Historian David Hackett Fischer reinterprets American colonial and pioneer history in his brilliant book, *Albion's Seed*. He traces the settlement of the colonies by four different groups from Britain, each bringing their own particular folkways. One of these groups is popularly known as the Scotch-Irish or Scots-Irish.¹ Actually, many of them were English from

Cumberland and Northumberland, but they shared a common culture with the lowland Scots and Northern Ireland Scots. These are my people, and my ancestors played out the typical tale of Borderland Scots in frontier history—constantly moving away from their neighbors' chimney smoke to the edge of settlement. Huck lighting out for the territory in Mark Twain's *Huckleberry Finn* is pure Borderland Scot.

Scots-Irish folkways have deeply influenced "country" culture in America—country music, the truck driver cult, redneck chic, and biker culture. Fischer shows that many of the cultural traits that I thought had evolved on the American frontier in

fact came directly from the Scottish-English and Scottish-Irish borderlands. The pejoratives "redneck" and "cracker" were and are still used in the British Isles. I was surprised to learn that my dialect—pronouncing "fire" as "far" and using "fixin'" for "getting ready to do something"—comes from the distinctive English spoken in the English-Scottish borderlands.² (In the discussion that follows, I will use "redneck," "Borderland Scot," and "Scots-Irish" interchangeably. By the way, I do not think of "redneck" as an insult. If I am part of any cultural tribe in America, it is the redneck tribe, although my affinity for French wine and season tickets to the symphony do open me to charges of being a backslider.) Similarly, many American frontier traits such as extreme individualism, fear of government, opposition to taxes, and rootlessness come from the Borderland Scots in the British Isles. These are also traits of fearful populism in rural America today. We can trace such characteristics from the English-Scottish borderlands to the American Appalachians to the rural West and to redneck culture in general. The Borderland Scots have had good reason to develop these traits in their thousand-year history as a frontier people in the British Isles and then in America. When not taken to excess, American common-man politics is the noblest defense of individual freedom against the state that the world has ever seen. When taken to excess, however, it becomes something very dark indeed.

I believe much of the rural and small town opposition to conservation can be better understood through the lens of these borderland folkways. These folkways include: poverty mixed

with pride, insecurity, rootlessness, unwillingness to change beliefs, intolerance for other views, tendency to violence, resistance to outside control except for strong leaders from one's own group, and loyalty to self and kin instead of to government.

The Borderland Scots were not warmly welcomed in the American colonies. Looked upon as barbarians, called "the scum of two nations,"³ many came to escape "famine and starvation" and "high rents, low wages, heavy taxes, and short leases." They came for different reasons than the other groups from Britain. "No talk of holy experiments, or cities on a hill. These emigrants came mainly in search of material betterment."⁴ Poor though they were, they had pride. Fischer writes, "Their humble origins did not create the spirit of subordination which others expected of 'lower ranks.'"⁵ Those who look down on the bearers of this culture today call them "rednecks" and "white trash." Redneck, at least, has become a term of pride for many of us. White trash is often used derisively within Scots-Irish culture to refer to shiftless or trouble-making members of the community.

In a sense, fearful populism is the modern version of the age-old war of the city against the country, of civilization against barbarism.

Given the peculiar history of Borderland Scots and English (constant warfare and raiding, shifting alliances where a man grew to depend on himself and his family instead of on nobles and kings, and a low percentage of land ownership), the idea of open land, free land, public land, and frontier land became a key part of free-

dom in the American story. Borderland Scots were the perfect people for the Tidewater Aristocracy (from the Royalist Cavalier folkway) to push to the dangerous edge of settlement because they had honed fighting and settlement skills from centuries of being on frontiers in the Scottish-English borderlands and northern Ireland. (Perhaps fighting the Shawnees, Cherokees, Creeks, Choctaws, and Chickasaws wasn't so much different than fighting the Irish.) The borderlanders gladly took to the backcountry to get away from government and aristocracy. In many cases, they did not try to gain legal title, but "simply squatted" on "a spot of vacant land."⁶

Due to traditional insecurity and rootlessness, the Scots-Irish in America adopted the log cabin, although few other groups favored it.⁷ It was easy to throw up and easy to abandon for whatever reason. This folkway was brought from the borderlands and Northern Ireland where similar impermanent cabins were built of "turf and mud in Ireland, stone and dirt in Scotland." Fischer explains that the borderland and Northern Ireland

"system of land tenure gave no motive for improvement."⁸ Cabin architecture "was a simple style of building, suitable to a migratory people with little wealth, few possessions and small confidence in the future. It was also an inconspicuous structure, highly adapted to a violent world where a handsome building was an invitation to

disaster.”⁹ For the same reasons, little effort was made to keep a farm or woods in good shape. Why bother if you might soon move or if someone may take it away from you? Get what you can from the land and then move on. This might work for few people and much land, but for many people and little land, it leads to ruined land and squalor. Today, many with this fare-thee-well attitude are stuck on the land their daddies scalped.

Despite insecurity and rootlessness (or maybe because of it), cultural conservatism is another trait of red-necks. One Appalachian woman proudly said, “We never let go of a belief once fixed in our minds.” A deep suspicion of foreigners (anyone outside your immediate area) was common, with hostility to the planter aristocracy and to abolitionists before the Civil War, intense hatred of blacks and Jews later, and, more recently, furious dislike of communists and capitalists both.¹⁰ Clinging irrationally to old beliefs and facing the world with xenophobia leads to the antiscientific and anticonservation views today among some ranchers, loggers, miners, and other rural folk.

While demanding their own autonomy, the Scots-Irish were intolerant of other views. Religious bigotry was rife in the American backwoods. One Anglican sermon was disrupted by the dominant Presbyterians: they “rioted while he preached, started a pack of dogs fighting outside the church, loosed his horse, stole his church key, refused him food and shelter, and gave two barrels of whiskey to his congregation before a service of communion.”¹¹ I have been to public hearings on conservation issues in the rural West much like this.

The unrelenting violence on the Scottish-English borderlands led to the importance of blood relationships, where clan loyalty trumped loyalty to the crown, and to a distrust of legal institutions, instead “settling their own disputes by...feud violence and blood money,” and through “payment of protection money to powerful families,” called “blackmail.”¹² The borderlands had been brought to heel with a campaign of pacification after Scotland’s King James VI gained the English crown in 1603. The ancient borderland culture was disrupted, many were hanged, and many families were forced to northern Ireland. “The so-called Scotch-Irish who came to America thus included a double-distilled selection of some of the most disorderly inhabitants of a deeply disordered land.” A deep-seated “memory of oppression” came to America with the border folk. Fischer notes that this “shaped their political attitudes for generations to come.”¹³ It does yet today.

It was important to be tough and willful in borderland culture not only because of constant danger, but also because of the practice of *tanistry* “where the strong were treated with deference and the weak were despised and abandoned,” particularly in old age.¹⁴

When stirred up about real or imagined tyranny, this rural individualism turns into the Posse Comitatus or the militia groups lurking about the hinterlands today. In this guise it is heir to the 1676 Bacon Rebellion in Virginia, which sacked Jamestown and ran the royal governor out of town,¹⁵ Shays’s Rebellion in Massachusetts in the late 1780s, and the Whiskey Rebellion in western Pennsylvania.¹⁶ Much of this rebellious history comes

from the borderlands notions of order, which “rested upon an exceptionally strong sense of self-sovereignty.” A survey of vigilante movements in the United States shows that the overwhelming majority of them have been in regions dominated by the borderland culture.

Some prominent families from the borderlands and Northern Ireland came to America. They moved to the backwoods and established themselves as an elite over their cultural compatriots. Patrick Henry, Andrew Jackson, and John C. Calhoun were archetypes.¹⁷ “This backcountry elite was not distinguished by learning, breeding, intellect or refinement. In consequence, its eminence was always directly contingent upon its wealth and power,” says Fischer.¹⁸ We see this same sort of social stratification today in the rural West where an elite of the biggest ranchers sits atop the community. No one, for example, would ever accuse Joe Skeen, recently New Mexico’s sheepman congressman, of learning, breeding, intellect, or refinement. He did, however, cut a mighty wake through southern New Mexico.

While a bit of Borderland Scot folkways is a good thing even in the modern day, too much of it makes a culture of losers. Folks from this tradition make up a modern frontier movement in the United States. I’m not talking about the back-to-the-land hippies in the 1960s and 1970s, but about working class populists moving to Alaska and to lightly populated remote areas like Catron County, New Mexico; Lemhi County, Idaho; and Kingman, Arizona. Their preference for mobile homes is traditional, as Fischer points out. “The mobile home is a cabin on wheels—small, cheap,

simple and temporary. The materials have changed from turf and logs to plastic and aluminum, but in its conception the mobile home preserves an architectural attitude that was carried to the backcountry nearly three centuries ago.”¹⁹

A lot of these rednecks are men and women and families trying to better their lot. I know a few who love wilderness and wildlife. Others are bottom-of-the-barrel white trash, long hair and beards on the men like cartoon hillbillies. They smoke dope and brew crank in their trailers, and sport biker-style tattoos. In general, I have found that the most paranoid, potentially violent anticonservationists in rural areas are these losers—the down-on-their-luck newcomers drawn to a romantic, traditional idea of the frontier as a place where they will be left alone and can grub out a living on “open” land without supervision or interference. My friend Jim Scarantino, a former Catron County resident, calls them the “end-of-the-roads.” In the rust-belt cities and rural poverty of the Midwest, these are the folks who join the militia.

Characteristics of today's fearful populists

Fearful populists, including those who are not necessarily believers in a vast conspiracy, share certain traits.

ANTISCIENCE. The fearful ones in today's populist political whirl have a deep-seated distrust of science. Part of the problem is the failure of our school system to teach students the scientific method and basic science facts—particularly within the realm of ecology. Scientists are also at fault for not being able to communicate scientific theories and explanations to the public, which

has a fifth grade reading level. The news media does a sorry job of explaining public issues that involve science. Public opinion polls and testing show an abysmal lack of understanding of basic science among the American public. Basically, however, anticonservationists, right-to-lifers, conspiracy theorists, fundamentalist Christians, and other right-wing populists are antiscience because of historic American anti-intellectualism and anti-elitism.

In rural areas practical experience is prized, and someone who has lived in a place all his or her life is believed to innately have more understanding of local natural history than has any university biologist. When I lived in rural Catron County, New Mexico, my neighbors told me that spiny lizards were baby Gila monsters, for example. Despite all scientific and historical evidence to the contrary, rural anticonservationists are convinced that wolves are dangerous to people.

Neoconservative columnist (and former psychiatrist) Charles Krauthammer warns of “a flight toward irrationality, a retreat to prescientific primitivism in an age that otherwise preens with scientific pride.” After considering New Age medicine and the crackpot charges of Satanic child abuse, he writes, “Perhaps these outbreaks of irrationality should be expected in an age in which, 70 years after the Scopes ‘Monkey Trial,’ many Fundamentalists are trying to force schools to teach the crank ‘science’ of creationism.”²⁰

COMMON MAN INDIVIDUALITY. Fischer shows how this overweening individuality is a trait of the frontier Scots-Irish. It comes through in an exalted sense of private property, gun

ownership, and a “don't tell me what I can do” attitude. My friends frequently remind me of my guilt here, and I suppose the undesirable discharge from the Marine Corps on my office wall proves them right.

GULLIBLE AND PARANOID. I'm fascinated how individuals and groups so paranoid and mistrustful of *them* can be so gullible when a crackpot spins out farfetched conspiracy theories or when a slick con artist comes to call.

CONSPIRACY THEORIES. Conspiracy theories abound. East Coast liberals are going to take away all our guns. Homosexuals working through the National Endowment for the Arts are trying to turn our kids into queers. The Communists—oops, I'm sorry, now it's the UN—have troops occupying Yellowstone National Park. Conservation groups are using the Biodiversity Treaty to take away private property rights. And other such nonsense.

GUNS AND VIOLENCE. Guns have always been seen as the great equalizer in America. As Ed Abbey wrote, “When guns are outlawed, only governments will have guns.” But what is disturbing about some paranoid groups is their willingness to use violence to achieve their ends. The KKK burning crosses outside the cabins of freed blacks, lynchings during the Civil Rights movement, bombings of abortion clinics, loggers beating up peaceful old-growth demonstrators... Tim McVeigh. These are fearful people. They feel powerless, threatened, impotent; and they lash out.

RACISM. Not all fearful populists are racist, but racism has run deep in militia precursors and in the militia

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Mountain Biking in Wilderness? The conversation continues

I WAS EXTREMELY disappointed to read of Dave Foreman's flirtation with Wilderness Lite—the suggestion that popular mountain bike trails be cherry-stemmed from future wilderness area designations (“A Modest Proposal,” Spring 2003). And while Foreman professes, in the same article, to oppose Wilderness Lite, that is exactly where his flirtation will lead. Virtually every deserving unprotected wilderness area on federal land has, or could have, a mountain bike route and a vocal constituency to demand that route be cherry stemmed from any potential wilderness area designation.

Foreman is wrong on this one. The purity of wilderness areas—all wilderness areas—must never be compromised. And keep in mind that a great variety of other “muscle-powered recreation” devices are already finding their way into the backcountry, including sand boards and off-pavement (read mountain trail) versions of skateboards, scooters, and in-line skates. If mountain bikes are allowed, all their wheeled kin will also be allowed and we will see the beginning of the end of wilderness as we know it.

Allowing mountain bikes in future wilderness areas, regardless of Foreman's suggested limitations, is a Pandora's box that, once opened, will never be closed again. Don't go there.

Tom Hopkins

Santa Cruz, California

Dave Foreman responds:

Wilderness Lite? I think not. If you read my editorial in the mountain bik-

ing forum more carefully, you might discover that all I proposed was “an open discussion within the wilderness community” on one approach to the biking issue. Until such a discussion, I don't know what my final position might be on the points I listed, except that under no circumstances should bicycles ever be allowed in designated wilderness areas. But I do think it would be useful for knowledgeable conservationists to think strategically about how to deal with mountain bikes in the backcountry.

I AM AN ARDENT conservationist and very concerned about the mountain bike situation on our trails in Southern California. Our position is that mountain bikes have hundreds of miles of fireroads (which are wide dirt roads), and some narrow trails as well, in the Santa Monica Mountains. However, mountain bike groups have been very aggressive in trying to gain access to almost all trails. Because we have such a large population, when a narrow trail is opened to bikes, hikers and equestrians tend to abandon it. Trail damage and erosion from bikes is significant. Habitat corridors can be interrupted. Safety of those on foot can be compromised by the speedy bikes.

I felt the forum in the spring issue was very balanced and plan to share it with people who have wrestled with the increase of mountain biking in Southern California and elsewhere.

Mary Ann Webster

Culver City, California

Mary Ann Webster is Chair of the Sierra Club's Santa Monica Mountains Task Force.

ANDY KERR'S proposal to amend the Wilderness Act to allow mountain bikes in designated wilderness on a trail-by-trail basis is a recipe for further degradation of the National Wilderness Preservation System. Ongoing and proposed nonconforming uses of wilderness already proliferate, and creeping degradation—the thousands of small insults that cumulatively are a big problem—is already de-wilding millions of acres. As increasing numbers of humans vie for space in an overall shrinking wilderness land base (due to the ongoing loss of unprotected roadless areas), existing problems and demands will worsen. The last thing our wilderness lands need is hoards of mountain bikers added to the stew. It's not as though these recreationists are unfit to walk. And imagine the energy drain of trying to deal with the mountain bike question on a trail-by-trail basis. I don't even want to ponder that can of worms!

Kerr believes that mountain bikers are of the same natural pro-wilderness mind-set as the rest of us tree huggers. If so, then their past failure to join battles against wildland development reverberates loudly across the public domain. There are, of course, many exceptions, and those exceptions illustrate the ability of some to view wilderness as a landscape with intrinsic value and unique levels of wildness and ecological integrity. In other words, our designated and proposed wildernesses should not be viewed as a pie to be divided up among user groups. The question is, can humans exercise enough restraint to assure that some places remain self-willed, funda-

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mentally different from the vast bulk of the Earth's remaining and intensively managed terrestrial habitats? One of those fundamental differences is that in wilderness, humans revert to biped or four-legged locomotion, leaving their machines behind.

Let's not forget that the Forest Service and BLM set up this political collision by first allowing bikes in roadless backcountry (proposed wilderness). Yes, some in the agencies gleefully view this controversy as a boon to their anti-wilderness agenda. Yet if we amend the Wilderness Act to allow mountain bikes, where does this slippery slope end? It doesn't. Next thing, some genius will invent wheeled snowboards or battery-powered helicopter packs that can plunk you down 40 miles from the nearest road. And rest assured, mountain bikes will continue to become lighter, peddlers stronger. Big wilderness is wild precisely because its core is distant from the edge. Our deep wilderness retreats will become crowded, easily accessed, and more vulnerable to at least some edge effect problems such as weeds, noise, wildlife disturbance, and physical deterioration due to overuse of formerly remote fragile habitats.

I understand the desire to neutralize a big potential anti-wilderness constituency. Our wilderness system has a long way to go, with many millions of unprotected roadless acres needing designation. But once we start having official lower-grade "wilderness," Congress will saunter down the easy path of appeasing every potential non-conforming (to Wilderness Act ideals)

user group imaginable. Wilderness, as we old "wild preservatives" have known it, will be history.

Other solutions to the mountain bike problem may make sense in some extreme cases. Popular bike trails might be cherry-stemmed out of a wilderness proposal. Or, conservationists might propose an alternative designation such as a "roadless national conservation area." But alas, those slopes also seem a might slick. So count me as a vote for staying the course for "Big W" Wilderness Act wilderness, as that law's authors intended, in all but the most unusual cases.

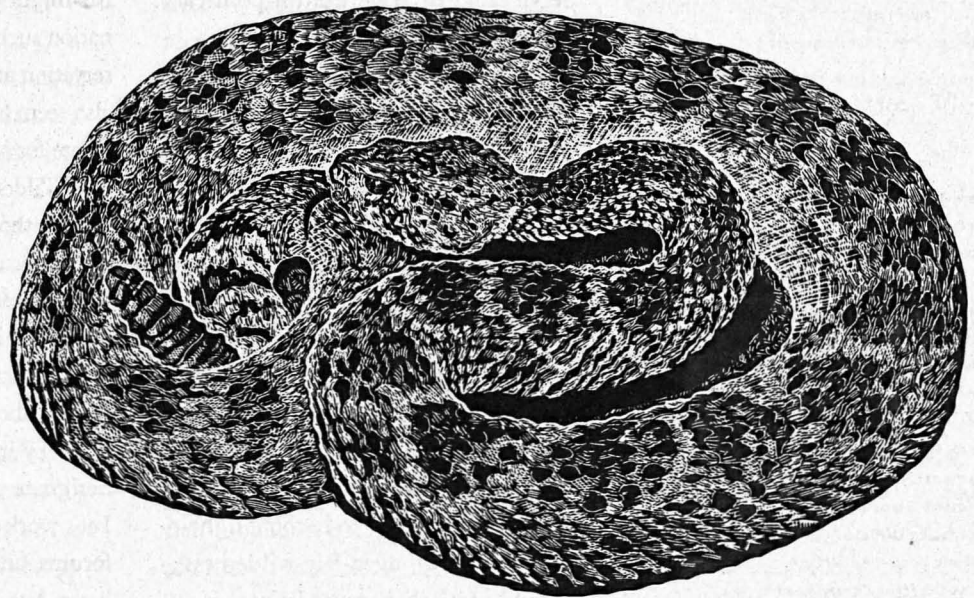
Instead of trying to appease mountain bikers, let's educate them about what wilderness really is, why it's not about recreation user groups, and why it's ecologically imperative to designate unprotected roadless wilds. Let's work on them, through dialogue, forums, and articles. With an open heart, but also with dedication to the wilderness ideal. This is no easy fix, and we will not neutralize those mountain bikers who don't give a damn about anything but their use of Nature as an outdoor gymnasium. These folks, though, are unlikely to help us anyway. What we will gain is the support of those who are open to looking at wilderness as a unique domain of unequalled magic that will remain such only at our considered discretion. Staying the course isn't always easy. But our resolve to keep wilderness wild is the only thing that blocks the floodgate of a juggernaut that otherwise knows no bounds.

Howie Wolke

Bitterroot Mountains, Montana



We welcome your comments. Please send them to us at P.O. Box 455, Richmond, VT 05477 or e-mail to letters@wild-earth.org. Published letters may be edited for length and clarity.



Facing the Serpent

YESTERDAY MORNING, while walking in the woods behind our house, I very nearly bumped into a black bear. The bear snortled and snuffled and growled, I withdrew a piece and watched him (or her) briefly with binoculars, then left him to his business.

Today, trotting along the same woodland path, my attention to the world about me was starkly different. Every dark stump or rock became a potential bear, each twig

crackling underfoot caused a jolt of adrenaline. When an ovenbird exploded from the ferns at my feet, I startled. In a forest where I've walked a thousand times—but had never before seen a bear—the woods were now alive with ursine possibility, and I was newly attentive. Such is the demeanor of any good hunter, whether armed with bow or binoculars, but generally not the attitude I've had on my drowsy, early morning rambles.

That feeling of vigilance, of hyper-awareness of one's surroundings, is also the mark of wary travelers in rattlesnake country. It was a feeling drilled into me every summer as a kid when we visited my grandparents' ranch in eastern Wyoming. Some of my earliest memories are of scrambling on the sandstone bluffs of a little cottonwood-lined wash just below the ranch house. By the time I was five or six I was allowed to play down there by myself, or with older siblings. Certain rules

were clear, though: "Watch for rattlesnakes. Never, ever place a hand or foot somewhere you can't see. If you hear a hissing rattle, freeze."

Climbing on the rocks and running through the sagebrush, we kids waited to hear that hiss. We knew the sound well. In the evenings, around the kitchen table, we'd beg Grandma to get out the old cigar box full of dried rattles, cut from snakes killed on the ranch. We'd shake the rattles and hiss and pester Granddad to tell us snake stories. He'd oblige, but it was obvious that Grandma didn't like to hear them; she shuddered when the rattle box came out.

My grandparents are the hardest working people I've ever known; they are ranchers of the old school, cut from the toughest cloth. (Well into her eighties, Grandma bought a new recliner chair for the living room one Christmas. Having no hired man at that time of year, and wanting to surprise Granddad, she unloaded it from the truck and hauled it in the house by herself.) Grandma had only one weakness that was known to me as a child: she was terrified of snakes. Despite that phobia, she occasionally dispatched the unfortunate rattlesnake that chose to use the house's concrete front stoop for a sunning rock. Their rattles went in the box.

I certainly don't begrudge Grandma her behavior toward potentially dangerous snakes. For her, any other attitude would have been unthinkable, especially with grandkids around the place. As several of the writers in this issue's theme section note, a deep fear of poisonous snakes is a widespread phenomenon in humans, transcending cultures. There may well be a genetic basis for this tendency,

which apparently is shared by some of our closest primate kin.

If the twinning impulses of fear and fascination that underlie our relations with serpents can be harnessed constructively, there may yet be time to reverse the trend of declining snake fauna worldwide. Veneration of snakes is also a broad cultural phenomenon, and perhaps one useful step toward inculcating that impulse widely is starting down the serpent of our fears and imaginations—not to overturn the serpent's mythic power but to enrich it with knowledge of snake biology. There is likely no better place to start than with herpetologist Harry Greene's marvelous book *Snakes: The Evolution of Mystery in Nature* (University of California Press, 1997). Greene's book is a masterpiece, filled with beautiful photography and myriad interesting details on snake physiology, behavior, and ecology. The sections on limbless locomotion and feeding, for example, are classics. (Ever wonder how a relatively small-diameter creature can get its head around a much larger prey item? Read this book!) Moreover, it is infused with a scientist's obvious love for Nature's diversity.

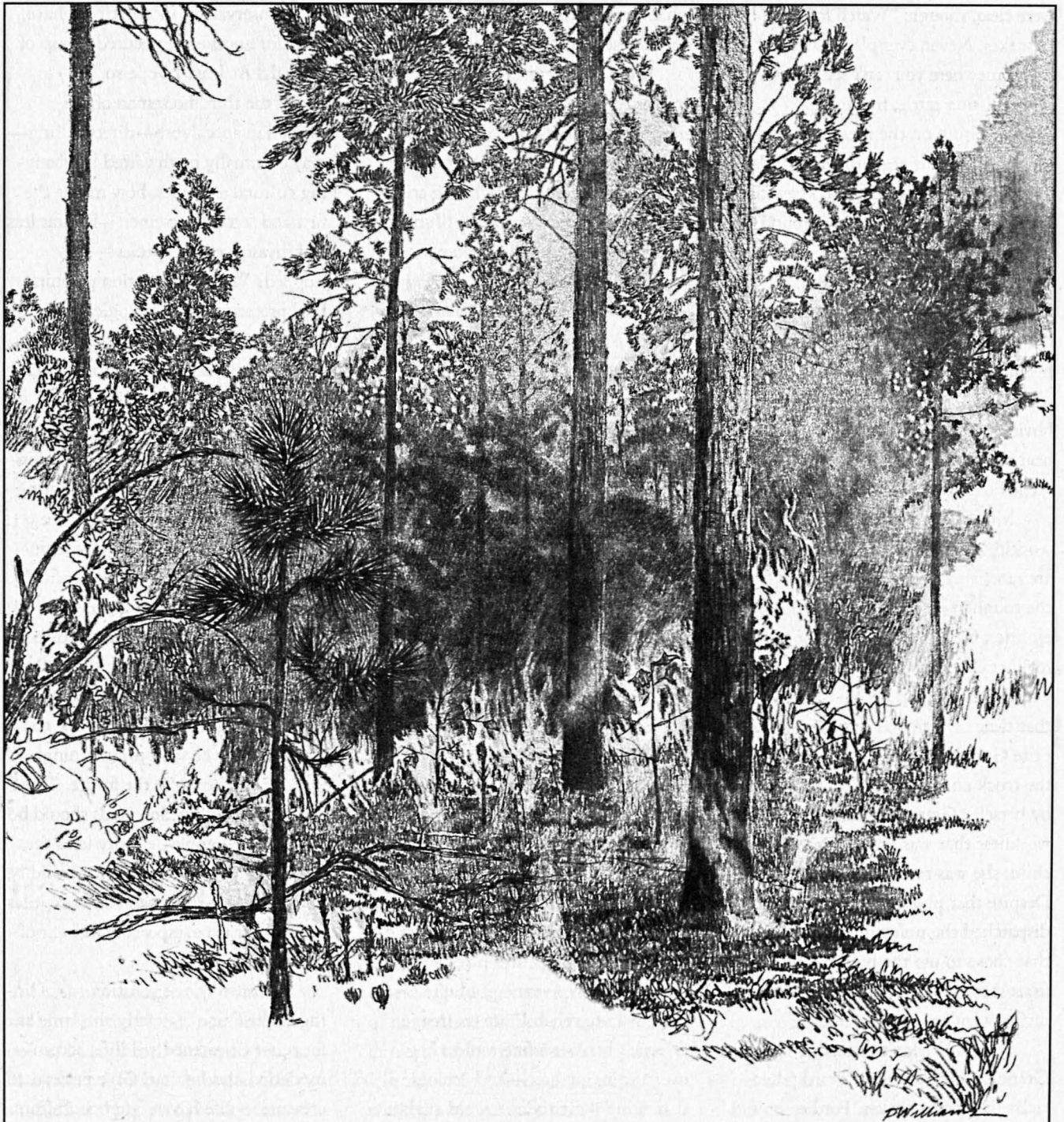
Barring the unlikely prospect that suborder Serpentes hires a really good Madison Avenue public relations firm to rehabilitate its image, Greene's book is a fine tool to begin overturning archaic—and ecologically damaging—attitudes toward snakes. Such shifts in perception take time but are certainly possible (think of public opinion toward wolves 30 years ago versus today, for instance). Surely some charismatic young herpetologist will become the popular face of snake conservation in America, emulating what Merlin Tuttle and

Bat Conservation International have done for another persecuted group of animals. At least I hope so.

If the third horseman of the extinction apocalypse—direct killing—may eventually be thwarted by changing cultural attitudes, how might the first and second horsemen—habitat loss and invasive exotic species—be stopped? With conservation planning, land protection, and ecologically astute management. Some snake species display fierce devotion to a particular place (if moved much outside their home ranges, individuals will starve to death), have specific habitat needs such as winter denning sites and summer hunting grounds (requiring a secure linkage between them), and have a low reproductive rate. Snake populations often are highly vulnerable to hostile humans, and with their limited dispersal capacity, may be slow to recolonize open territory. Establishing wildlands networks that maintain landscape connectivity may be vital to sustaining metapopulations into the future. Those systems of conservation lands should be rich in topographic diversity (and thus, in microclimates), a factor that could be key to helping snakes and other reptiles persist over time, especially in light of climate change.

Ultimately, the solution to declining snake fauna is exactly the same as for other threatened wildlife: accommodation and habitat. Give persecuted creatures a safe haven far enough from roads and most potential threats dissipate. If snake populations can be maintained long enough for public values to change, the serpents we both loathe and love may have a chance to stay alive in the wild world, and not just in our imaginations.

≈ Tom Butler



Are Rednecks the Unsung Heroes of Ecosystem Management?



by Francis E. Putz

IN THE UNITED STATES, correlates with fire suppression and population explosions of game animals appear to me to include the quality of reception of National Public Radio stations as well as local densities of Volvos and other foreign cars. Where fires are frequent and deer are scarce, densities of full-sized, American-made pickups are high, a substantial proportion of adult males lack formal employment, and per capita tofu consumption is below detectable levels. A composite independent variable that captures the essence of these relationships is the local density of what are referred to in American vernacular as "rednecks." As incendiarists and hunters, the oft-disparaged rednecks play vital but seldom recognized roles as environmental stewards, roles that are currently being only partially filled by officialdom.

Before jumping to the defense of traditional land uses and wildlife management techniques, invocation of the term "redneck" requires some justification, especially given that it can be used pejoratively. More or less equivalent names for this diverse socioeconomic and cultural designation include: English—country bumpkin, briar, hick, yokel, cracker, and hillbilly; French—*bouseaux*; Spanish—*cholo*; Russian—*zhlobs*. Many North Americans referred to as rednecks, particularly in the Southern states, are descendents of the Celtic tribes that terrorized but then were overwhelmed and ridiculed by ancient Romans, economically and geographically marginalized to the hinterlands of Scotland, Ireland, and Wales by the Anglo Saxons, and shipped to the New World and Australia as prisoners and indentured servants by the English in the eighteenth century (McWhiney 1988). According to the Oxford English Dictionary, the term "redneck" was first used in the seventeenth century in the north of England in reference to dissenters against the Anglican Church. Before the mid-twentieth century in the United States, rednecks were

often referred to as "poor whites." Recently, several redneck defenders have quite forcefully pointed out that while stereotyping people on the basis of their race, gender, religion, ethnic affiliation, or sexual orientation is frowned upon in polite society, slurring people on the basis of their socio-economic status is generally accepted (Goad 1997). On the other hand, self-effacing humor is characteristic of many people who self-identify with rednecks (e.g., Wilde 1984, Foxworthy 1989).

Among the multitude of environmental problems confronting suburbanites and ecosystem managers throughout the developed world, fire (too few and therefore too intensive) and overpopulations of deer and a number of other "weedy" wildlife species figure prominently. Fire is a particularly serious problem where houses have encroached into ecosystems that historically were maintained by frequent, low-intensity fires. To protect the houses, fires are suppressed, which results in loss of fire-dependent native species (e.g., most pines, fox squirrels, badgers, bobolinks, tortoises, quail, and red-cockaded woodpeckers), massive fuel accumulation, and wildfires that are difficult to control when they do occur. Similarly, elimination of large predators and reduced human hunting pressure have allowed populations of raccoons, foxes, opossums, and other "meso-predators" to expand, to the detriment of the many songbird species on which they prey. Finally, suburbanization and the decreased hunting with which it is associated often result in deer populations that expand to the point that regeneration of many native plant species is impeded, gardening is futile, Lyme disease goes rampant, giardia is chronic, and driving is hazardous. To address these problems, governmental employees and their contractors thin dense stands, conduct prescribed burns and, where public sentiments and budgets allow, cull populations of deer and what were formerly "game" animals but are now considered

“varmints” (e.g., opossums and raccoons). Unfortunately, for a variety of reasons including lack of funds, legal restrictions, and bureaucratic impediments, official managers of game and ecosystems are not always successful at maintaining any semblance of natural balance.

Defending the “traditional” landscape and wildlife management practices of rednecks as a partial answer to these woes is challenging for several reasons. First of all, the same traditions for which I will provide selective defenses resulted in the near or complete local extirpation of a number of noteworthy species (e.g., beavers, wolves, moose, turkeys, and bears) from much of North America in the seventeenth and eighteenth centuries as well as continuing losses of tortoises, rattlesnakes, and other target species. Secondly, many redneck traditions, such as frequent burning, sometimes at night, and without elaborate precautions, are no longer tenable given suburbanization, exurbanization, and other forms of landscape fragmentation. Finally, the fondness of many rednecks for off-road vehicles is unquestionably problematic.

Rednecks as fire ecologists

In the glare of the conflagrations that consume forests and kill fire-fighters in western and far northern North America every fire season, special care is required when trying to present fire in a positive light. Even for ecosystems that depend on frequent, low-intensity fires for their maintenance, such as prairies and savannas, it is often politically challenging to make the case that lack of fire is a problem. Urbanization of human populations compounds the problems because opportunities for first-hand experience with open fires of any sort are diminishing. Few people in the United States, for example, still use wood fuels for cooking or kerosene lamps for lighting. It is even more challenging to defend the pyrophily of “veteran woods burners,” a group profiled in a U.S. Forest Service study (Doolittle and Lightsey 1979) as a “disadvantaged culture group with antisocial tendencies.”

Before presenting a qualified defense of fire use by rednecks, I should clarify that as a scientist and landowner, I use fire in a highly sophisticated manner as an ecosystem management tool. But to be honest, I must admit to having on occasion burned more than I “planned,” sometimes substantially more, and more than occasionally without official permits.

Defenses of fire abound in the ecological literature, so I will not expound upon them at length. At least in ecosystems where fires have historically occurred at frequent intervals, prescribed fires are recommended to reduce fuel loads and

thus reduce the likelihood of uncontrollable cataclysmic fires. For plant and animal species that evolved with fire, which includes most taxa in my home state of Florida, fire is often required for reproduction and to reduce competition with more fire sensitive, invasive species. Enlightened managers of fire-maintained ecosystems therefore generally both advocate “let burn” policies and use prescribed burns to mimic historical fire regimes.

Rednecks are among a dwindling group of individuals outside of officialdom who conduct landscape-scale controlled (or somewhat controlled) burns, but their motivation for burning sometimes differs from that of certified and otherwise officially sanctioned burners. Note that here I am considering neither recklessly set fires nor the vengeful fires of arsonists, but instead focus on fires set according to traditions that may be as old as the species assemblages being burned. Some rednecks burn out of concern for ecosystem integrity, but more burn to improve hunting, to kill ticks, because the mower won't start, to expose snakes, and for fun. Of all the reasons why people burn, the recreational nature of fire has received little attention from serious researchers, perhaps because they are themselves so serious. Whatever the motivation, when



Rednecks are among a dwindling group of individuals outside of officialdom who conduct landscape-scale controlled (or somewhat controlled) burns.

cultural differences are surmounted, veteran burners have much to teach the Nomex-garbed newcomers to the field.

Fires endanger houses, especially wooden ones, but rednecks have burned fewer of their own houses than might be expected because they traditionally kept their yards free of grass and other combustibles. In fact, prior to the advent of chemlawns, carefully swept yards devoid of plant material, living or dead, were considered *de rigueur* throughout the South. Yard-sweeping is now only occasionally observed in the U.S., but is still commonplace in many developing countries. As a method for protecting houses from fires, this approach is far superior to the "firewise" landscaping techniques currently being promoted by various governmental agencies. Furthermore, yard sweeping is effective for keeping mosquitoes, tsetse flies, snakes, and other varmints at bay as well as for tracking crepuscular encroachers of the human and non-human varieties.

Regardless of whether polite society accepts woods burning as a legitimate form of recreation, it is hard to deny that fire can be fun. From the montane savannas of New Guinea, to the pampas of Argentina, and to the savannas of Africa, local people traditionally burned early and often, whatever they could get to burn, often for no better or at least more apparent reason than that it would burn. Paleontologists, palynologists, and other sorts of experts on pre-history tell us that evidence of this approach to ecosystem management goes back as far as their records of pollen, charcoal, and phytoliths (Pyne 1995). Unfortunately for many fire-dependent species of now encroached savannas and prairies, this ancient legacy is fading fast among rednecks all over the world.

I doubt that anyone knows how many thousands of acres of pineywoods and other pyrogenic ecosystems rednecks traditionally burned every year in the Southeastern Coastal Plain Province of the U.S. before Smokey Bear burst on the scene, but I am confident that the area was far larger than that which is currently being burned by the highly trained forces of all the burn-permit granting agencies combined. That rednecks typically have burned during the winter when fires are not "natural" (according to the experts) may not turn out to be such a problem as evidence accumulates for the importance of human-ignited fires in pre-history. I doubt that the Native American predecessors of rednecks, for example, hesitated to ignite winter burns if they were cold, tired of tripping over catbrier vines, looking for fallen hickory nuts, or just for the heck of it. Furthermore, it seems to me that for hardwood-beleaguered savannas in the South, any fire is better than no fire.

More significant as constraints on redneck pyrophily than employment, education, and acculturation are the combined threats of fence laws, landscape fragmentation, industrialization of agriculture, television-induced cultural homogenization, intensification of forestry, and ecologically perverse tax incentives. As wealthy people move out into the countryside, land prices go up and so do taxes as residents of the new communities demand urban-quality services in formerly rural areas. Furthermore, as the products of mechanized industrial agriculture increasingly dominate vegetable markets, labor-intensive row crop agriculture is becoming less and less lucrative and opportunities for even seasonal employment are diminishing in many rural areas. Similarly, the fire-friendly long-rotation forestry operations for which rednecks were natural managers are being replaced by densely planted short-rotation pulpwood plantations for which fire is a menace and rednecks are superfluous. Tax laws, particularly stringent definitions of for-profit agriculture and looming threats of estate taxes, make owning land particularly onerous for economically challenged rednecks who typically use low capital and low intensity approaches to land management. And as homes crop up in ecosystems formerly maintained by frequent fires, carrying out either recreational or management burns becomes increasingly problematic.

Rednecks as wildlife managers

The "deer problem" confronted by many ecosystem managers and suburbanites in the wealthy portions of the world is usually that there are too many deer. It is ironic that up until a few decades ago, and to this date in most of the poorer countries of the world, the "deer problem" was and is quite the opposite—too few deer, too many unsuccessful hunts, and too many protein-scarce days. Other species that are becoming all too familiar in backyard vegetable gardens and on BMW bumpers include wild hogs, turkeys, raccoons, and bears; some gardens are now only suited for rice or cranberries, thanks to the industrious engineering of beavers.

Populations of white-tailed deer are particularly problematic in suburban communities where they often reach densities of greater than 100 per square kilometer, some 20 times that which biologists consider "natural" (Rooney and Dress 1997). To put the gravity of the situation in perspective, several communities have hired sharpshooters to cull their deer herds at costs of up to \$100 per head (<http://www.attra.org/attra-pub/deercontrol.html>). It is hard to imagine any community with a functioning participatory

democracy agreeing to hire professional hunters armed with high-powered rifles, spotlights, and silencers to shoot deer off baits in their backyards, but it occurs frequently in some of the more affluent and politically liberal parts of the United States. These sorts of culling operations are by no means "sporting," but they are apparently very effective. Along similar lines, you can now hire packs of trained "goose buster" dogs to keep Canada geese off the greens of your golf course.

The impacts of meso-predators, like foxes and raccoons, on songbird and amphibian populations are widely lamented, but the control of these predators by coon-hunting, possum-shooting, and armadillo-smoking rednecks is not held in high regard. Suburban populations of these predators can reach astounding densities, as any early morning drive will reveal. A surprisingly high proportion of bird watchers do not even recognize that raccoons, opossums, and armadillos are edible and that these animals eat vast numbers of birds and bird eggs. Unfortunately, the knowledge of how to hunt or trap and then prepare the meats and pelts of these animals is fast disappearing. And like so many traditional redneck activities, hunting these voracious predators of birds, reptiles, and amphibians is socially shunned (or at least I am not aware of any possum hunting clothes and accessories being sold by high-end mail-order houses in Maine). Instead of being controlled by native carnivores or human hunters, populations of these meso-predators are reduced by frequent rabies epidemics, a fate that I would not wish on the peskiest possum.

Most rednecks hunt, or at least hunted before their lifestyles suffered under the combined forces of crowding and gentrification. Where there are still ample numbers of gun-toting rednecks, over-populations of deer and other game species are unlikely to develop. And if rednecks sometimes stretched the rules of hunting, at least as dictated by the sporting class, their exploits seem mild when the alternative of culling by contract hunting or poisoning are considered. While not condoning rattlesnake roundups or raptor shooting, it seems only fair to recognize the ecological benefits of the traditions of hunting of what rapidly become nuisance species after suburbanization and gentrification of rednecks.

Conclusions

Human populations densities, fence laws, house prices, and zoning regulations may be too high to allow rednecks the freedom to continue their traditions of burning and hunting, but this historically important group of ecosystem managers should not be entirely shunned. While recognizing some of

the more unsavory characteristics of stereotypic rednecks, I would like to acknowledge them for literally "taking up the torch" of the indigenous people whom they replaced in many parts of the world. And even people who do not hunt must acknowledge that a shot deer in the back of a pickup is one that they are not going to see between their headlights or munching in their garden.

Similarly, anyone who has had the pleasure of leaning on a rake while a grass fire swept gently through a pine savanna on a cold winter day (or night) is unlikely to condemn the practice of woods burning and is equally likely to acknowledge the recreational nature of fire. As the results of fire suppression become more evident and the costs of labor increase, properly controlled recreational burning may still have a role to play in ecosystem management. Perhaps I am being overly nostalgic or atavistic, but it seems a pity that the only experiences many people have with open fires are either bad or involve burning things that come with ignition instructions on the packaging. Even charcoal lighting fluid no longer flares up!

I am not suggesting that woods-burners or coon-hunters get conservation awards, but I have noticed that when rednecks are gainfully employed, educated, law-abiding, and otherwise gentrified, fuels accumulate and game animal populations explode to the point that they pose serious environmental problems. And although I do not condone destructive or anti-social activities, I hope that rednecks are recognized for the ecosystem management services that they have traditionally supplied, even if they were having fun in the process. ☺

Francis Putz is a professor of botany and forestry at the University of Florida as well as the owner and manager of 100 acres of former pine savanna and swamp. His research focuses on tropical forest conservation through sustainable use, but he also studies fire ecology and ecosystem management in the South.

SOURCES CITED

- Doolittle, M.L. and M.L. Lightsey. 1979. Southern woods-burners: A descriptive analysis. USDA Forest Service Research Paper SO-151. New Orleans, Louisiana: Southern Forest Experimental Station.
- Foxworthy, J. 1989. *You might be a redneck if...* Marietta, Georgia: Longstreet Press.
- Goad, J. 1997. *The Redneck Manifesto: America's Scapegoats — How We Got That Way and Why We're Not Going to Take it Anymore*. New York: Simon and Schuster.
- McWhiney, G. 1988. *Cracker Culture: Celtic Ways in the Old South*. Tuscaloosa, Alabama: The University of Alabama Press.
- Pyne, S. 1995. *World Fire: The Culture of Fire on Earth*. New York: Henry Holt and Company.
- Rooney, T.P. and W.J. Dress. 1997. Species loss over sixty-six years in the ground-layer vegetation of Heart's Content, an old-growth forest in Pennsylvania, USA. *Natural Areas Journal* 17:297-305.
- Wilde, L. 1984. *The Official Rednecks Joke Book*. New York: Bantam Books.

John Muir's Indian Summer

Mountains of books and biographies have given us a rich portrait of John Muir; for a review of four new titles, see page 71. Yet more remains to be learned of his life. This poem from 1871, written in his best cursive, and—uncharacteristically—signed, was found on a piece of onion-skin paper among his manuscript material. Like some of Muir's journal entries, it has never before been published. He dated it April 21; Muir fans will recognize this was his 33rd birthday. Muir drew a rectangle and composed his poem within it, and, as he did with many journal entries, he left a space at center-right open—in which he probably planned to add an illustration. Most of the poem was drafted in a warm sepia-colored ink, but there are several emendations in pencil. Can this be considered a finished work? Probably not, and the arrangement here is interpretive—but Muir's enchanted voice is unmistakable.

In the calm thoughtful Indian summer of the High Sierra, when the earliest of the Cloudland meadows are in bloom they shed their radiant snowflowers like apple orchards in the spring lightly lightly they lodge in the brown grasses and tasseled needles of the pines falling hour after hour day after day glancing and circling hither thither glinting against one another rays interlocking silently, and soon the dry grasses and the trees and the moraines and the meadows are all equally abloom again. The fall of raindrops in the thunder showers of summer is a marvelously impressive sight transparent drops, each a small world hurling free through the air like planets through space. But still more impressive is the coming of the snowflowers—fallen stars, winter daisies, giving bloom to all the ground alike. Raindrops shine gloriously in rainbows, and change to flowers in the sod but snow comes in full flower direct from the deep dark sky.

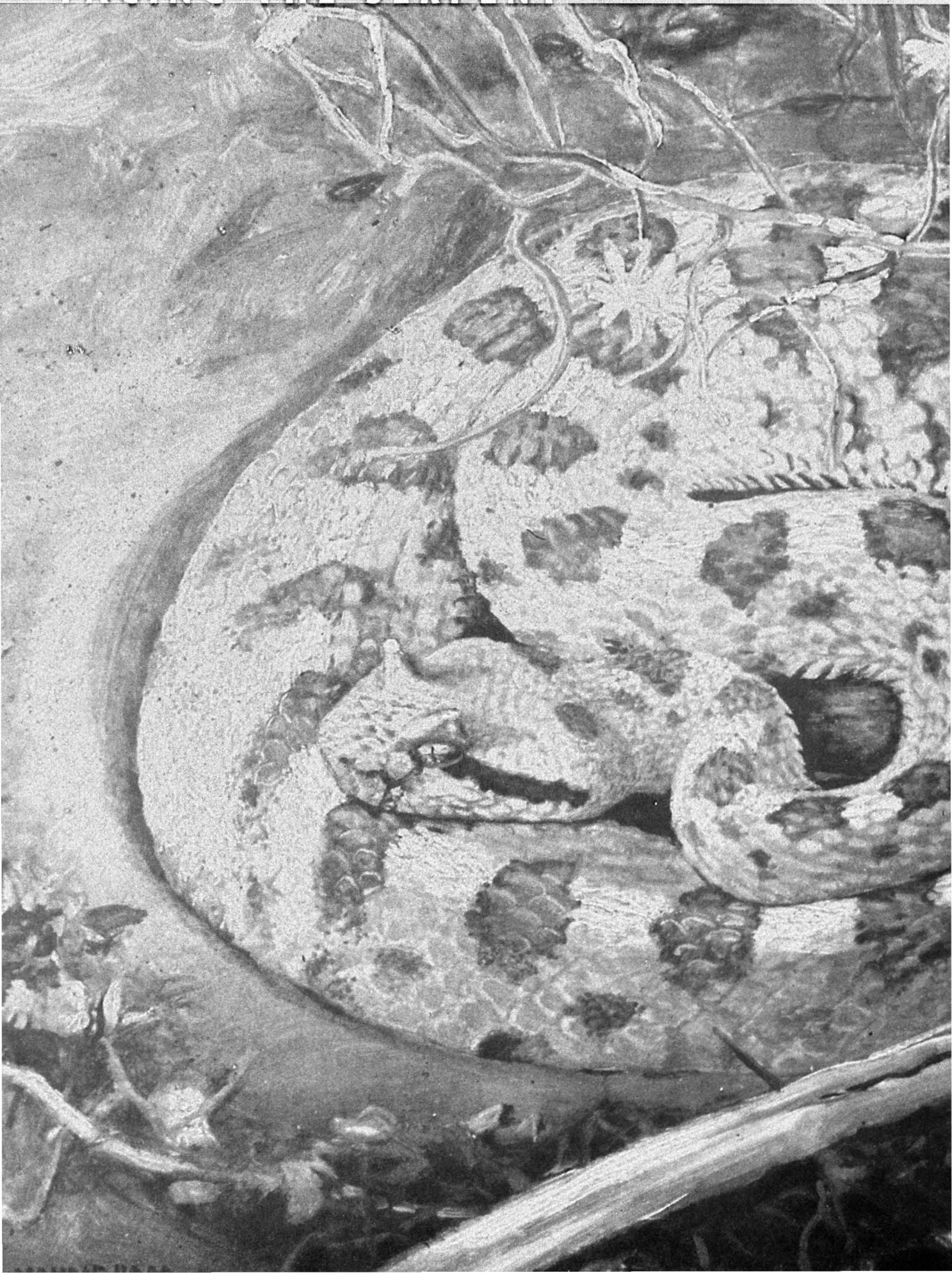
April 21.
John Muir

In the calm thoughtful Indian summer of the High Sierra, when the earliest of the Cloudland meadows are in bloom they shed their radiant snowflowers like apple orchards in the spring lightly lightly they lodge in the brown grasses & tasseled needles of the pines falling hour after hour day after day glancing & circling hither thither glinting against one another rays interlocking silently, and soon the dry grasses & the trees & the moraines & the meadows are all equally abloom again. In the summer thunder showers how impressive it is to watch the coming of

The brown meadows & forests are all open
to all the world
all the ground suddenly laden with the
glorious harvest of winter flowers

From the John Muir Papers, Holt-Atherton Special Collections, University of the Pacific Library. ©1984 Muir-Hanna Trust. We are grateful to Kit Stolz for bringing this poem to our attention and to Janene Ford, Curator of the Muir Papers, for her assistance.

FACING THE SERPENT



The mind is primed to react emotionally to the sight of snakes, not just to fear them but to be aroused and absorbed in their details, to weave stories about them.

The Serpent

by E.O. Wilson

WHAT IS IT EXACTLY THAT BINDS US so closely to living things? The biologist will tell you that life is the self-replication of giant molecules from lesser chemical fragments, resulting in the assembly of complex organic structures, the transfer of large amounts of molecular information, ingestion, growth, movement of an outwardly purposeful nature, and the proliferation of closely similar organisms. The poet-in-biologist will add that life is an exceedingly improbable state, metastable, open to other systems, thus ephemeral—and worth any price to keep.

Certain organisms have still more to offer because of their special impact on mental development. In 1984, in a book titled *Biophilia*, I suggested that the urge to affiliate with other forms of life is to some degree innate. The evidence for the proposition is not strong in a formal scientific sense: the subject has not been studied enough in the scientific manner of hypothesis, deduction, and experimentation to let us be certain about it one way or the other. Nevertheless the biophilic tendency is so clearly evinced in daily life and so widely distributed as to deserve serious attention. It unfolds in the predictable fantasies and responses of individuals from early childhood onward. It cascades into repetitive patterns of culture across most or all societies, a consistency often noted in the literature of anthropology. These processes appear to be part of the programs of the brain. They are marked by the quickness and decisiveness with which we learn particular things about certain kinds of plants and animals. They are too consistent to be dismissed as the result of purely historical events etched upon a mental blank slate.

Perhaps the most bizarre of the biophilic traits is awe and veneration of the serpent. The dreams from which the dominant images arise are known to exist in all societies whose mental life has been studied. At least five percent of the people at any given time remember experiencing them, while many more would probably do so if they recorded their waking impressions over several months. The images described by urban New Yorkers are as detailed and emotional as those of Zulus and Australian aboriginals. In all cultures the serpents are prone to be mystically transfigured. The Hopi know Palulukon, the water serpent, a benevolent but frightening

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godlike being. The Kwakiutl fear the *sisiutl*, a three-headed serpent with both human and reptile faces, whose appearance in dreams presages insanity or death. The Sharanahua of Peru summon reptile spirits by taking hallucinogenic drugs and stroking their faces with the severed tongues of snakes. They are rewarded with dreams of brightly colored boas, venomous snakes, and lakes teeming with caimans and anacondas. Around the world serpents and snakelike creatures are the dominant elements of dreams in which animals of any kind appear. They are recruited as the animate symbols of power and sex, totems, protagonists of myths, and gods.

These cultural manifestations may seem at first detached and mysterious, but there is a simple reality behind the ophidian archetype that lies within the experience of ordinary people. The mind is primed to react emotionally to the sight of snakes, not just to fear them but to be aroused and absorbed in their details, to weave stories about them. This distinctive predisposition played an important role in an unusual experience of my own, a childhood encounter with a large and memorable snake, a creature that actually existed.

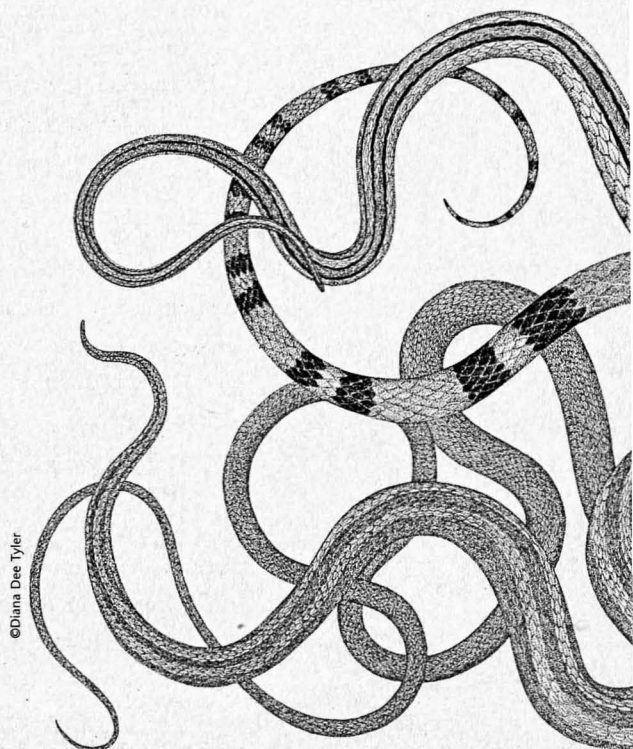
I grew up in the panhandle of northern Florida and the adjacent counties of Alabama. Like most boys in that part of the country set loose to roam the woods, I enjoyed hunting and fishing and made no clear distinction between these activities and life at large. But I also cherished natural history for its own sake and decided very early to become a biologist. I had a secret ambition to find a Real Serpent, a snake so fabulously large or otherwise different that it would exceed the bounds of imagination, let alone existing fact.

Certain circumstances encouraged this adolescent fantasy. First of all, I was an only child with indulgent parents, encouraged to develop my own interests and hobbies, however farfetched; in other words, I was spoiled. Second, the physical surroundings inclined youngsters toward an awe of nature. Four generations earlier, that part of the country had been covered by a wilderness as formidable in some respects as the Amazon. Dense thickets of cabbage palmetto descended into meandering spring-fed streams and cypress sloughs. Carolina parakeets and ivory-billed woodpeckers flashed overhead in the sunlight, and wild turkeys and passenger pigeons still counted as game. On soft spring nights after heavy rains a dozen varieties of frogs croaked, rasped, bonged, and trilled their love songs in mixed choruses. Much of the Gulf Coast fauna derived from species that had spread north from the

tropics over millions of years and adapted to the warm local temperate conditions. Columns of miniature army ants, close replicas of the large marauders of South America, marched mostly unseen at night over the forest floor. *Nephila* spiders the size of saucers spun webs as wide as garage doors across the woodland clearings.

From the stagnant pools and knothole sinks, clouds of mosquitoes rose to afflict the early immigrants. They carried the Confederate plagues, malaria and yellow fever, which periodically flared into epidemics and reduced the populations along the coastal lowlands. This natural check is one of the reasons the strip between Tampa and Pensacola remained sparsely settled well into the twentieth century and why even today, long after the diseases have been eradicated, it is still the relatively natural "other Florida."

Snakes abounded. The Gulf Coast has a greater variety and denser populations than almost any other place in the world, and they are frequently seen. Striped ribbon snakes hang in gorgonlike clusters on branches at the edge of ponds and streams. Poisonous coral snakes root through the leaf litter, their bodies decorated with warning bands of red, yellow, and black. They are easily confused with their mimics, the scarlet kingsnakes, banded in a different sequence of red, black,



©Diana Dee Tyler

snakes: San Francisco garter, scarlet king, rough green,

and yellow. The simple rule recited by woodsmen is: "Red next to yellow will kill a fellow, red next to black is a friend of Jack." Hognoses, harmless thick-bodied sluggards with upturned snouts, are characterized by an unsettling resemblance to venomous African gaboon vipers and a habit of swallowing toads live. Pygmy rattlesnakes two feet long contrast with diamond-backs of seven feet or more. Watersnakes are a herpetologist's medley distinguished by size, color, and the arrangement of body scales, encompassing ten species of *Natrix*, *Seminatrix*, *Agkistrodon*, *Liodytes*, and *Farancia*.

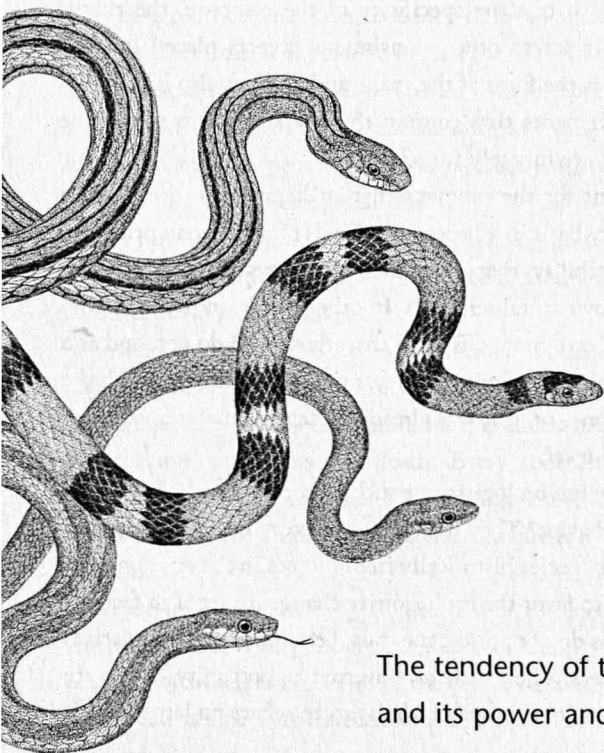
Of course limits to the abundance and diversity exist. Because snakes feed on frogs, mice, fish, and other animals of similar size, they are necessarily scarcer than their prey. You can't just go out on a stroll and point to one individual after another. An hour's careful search will often turn up none at all. But I can testify from personal experience that on any given day you are ten times more likely to meet a snake in Florida than in Brazil or New Guinea.

IT IS A WONDERFUL THING to grow up in southern towns where animal fables are taken half-seriously, breathing into the adolescent mind a sense of the unknown and the possibility that something extraordinary might be found within a

day's walk of where you live. No such magic exists in the environs of Schenectady, Liverpool, and Darmstadt, and for all children dwelling in such places where the options have finally been closed, I feel a twinge of sadness. I found my way out of Mobile, Pensacola, and Brewton to explore the surrounding woods and swamps with a languorous intensity. I formed the habit of quietude and concentration into which I still pass my mind during field excursions, having learned to summon the old emotions as part of the naturalist's technique.

Once, deep in a swamp miles from home, half lost and not caring, I glimpsed an unfamiliar brightly colored snake disappearing down a crayfish burrow. I sprinted to the spot, thrust my hand after it, and felt around blindly. Too late: the snake had squirmed out of reach into the lower chambers. Only later did I think about the possibilities: suppose I had succeeded and the snake had been poisonous? My reckless enthusiasm did catch up with me on another occasion when I miscalculated the reach of a pygmy rattlesnake, which struck out faster than I thought possible and hit me with startling authority on the left index finger. Because of the small size of the reptile, the only results were a temporarily swollen arm and a fingertip that still grows a bit numb at the onset of cold weather.

I found my Serpent on a still July morning in the swamp fed by the artesian wells of Brewton, while working toward higher ground along the course of a weed-choked stream. Without warning a very large snake crashed away from under my feet and plunged into the water. Its movement especially startled me because so far that day I had encountered only modestly proportioned frogs and turtles silently tensed on mudbanks and logs. This snake was more nearly my size as well as violent and noisy—a colleague, so to speak. It sped with wide body undulations to the center of the shallow watercourse and came to rest on a sandy riffle. Though not quite the monster I had envisioned, it was nevertheless unusual, a water moccasin (*Agkistrodon piscivorus*), one of the poisonous pit vipers, more than five feet long with a body as thick as my arm and a head the size of a fist. It was the largest snake I had ever seen in the wild. I later calculated it to be just under the published size record for the species. The snake now



The tendency of the serpent to appear suddenly in dreams, its sinuous form, and its power and mystery are the natural ingredients of myth and religion.

lay quietly in the shallow clear water completely open to view, its body stretched along the fringing weeds, its head pointed back at an oblique angle to watch my approach. Moccasins are like that. They don't always keep going until they are out of sight, in the manner of ordinary watersnakes. Although no emotion can be read in the frozen half-smile and staring yellow cat's eyes, their reactions and posture make them seem insolent, as if they see their power reflected in the caution of human beings and other sizable enemies.

I moved through the snake handler's routine: pressed the snake stick across the body in back of the head, rolled it forward to pin the head securely, brought one hand around to grasp the neck just behind the swelling masseteric muscles, dropped the stick to seize the body midway back with the other hand, and lifted the entire animal clear of the water. The technique almost always works. The moccasin, however, reacted in a way that took me by surprise and put my life in immediate danger. Throwing its heavy body into convulsions, it twisted its head and neck slightly forward through my gripped fingers, stretched its mouth wide open to unfold the inch-long fangs and expose the dead-white inner lining in the intimidating "cottonmouth" display. A fetid musk from its anal glands filled the air. At that moment the morning heat became more noticeable, the episode turned manifestly frivolous, and at last I wondered what I was doing in that place alone. Who would find me? The snake began to turn its head far enough to clamp its jaws on my hand. I was not very strong for my age, and I was losing control. Without thinking I heaved the giant out into the brush, and this time it thrashed frantically away until it was out of sight and we were rid of each other.

I sat down and let the adrenaline race my heart and bring tremors to my hand. How could I have been so stupid? What is there in snakes anyway that makes them so repellent and fascinating? The answer in retrospect is deceptively simple: their ability to remain hidden, the power in their sinuous limbless bodies, and the threat from venom injected hypodermically through sharp hollow teeth. It pays in elementary survival to be interested in snakes and to respond emotionally to their generalized image, to go beyond ordinary caution and fear. The rule built into the brain in the form of a learning bias is: become alert quickly to any object with the serpentine gestalt. *Overlearn* this particular response in order to keep safe.

Other primates have evolved similar rules. When guenons and vervets, the common monkeys of the African forest, see a python, cobra, or puff adder, they emit a distinctive chattering call that rouses other members in the group. (Different calls are used to designate eagles and leopards.) Some of the adults then follow the intruding snake at a safe distance until it leaves the area. The monkeys in effect broadcast a dangerous-snake alert, which serves to protect the entire group and not solely the individual who encountered the danger. The most remarkable fact is that the alarm is evoked most strongly by the kinds of snakes that can harm them. Somehow, apparently through the routes of instinct, the guenons and vervets have become competent herpetologists.

The idea that snake aversion is inborn in man's relatives is supported by studies of rhesus macaques, the large brown monkeys of India and surrounding Asian countries. When adults see a snake of any kind, they react with the generalized fear response of their species. They variously back off and stare (or turn away), crouch, shield their faces, bark, screech, and twist their faces into the fear grimace—lips retracted, teeth bared, and ears flattened against the head. Monkeys raised in the laboratory without previous exposure to snakes show the same response to them as those brought in from the wild, though in weaker form. During control experiments designed to test the specificity of the response, the rhesus failed to react to other, nonsinuous objects placed in their cages. It is the form of the snake and perhaps also its distinctive movements that contain the key stimuli to which the monkeys are innately tuned.

Grant for the moment that snake aversion does have a hereditary basis in at least some kinds of nonhuman primates. The possibility that immediately follows is that the trait evolved by natural selection. In other words, individuals who respond leave more offspring than those who do not, and as a result the propensity to learn fear quickly spreads through the population—or, if it was already present, is maintained there at a high level.

How can biologists test such a proposition about the origin of behavior? They turn natural history upside down: they search for species historically free of forces in the environment believed to favor the evolutionary change, to see if in fact the organisms do not possess the trait. Lemurs, primitive relatives of monkeys, offer such an inverted opportunity. They are indigenous inhabitants of Madagascar, where no large or poi-

sonous snakes exist to threaten them. Sure enough, lemurs presented with snakes in captivity fail to display anything resembling the automatic fear responses of the African and Asian monkeys.

Another line of evidence comes from studies of the chimpanzee, a species thought to have shared a common ancestor with prehumans as recently as five million years ago. Chimps raised in the laboratory become apprehensive in the presence of snakes, even if they have had no previous experience. They back off to a safe distance and follow the intruder with a fixed stare while alerting companions with the *Wab!* warning call. More important, the response becomes gradually more marked during adolescence.

This last quality is especially interesting because human beings pass through approximately the same developmental sequence. Children under five years of age feel no special anxiety over snakes, but later they grow increasingly wary. Just one or two mildly bad experiences, such as the sight of a garter snake writhing away in the grass, having a rubber model thrust at them by a playmate, or hearing a counselor tell scary stories at the campfire, can make children deeply and permanently fearful. The pattern is unusual if not unique in the ontogeny of human behavior. Other common fears, notably of the dark, strangers, and loud noises, start to wane after seven years of age. In contrast, the tendency to avoid snakes grows stronger with time. It is possible to turn the mind in the opposite direction, to learn to handle snakes without apprehension or even to like them in some special way, as I did—but the adaptation takes a special effort and is usually a little forced and self-conscious. The special sensitivity is just as likely to lead to full-blown ophidiophobia, the pathological extreme in which the mere appearance of a snake brings on a feeling of panic, cold sweat, and waves of nausea.

Why should serpents have such a strong influence during mental development? The direct and simple answer is that throughout the history of mankind a few kinds have been a major cause of sickness and death. Every continent except Antarctica has poisonous snakes. Over large stretches of Asia and Africa the known death rate from snakebite is five persons per 100,000 each year or higher. The local record is held by a province in Burma, with 36.8 deaths per 100,000 a year. Australia has an exceptional abundance of deadly snakes, a majority of which are relatives of the cobra. Among them the tiger snake is especially feared for its large size and tendency to

strike without warning. In South and Central America live the bushmaster, fer-de-lance, and jaracara, among the largest and most aggressive of the pit vipers. With backs colored like rotting leaves and fangs long enough to pass through a human hand, they lie in ambush on the floor of the tropical forest for the small warm-blooded animals that constitute their major prey. Few people realize that a complex of dangerous snakes, the "true" vipers, are still relatively abundant throughout Europe. The common adder *Viperus berus* ranges to the Arctic Circle. The number of people bitten in such improbable places as Switzerland and Finland is still high enough, running into the hundreds annually, to keep outdoorsmen on a sort of yellow alert. Even Ireland, one of the few countries in the world lacking snakes altogether (thanks to the last Pleistocene glaciation and not Saint Patrick), has imported the key ophidian symbols and traditions from other European cultures and preserved the fear of serpents in art and literature.

Here, then, is the sequence by which the agents of nature appear to have been translated into the symbols of culture. For hundreds of thousands of years, time enough for the appropriate genetic changes to occur in the brain, poisonous snakes have been a significant source of injury and death to human beings. The response to the threat is not simply to avoid it, in the way that certain berries are recognized as poisonous through a process of trial and error. People also display the mixture of apprehension and morbid fascination characterizing the nonhuman primates. They inherit a strong tendency to acquire the aversion during early childhood and to add to it progressively, like our closest phylogenetic relatives, the chimpanzees. The mind then adds a great deal more that is distinctively human. It feeds upon the emotions to enrich culture. The tendency of the serpent to appear suddenly in dreams, its sinuous form, and its power and mystery are the natural ingredients of myth and religion.

TO SUMMARIZE THE RELATION between human and snake: life becomes part of us. Culture transforms the snake into the serpent, a far more potent creation than the literal reptile. Culture, as a product of the mind, can be interpreted as an image-making machine that recreates the outside world through symbols arranged into maps and stories. But the mind does not have the capacity to grasp reality in its full chaotic richness; nor does the body last long enough for the brain to process information piece by piece like an all-purpose

computer. Rather, consciousness races ahead to master certain kinds of information with enough efficiency to survive. It submits to a few biases easily, while automatically avoiding others. A great deal of evidence has accumulated in genetics and physiology to show that the controlling devices are biological in nature, built into the sensory apparatus and brain by particularities in cellular architecture.

The combined biases are what we call human nature. The central tendencies, exemplified so strikingly in fear and veneration of the serpent, are the wellsprings of culture. Hence simple perceptions yield an unending abundance of images with special meaning while remaining true to the forces of natural selection that created them.

How could it be otherwise? The brain evolved into its present form over a period of about two million years, from the time of *Homo habilis* to the late Stone Age of *Homo sapiens*, during which people existed in hunter-gatherer bands in intimate contact with the natural environment. Snakes mattered. The

smell of water, the hum of a bee, the directional bend of a plant stalk mattered. The naturalist's trance was adaptive: the glimpse of one small animal hidden in the grass could make the difference between eating and going hungry in the evening. And a sweet sense of horror, the shivery fascination with monsters and creeping forms that so delights us today even in the sterile hearts of the cities, could keep you alive until the next morning. Organisms are the natural stuff of metaphor and ritual. Although the evidence is far from all in, the brain appears to have kept its old capacities, its channeled quickness. We stay alert and alive in the vanished forests of the world. ☾

Edward O. Wilson is Pellegrino University Professor and curator of entomology at the Museum of Comparative Zoology at Harvard University. His many books include *Naturalist* (1994), *Consilience* (1998), and *The Future of Life* (2002). On *Human Nature* (1978) and *The Ants* (1990, co-authored with Bert Holldobler) won the Pulitzer Prize.

Snakes in the Balance

David Suzuki, host of the television series *The Sacred Balance*, is on a quest to understand humanity's place in Nature. No wonder, then, that Dr. Suzuki asked his old friend, E.O. Wilson, to share with viewers his philosophy on "biophilia" and his deep connection to many of the least understood creatures on the planet—including snakes. Dr. Wilson is featured in the final episode of *The Sacred Balance*; this 4-part television series will air on many PBS stations starting September 3.

The Wildlands Project is a proud partner in *The Sacred Balance* outreach campaign bringing informal science activities to museums, classrooms, and public libraries. Meet David Suzuki on a Sacred Balance tour starting September 2 in Washington DC, and traveling to New York City, September 4; St. Louis, September 5; San



David Suzuki and E.O. Wilson share a serpent.

Francisco/Berkeley, September 7; Dallas, September 9; and Atlanta, September 10. Science and technology museums will partner with local PBS stations to screen series segments—it's an opportunity to hear a presentation from Dr. Suzuki and connect with local conservation efforts. For more information visit www.sacredbalance.com/outreach.

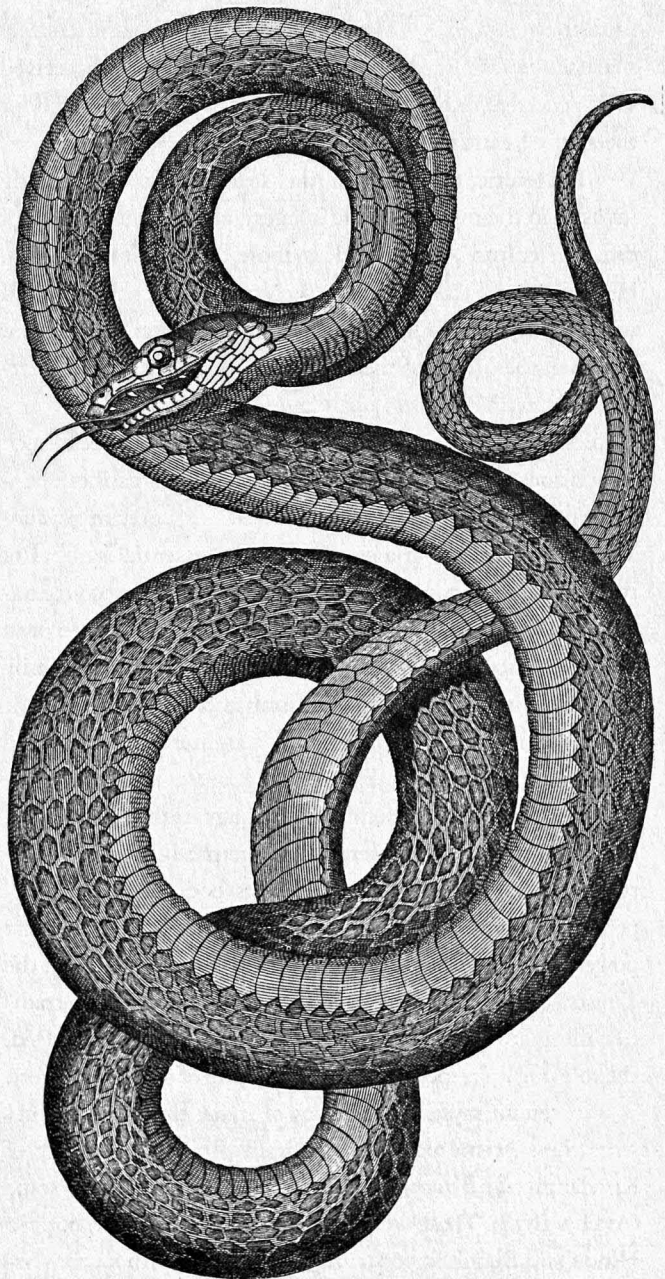
Serpentes, *the Ultimate Other*

by Eileen Crist



SNAKES MAY CLASSIFY as the ultimate “other.” They have evolved powerful and graceful forms of movement without legs. Their bodies vary in thickness and length according to whether they chase or ambush their prey; some snakes stay stock still, moving the tip of their tails in wormlike fashion to lure unwary animals. Arboreal snakes have evolved prehensile tails to hang from branches and pluck their meals, chiefly birds and bats, from the air. The gaze of snakes appears fixed and mesmerizing because their transparent eyelids are permanently closed. Despite the liquid feel of their appearance to the human eye, they are dry to the touch. Snakes are often exquisitely patterned and colored, or exhibit a uniform iridescent sheen. The battles of male snakes are so stylized, they are easily mistaken for courtship dances. To most people, snakes are strange.

The careful observation of naturalists and laboratory research has expanded our knowledge of fascinating snake biology. Some snakes lay eggs, while others give live birth. Boas, pythons, and pit vipers can detect minute fluctuations of temperature and can strike prey accurately even in complete darkness. Forty percent of venomous bites are “dry”—the snake does not inject poison. Male snakes have two penes,



each one mis-named a hemipenis, with which they typically alternate from mating to mating; the penes are often bifurcate and are sometimes ornamented with spines, spinules, flounces, and so forth. Some species, such as rattlesnakes and cobras, stay locked in coitus for six to twelve hours, or more.

Coming across any snake is always a thrilling wilderness experience. This thrill has been honored in the collective consciousness of humanity through the myths of ancient and modern cultures, as well as in the universal occurrence of snake folktales and dreams. No other creature has received such pervasive recognition as the snake for its beauty and for the symbolic intimations of its elegant form.

The erotic resonance of the snake's form is regularly invoked in the myths, artistic imagery, and religious beliefs of different cultures—as varied as those of ancient Babylonia, Hinduism, and the Celts. The serpent is frequently affiliated with fertility and virility, and associated deities and rituals; for example, the Hopis of the American Southwest handled rattlesnakes with “reckless abandon” during rainmaking ceremonies (Mundkur 1983). Certain healing traditions echo such associations in the belief that ingesting snake organs can confer sexual prowess. Among other traditions, modern psychoanalysis has avowed the serpent as quintessential symbol of the phallus—a proposition readily admissible by commonsense. Indeed, encountering the snake/serpent in waking or in dreams can play the strings of the subconscious: as Emily Dickinson writes in the closing stanza of her poem on the snake, “this Fellow” brings about “a tighter breathing, And Zero at the Bone.”

The dragon, a chimera that amalgamates many animals, is arguably the most powerful creature the human imagination has created: the foundation of its body-plan is the serpent. Emblem of intelligence, shrewdness, mystery, and power, the dragon appears in cultures as diverse as those of the Taoists, the ancient Greeks, and the Celts. Fairytales traditionally picture the dragon as guardian of treasures; indeed, the role of gatekeeper is a recurrent theme of serpent imagery.

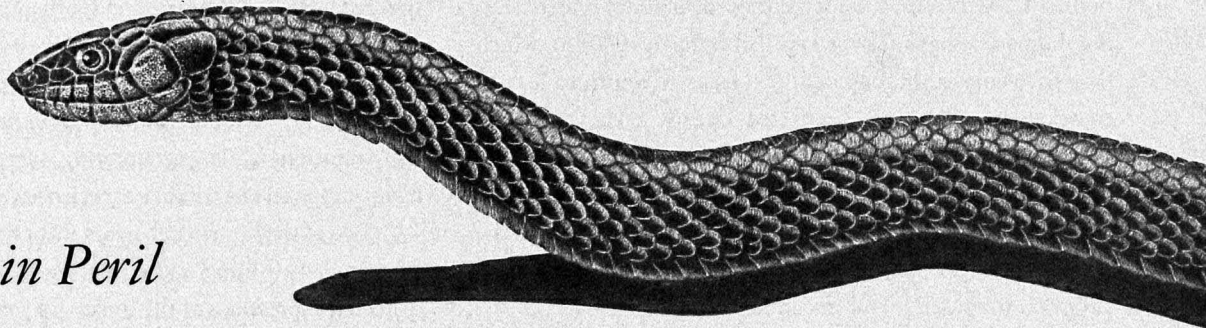
In certain mystical traditions of India, the serpent represents the supreme power in the human body, the energy of Kundalini coiled (and fast asleep) at the base of the spine (Avalon 1974). Those who have awakened this power, both in Hindu and Buddhist portrayals, are pictured with a cobra rising along the spine and spreading her protective hood over their heads. In Christianity, the snake has a star role in the myth of

While it is widely recognized that amphibians are in trouble worldwide, it is less well known that snakes—which are grouped in the suborder of Serpentes of the class of Reptiles—face a similar predicament. “Sadly, snakes are disappearing from many parts of the globe where they used to be common,” writes herpetologist Chris Mattison, “just when we are starting to understand their place in the world.” Twenty percent of reptiles and twenty-five percent of amphibians are estimated to be endangered or vulnerable. The decline of herpetofauna—reptiles and amphibians—is a consequence of multiple factors, including habitat destruction, exotic species, pesticides, roadkill, and direct persecution, and their compounded effects. Some scientists anticipate that climate change will also exacerbate the blow on herpetofauna. These animals are particularly vulnerable to climactic conditions, for they are physiologically tuned to external temperatures, often require water for their reproductive cycles and/or survival, move at a crawling pace, and are unable to cross dry, steep, or otherwise forbidding terrain.

Habitat destruction has driven many snakes to the brink of extinction—especially island and other highly endemic species. For example, three boa species of Madagascar are threatened with extinction; the Jamaican boa is confined to a fraction of its original range; and virtually all boas of the West Indies are endangered. Examples on the North American continent include the San Francisco garter snake, the massasauga rattlesnake (found from southern Ontario and New York diagonally across to southeastern Arizona and northern Mexico), and two species of salt marsh snake in the Southeast. Snakes adapted to continental forests also suffer great losses in numbers from logging and fragmentation. The Indian python, for instance, has declined precipitously as forests have been converted to agriculture. Habitat fragmentation often goes hand-in-hand with road construction, and road kills add up to thousands of snake deaths each year.

Nonnative species are also having an injurious effect. The mongoose, intentionally introduced in the Caribbean as a weapon against venomous snakes, has

Snakes in Peril



caused the decline of several snake species on the islands. Fire ants, brought to the United States from South America, enter the eggs when snakes start to hatch and eat the newborns. Three exotic species—cats, rats, and goats—have had pronounced negative effects on snake fauna worldwide. All three are implicated in the probable extinction of the Indian Ocean's Round Island boa, which has not been seen since 1975. The Antigua racer, found only on the island of Antigua, faces extinction because of introduced rats.

The effects of pesticides on snakes have not been studied as extensively as in the case of frogs, but circumstantial and direct evidence is emerging that chemicals are taking a toll. In a study of two adjacent valleys in southern Texas, one pesticide-free and the other sprayed, the latter was found to lack egg-laying snake species. More blatantly, the use of the highly toxic chemical dieldrin in Africa against tsetse flies has killed many snakes.

These factors are hardship enough for any group of animals, but problems for snakes do not end here. Snakes everywhere—especially rare species—are threatened by live trafficking; according to Chris Mattison, “tens if not hundreds of thousands of snakes trade hands every year.” And snakes are additionally threatened by direct persecution: many snake-skins are exported from Asia, South America, and Africa to the consumers of wealthy European countries, the United States, and Japan. In Asia, snake body parts are believed to have curative or aphrodisiac qualities. The venom of vipers and cobras is highly coveted in Chinese medicine, while snake bladders are regarded as having healing and virility boosting

properties. In China and Thailand snakes are treated as a “crop” for medicinal products—and they’re not being harvested sustainably. Even in India, despite ancient religious reverence and contemporary law, the endangered Indian python is killed for its oil which is thought to heal. And, in the southern U.S., in traditional events called “roundups,” brutal techniques are employed for killing and capturing rattlesnakes. They are sold for skins and meat, or milked for their venom; even snakes that survive capture and are released do not live, because they are highly dependent on their familiar home territory. The western diamondback rattlesnake has been the most affected by roundups, with some local populations virtually eliminated.

In short, hundreds of thousands of snakes are killed annually the world over for their marketable products—and simply from fear. —Eileen Crist

SOURCES AND RECOMMENDED READING

- Barth, Kelly. 2001. *Snakes: Endangered Animals and Habitats*. San Diego: Lucent Books.
- BBC News. December 2001. China's snakes “at risk.” <http://news.bbc.co.uk>
- Ernst, Carl and George Zug. 1996. *Snakes In Question: The Smithsonian Answer Book*. Washington D.C.: The Smithsonian Institution Press.
- Mattison, Chris. 1999. *Snake: The Essential Visual Guide to the World of Snakes*. New York: DK Publishing, Inc.
- Mattoon, Ashley. 2001. Deciphering Amphibian Declines. In *State of the World 2001*, ed. Lester Brown et al., 63–82. W.W. Norton & Company.
- Ricciuti, Edward. 2001. *The Snake Almanac: A Fully Illustrated Natural History of Snakes Worldwide*. New York: The Lyons Press.
- Schneider, Stephen and Terry Root. 1998. Climate Change. In *Status and Trends of the Nation's Biological Resources*, ed. M. J. Mac. et al., 89–116. US Department of the Interior, US Geological Survey.
- Tuxill, John. 1998. *Losing Strands of Life: Vertebrate Declines and the Conservation of Biological Diversity*. Worldwatch paper 141.

Genesis. Unfortunately, the Christian interpretation that prevailed has demonized the animal—and no doubt fueled attitudes of fear and loathing. But more sophisticated interpretations of Genesis regard the serpent as mediator of understanding: human beings must be expelled from the Garden, which they have enjoyed unconsciously, in order to return to it with conscious appreciation in a perfected state (Svoboda 1995). The early Christian Gnostics revered the serpent as “Instructor” (Pagels 1979). An offshoot of the Gnostics, the sect of Ophites, explicitly celebrated the cult of the serpent. “We venerate the serpent,” they proclaimed, “because God has made it the cause of Gnosis [knowledge] for mankind” (Doresse 1986).

It is notable that both Kundalini and Christian imagery represent the serpent as gatekeeper of extraordinary power—be that power conceived as energy or awareness. The two snakes intertwined around the caduceus, symbol of the medical profession, evoke the serpent as gateway to healing.

The longstanding symbolic associations of the snake are in keeping with the biophilia hypothesis—the proposition that there is an innate human inclination to affiliate with other living beings (Wilson 1984). The arcane secrets guarded by the serpent according to potent myths, coupled with the powers snakes are supposed to confer to those who wear or consume their body parts, belie an unqualified, monolithic notion of a genetic tendency to fear snakes. While it is true that fear of snakes is prevalent enough that we have a word for it—*ophidiophobia*—it is worth noting that serpent worship has been sufficiently ubiquitous to also own a term—*ophiolatry*.

Our complexities of behavior and belief suggest that human beings have a deep fascination with snakes that

emerges at the intersection of diverse sources: the snake’s undeniable aesthetic otherness; the erotic intimations of its form; and a plausible genetic “memory” of danger revealed in the readiness, of humans and other primates, to learn a healthy wariness in the presence of these animals. Interwoven, these elements create the serpent’s mystique and power in the human mind: encountering snakes in waking life galvanizes the attention while encountering serpents in dreams is a haunting, even electrifying experience.

Two of the human behaviors that critically threaten snake fauna today—killing and collecting—may be understood as distorted expressions of the innate fascination with snakes. As long as fascination is unconscious (by which I do not mean repressed, but unacknowledged) then cultural indoctrination can transmute it into fear. The intrinsic otherness of the snake facilitates the reduction of the rich response of fascination to the one-dimensional reaction of fear.

The deeper nature of this fear is, I believe, a fear to love the other. Such love is exacting, for it requires an openness to include a creature in one’s broadly-conceived “community” that does not even remotely reflect one’s self. But fear to love does not extinguish love. Biophilia persists, ecopsychologists might argue, in the southerner’s flaunting of rattlesnake parts on his boots, hat bands, and belts. While superficially this is a display of domination over the other, at a deeper layer it may express a desire for communion. Perhaps such an interpretation seeks a silver lining where there is none: but perversion of love is a reasonable (though not provable) explanation for such contradictory behavior as being magically empowered by a creature that is loathed and destroyed.

Throughout human history, and in all cultures, the serpent has been agent and symbol in folklore, myth, religion, and dreams.



Keeping these animals as pets or in collections is a more obvious expression of human fascination with snakes. The beautiful and venomous coral snake kept in a glass tank, for example, is intended first and foremost to feast the eyes. By keeping the snake, the owner attempts to secure an ever-available source of *fascination*—of “being attracted irresistibly, as by beauty or other qualities; of being held spellbound, as by terror or awe” (Webster’s definition). But success at recreating the experience of fascination is dubious, because enslavement demolishes the mystery, grace (or chance), freedom, home context, and even danger that constitute the ingredients of the thrill in encountering the other in the wild.

In his essay “The Serpent,” E.O. Wilson observes that in the dance between nature and culture, the “snake” became transformed into the “serpent.” Throughout human history, and in all cultures, the serpent has been agent and symbol in folklore, myth, religion, and dreams. Modern science dips into the power of such lore by turning around and naming the suborder of snakes *Serpentes*. Scientific knowledge further magnifies the human fascination with snakes by the revelation of remarkable intricacies of their ecological adaptations. The snake/serpent underscores the truism that the living world and our stories are inseparably intertwined. The snake/serpent also intimates, less obviously, that if we are as rich as our stories are rich, we become depauperate when we destroy the living world. *Serpentes* are thus a gateway to yet another (still arcane) secret: that in honoring the other, we honor ourselves. ☾

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SOURCES CITED

- Avalon, Arthur. 1974 (1918). *The Serpent Power*. New York: Dover Publications, Inc.
- Doresse, Jean. 1986 (1958). *The Secret Books of the Egyptian Gnostics*. Rochester, VT: Inner Traditions International.
- Mundkur, Balaji. 1983. *The Cult of the Serpent: An Interdisciplinary Survey of its Manifestations and Origins*. Albany: State University Press of New York Press.
- Pagels, Elaine. 1979. *The Gnostic Gospels*. New York: Vintage Books.
- Svoboda, Robert. 1995. *Aghora II: Kundalini*. Albuquerque: Brotherhood of Life, Inc.
- Wilson, E.O. 1984. *Biophilia: The Human Bond with Other Species*. Cambridge: Harvard University Press.
- Wilson, E.O. 1996. “The Serpent,” in *In Search of Nature*. Washington D.C.: Island Press/Shearwater Books, 3–30.

A narrow Fellow in the Grass
Occasionally rides —
You may have met Him — did you not
His notice sudden is —

The Grass divides as with a Comb —
A spotted shaft is seen —
And then it closes at your feet
And opens further on —

He likes a Boggy Acre
A Floor too cool for Corn —
Yet when a Boy, and Barefoot —
I more than once at Noon

Have passed, I thought, a Whip lash
Unbraiding in the Sun
When stooping to secure it
It wrinkled, and was gone —

Several of Nature’s People
I know, and they know me —
I feel for them a transport
Of cordiality —

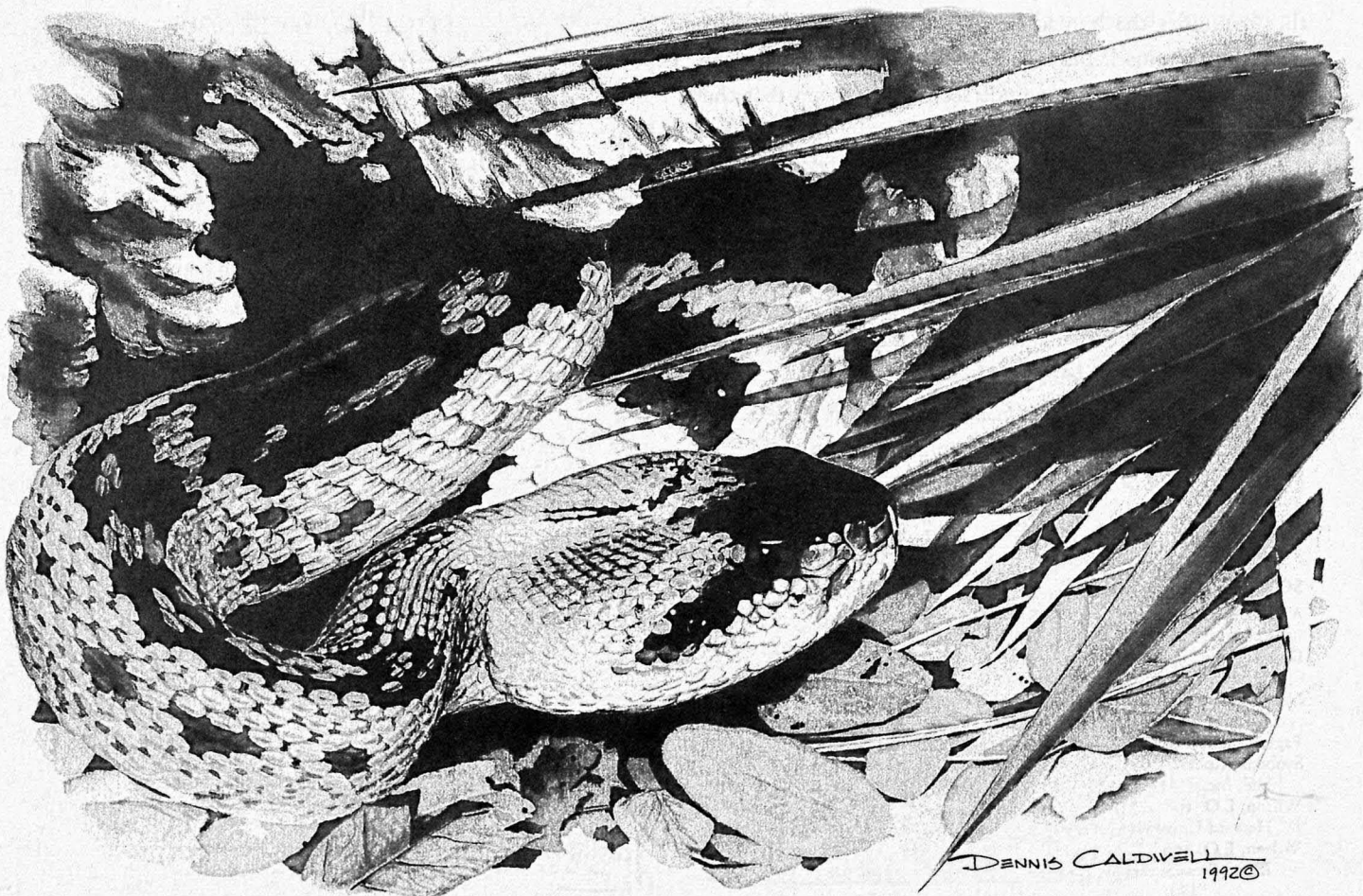
But never met this Fellow
Attended, or alone
Without a tighter breathing
And Zero at the Bone —

☞ **Emily Dickinson** (1830–1886)

Appreciating Rattlesnakes

by Harry W. Greene

"IN THE END, we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught." If ever a group of organisms exemplified Senegalese conservationist Baba Dioum's summary of the interplay among nature appreciation, education, and research, it's dangerous snakes. Venomous reptiles encapsulate the problems of living with animals that might kill us, as well as our reluctance to care about slithering, unpopular creatures—empathy is understandably a stretch when it comes to animals without fur or feathers, the more so when they lack limbs and moveable eyelids. Nevertheless, if people can appreciate rattlesnakes then turkey vultures and badgers should be easy, and having focused much of my research and teaching career on pitvipers, I am guardedly optimistic. Rattlesnakes have declined in abundance in many areas and some species are now threatened or endangered, but we have learned much about their ecology and behavior in the last 20 years, and our newfound knowledge is assuming an ever larger role in education and conservation.



In 1991, Pulitzer Prize-winning journalist Natalie Angier visited my lab in Berkeley for a piece she was writing on pitvipers for the *New York Times*. First I explained how surgically implanted radio transmitters had recently revolutionized snake biology, permitting herpetologists to study the predatory behavior and social lives of these generally secretive animals. As we looked over several of my live rattlesnakes, maintained as long-term captives for teaching, I pointed out that many of us have abandoned the old macho way of handling them. Pinning and manually restraining a snake's head often causes it to struggle violently, thereby increasing risk of injury to both animal and researcher. Instead, we now use a shepherd's crook-like "snake hook" to gently prod an animal part-way into a plastic tube, such that it can be carefully grasped at midbody with the front end safely inside the cylinder. One of the major payoffs of our ability to reliably and humanely observe rattlesnakes is that they have turned out to be fascinating animals, exemplifying far more than just their namesake antipredator adaptation.

A few minutes later, while Natalie gingerly touched a "tubed" Great Basin rattlesnake's buzzing tail and marveled at the velvety feel of its gray and charcoal-brown skin, I told her my pipe dream that someday nature tourists would sign up for supervised visits to a timber rattlesnake den. Natalie was obviously open to the beauty of snakes and keen on public education—her "Pitviper's life: bizarre, gallant and venomous" soon ran as a lead article in the weekly *Science Times* section—but the idea of *wanting* to go see wild rattlesnakes must have sounded preposterous because even she reacted with irony: "Ah, yes, get my travel agent." I was only sorry that because timber rattlesnakes aren't found anywhere near Berkeley, I had no prospects for setting up such a trip.

I deliberately imagined timber rattlesnakes as a test case for appreciating venomous reptiles because of their unusual cultural and conservation status. Captain John Smith mentioned this large species in his "A Map of Virginia, with a Description of the Countrey..." published in 1621, and rattler flags with the motto "Don't Tread on Me" were popular during the Revolutionary War. Unlike Benjamin Franklin [see sidebar], some of the roughly three million Europeans in North America at that time no doubt disliked rattlesnakes, but so few of them could not cause a potentially irreversible decline in a widespread, abundant species.

Scarcely two centuries later, with the U.S. human popu-

lation having increased almost a hundredfold, timber rattlesnakes are endangered or already extinct in some parts of their former range. This unfortunate predicament stems from a collision between their biology and our behavior, despite the fact that these elegant creatures cause few snakebite accidents and are among the larger predators in their ecosystems. Timber rattlesnakes at cold latitudes are evolutionarily designed for low adult death rates and they have slow population turnover: females require nine or more years to reach maturity, breed only every three to five years, give birth to about ten large young in a litter, and thus might only reproduce a few times during a 25-year lifetime. Those life history traits leave a population highly vulnerable to unexpected mortality, and because during winter months the snakes aggregate at rock outcrops, entire populations have been wiped out by marauding humans. The majority of historically active dens in the northeastern United States are now inactive because of persecution and habitat destruction, and only small, isolated colonies persist in areas where rattlesnakes were once common. Moreover, timber rattlesnakes use a winter den, a summer hunting range, and transient areas, annually traveling hundreds of yards or more among them. A healthy population must therefore encompass enough land to include all three sites, and even that might not assure dispersal and gene flow to neighboring den groups.

Fast forward to June, 2001, two years after I'd moved to Cornell University and met with leaders of a regional group dedicated to preserving wild places in upstate New York. The Finger Lakes Land Trust was purchasing Steege Hill because it encompassed a timber rattler den, and that property was just across the Chemung River from a Nature Conservancy preserve that also harbors rattlesnakes. Now the Trust wanted to spotlight rattlesnakes in their new summer "Talks and Treks" series for the public, and I finally got my chance. I began by recounting a 15-year field study of 50 telemetered Arizona black-tailed rattlesnakes, done in collaboration with Tucson physician David L. Hardy. We've watched some individual blacktails for more than nine years, and Dave's superb color photographs have captured most aspects of their behavior in Nature. I explained that the first slide was the only one I'd show of a rattlesnake in full threat display, head drawn back and ready to strike, and that rather than being aggressive the snake was reacting defensively, out of something akin to fear, to a different photographer's close approach.

As researchers we strive to not disturb snakes and thus rarely see defensive postures, and so Dave's images instead illustrate their complex, sometimes idiosyncratic lifestyles. Like most other rattlesnakes that have been studied, blacktails hunt for wary rodents and rabbits, find safe places to lay around after big meals, search for mates and wrestle with sexual opponents, court and copulate, give birth, and even briefly attend their young. Blacktails repeatedly visit certain places within their well-circumscribed home ranges; they occasionally and thus far inexplicably climb trees; and once we saw one seemingly solve an unexpected dilemma in a surprising fashion. No. 41, a large male, crawled into a shady ravine, tongue-flicked around a rodent runway for 13 minutes, and moved back into a hunting coil with his head aimed across the prospective ambush site. Then after two minutes he extended

his head and neck in a stereotyped posture typically used to fight with other males and pressed down a dried fern a few inches in front of him. Will future studies confirm the tantalizing possibility that male 41 knew a dead plant might thwart his strike, hours or even days later, then acted accordingly? Did that animal really exhibit what psychologists call inferential reasoning, whereby a novel problem is solved by generalizing from some previous experience, in this case perhaps the toppling of a rival male?

After the slide lecture, with the audience seated at a safe distance, I used a snake hook to lift an adult timber rattlesnake out onto the floor. I kept a careful eye on the four-foot-long reptile as it coiled quietly or crawled slowly nearby, and I described the rational dangers of snakebite; accidents with this species are rare and with proper medical treatment

The Rattlesnake as a Symbol of America by Benjamin Franklin

EDITOR'S NOTE *During the American Revolution, many colonists adopted the serpent as one of their own—it appeared on money, buttons, pamphlets and newspapers, and, of course, flags. One famous arrangement bears a coiled rattlesnake, ready to strike, against a yellow background. Why a rattlesnake? Its symbolic merits were expounded in the following letter, published in the Pennsylvania Journal, December 27, 1775. Signed "An American Guesser," most scholars now believe it was penned by the protean Benjamin Franklin.*

I OBSERVED ON ONE of the drums belonging to the marines now raising, there was painted a Rattle-Snake, with this modest motto under it, "Don't tread on me." As I know it is the custom to have some device on the arms of every country, I supposed this may have been intended for the arms of America; and as I have nothing to do with public affairs, and as my time is perfectly my own, in order to divert an idle hour, I sat down to guess what could have been intended by this uncommon device—I took care, however, to consult on this occasion a person who is acquainted with heraldry, from whom I learned, that it is a rule among the learned of that science "That the worthy properties of the animal, in the

crest-born, shall be considered," and, "That the base ones cannot have been intended;" he likewise informed me that the ancients considered the serpent as an emblem of wisdom, and in a certain attitude of endless duration—both which circumstances I suppose may have been had in view. Having gained this intelligence, and recollecting that countries are sometimes represented by animals peculiar to them, it occurred to me that the Rattle-Snake is found in no other quarter of the world besides America, and may therefore have been chosen, on that account, to represent her.

But then "the worldly properties" of a Snake I judged would be hard to point out. This rather raised than suppressed my curiosity, and having frequently seen the Rattle-Snake, I ran over in my mind every property by which she was distinguished, not only from other animals, but from those of the same genus or class of animals, endeavoring to fix some meaning to each, not wholly inconsistent with common sense.

I recollected that her eye excelled in brightness, that of any other animal, and that she has no eye-lids. She may therefore be esteemed an emblem of vigilance. She never begins an attack, nor, when once engaged, ever surrenders: She is therefore an emblem of magnanimity and true courage. As if anxious to pre-

even a serious bite is likely to be survivable. Then I pointed out that there are about 2,500 species of snakes, all of them capable of an array of limbless locomotor styles that we can scarcely imagine: undulatory, rectilinear, concertina, and so forth. About ten percent of all snake species are vipers, characterized by hypodermic needle-like, folding fangs with which they inject a cocktail of immobilizing agents and digestive enzymes into their prey. Thus armed, a viper can subdue and digest prey up to about one and a half times its own weight—imagine the average American male eating a 250-pound hamburger without benefit of hands or silverware! Roughly two-thirds of the species of vipers, including North American copperheads and cottonmouths, have heat-imaging pits between the nostrils and eyes, and of those pitvipers, about 30 New World species possess an amazing noise-mak-

ing namesake on the ends of their tails. The rattle itself is an interlocking set of shed skin segments, vibrated at around 60 times per second by specialized tail shaker muscles, and is used only to warn away enemies.

I closed the lecture by briefly telling my audience about the natural history and conservation status of timber rattlesnakes, using information gleaned mainly from William S. Brown's pioneering studies in eastern New York. Newly informed about snake biology, people responded to the live rattler with comments like "beautiful," "awesome," and "Isn't it wonderful to be able to see this animal up close!" There were inevitably questions too, ranging from, "Can you tell a rattlesnake's age by the number of rattles?" (no; a segment is added each time a snake sheds its skin, usually several times each year, and old segments are worn off) to, "Are rattlesnakes

vent all pretensions of quarreling with her, the weapons with which nature has furnished her, she conceals in the roof of her mouth, so that, to those who are unacquainted with her, she appears to be a most defenseless animal; and even when those weapons are shown and extended for her defense, they appear weak and contemptible; but their wounds however small, are decisive and fatal. Conscious of this, she never wounds 'till she has generously given notice, even to her enemy, and cautioned him against the danger of treading on her.

Was I wrong, Sir, in thinking this a strong picture of the temper and conduct of America? The poison of her teeth is the necessary means of digesting her food, and at the same time is certain destruction to her enemies. This may be understood to intimate that those things which are destructive to our enemies, may be to us not only harmless, but absolutely necessary

to our existence. I confess I was wholly at a loss what to make of the rattles, 'till I went back and counted them and found them just thirteen, exactly the number of the Colonies united in America; and I recollected too that this was the only part of the Snake which increased in numbers. Perhaps it might be only fancy, but, I conceited the painter had shown a half formed additional rattle, which, I suppose, may have been intended to represent the province of Canada.

'Tis curious and amazing to observe how distinct and independent of each other the rattles of this animal are, and yet how firmly they are united together, so as never to be separated but by breaking them to pieces. One of those rattles singly, is incapable of producing sound, but the ringing of thirteen together, is sufficient to alarm the boldest man living.

The Rattle-Snake is solitary, and associates with her kind only when it is necessary for their preservation. In winter, the warmth of a number together will preserve their lives, while singly, they would probably perish. The power of fascination attributed to her, by a generous construction, may be understood to mean, that those who consider the liberty and blessings which America affords, and once come over to her, never afterwards leave her, but spend their lives with her. She strongly resembles America in this, that she is beautiful in youth and her beauty increaseth with her age, "her tongue also is blue and forked as the lightning, and her abode is among impenetrable rocks." —*An American Guesser*



evil?" I answered that last one by saying I have no special theological knowledge, but as a former ambulance driver and army medic, what I've seen and regarded as evil has always been perpetrated by humans. With venomous snakes, I speculated, perhaps we can contemplate violence and mortality without anthropocentric implications, and thereby gain a little clarity in such matters.

On the following Saturday morning a dozen or so snake enthusiasts, primed with background knowledge of their quarry, joined me at the Tanglewood Nature Center in Elmira. Our leaders were Art Smith and his daughter Polly Blackwell, lifelong area residents and stewards of The Nature Conservancy's Frenchman's Bluff Preserve. Art, a retired optometrist, seems to know every rattler on the property, and over the next three hours he and Polly guided us to several rock outcrops, situated under openings in the forest canopy. By early summer, males and the adult female snakes that are not breeding this year have dispersed into the surrounding woods, lying in ambush for mice and chipmunks. Pregnant timber rattlesnakes, however, remain at good basking sites close to the winter dens, the better to maintain elevated body temperatures for their developing litters. The first few clearings we visited that morning yielded several common garter-snakes, resplendent in their black and yellow stripes, but no rattlers. As we approached the last rock pile though, while we were still about 20 feet out, Art signaled with upraised hand for us to halt quietly. Other than the leaders, no one in our group had ever seen a wild timber rattler in New York.

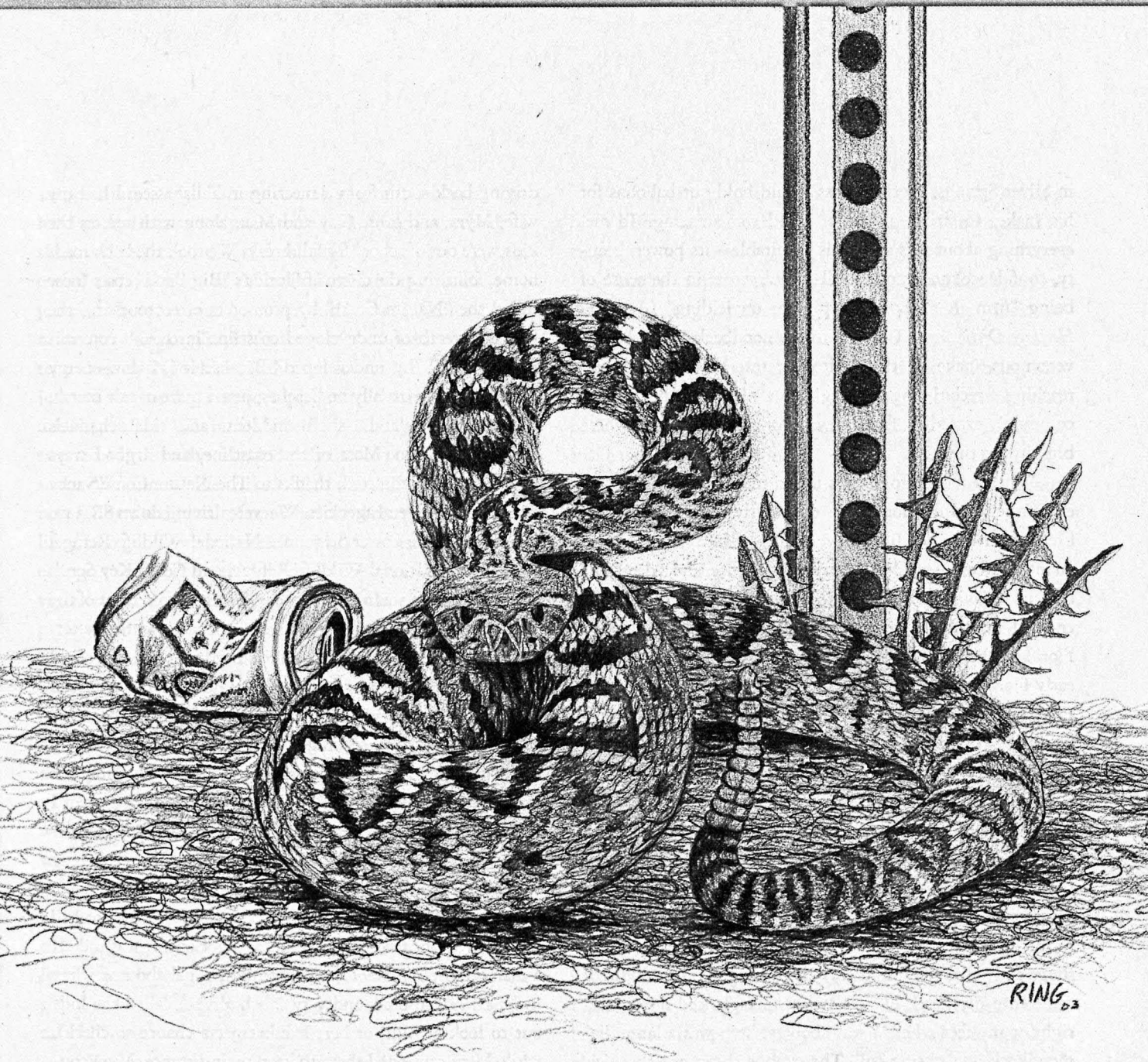
Art and I scanned ahead for a few seconds, then began pointing out the snake to our companions, and one by one they distinguished the set of scaly body loops from similar looking accumulations of leaves, fallen branches, and other litter. Soon our newly minted snake hunters looked like run-of-the-mill amateur ornithologists, except that their binoculars were angled *downward* and they were talking excitedly about an adult female timber rattler. Birds fluttered and sang overhead but these people stared straight ahead at the snake. She was perhaps three and a half feet long and coiled in dappled sunlight on a loose stack of slabs; she had probably recently molted, judging from the lustrous, rich appearance of her golden yellow and dark brown crossbands. Her hindparts and tail were velvety jet black, and her abdomen was swollen enough with young that stretched bluish skin was visible among the scales. We kept a respectful distance and soon

everyone stopped talking, just stood there watching the immobile coils. No obstreperous TV personality dangled that animal by the tail and crowed about how she was so "aggressive." No one poked her with a stick. And that beautiful snake didn't move in our presence, never so much as nervously *chick-chick-chicked* her rattles.

The first Talks and Treks program was consistent with my experience teaching undergraduate natural history classes in California—that with a little preparation people readily treasure an encounter with a live rattlesnake, and I am indeed optimistic about conserving such dangerous animals. We've got a long way to go though. A preliminary assessment in 1992 concluded that 50% or more of all species of pitvipers might already be threatened with extinction, and more than a decade later only a couple of dozen of those have achieved special protected status. Meanwhile people are still slaughtering rattlesnakes by the thousands every year at "roundups" in New Mexico, Oklahoma, and Texas, and not long ago two Missouri legislators tried (unsuccessfully) to exempt snakes from protection by their state's wildlife laws. Terciopelos, large tropical relatives of rattlesnakes, are routinely killed around buildings at a well known Costa Rican field station because they are hazardous to scientists and ecotourists, despite the fact that only a single serious snakebite has occurred at that site in 40 years. And just this spring a staff member at a Texas state park I visited, when asked if she saw many snakes, responded "They're bad this year!" Think about that, she said they are *bad*...

Conserving snakes ultimately depends on controlling our impact on their environments, as is of course also true for giant pandas and whales and other more typically charismatic organisms, but Baba Dioum's comments emphasize the extent to which research and education are linchpins for appreciating and thus valuing unpopular organisms. We can all be teachers in some sense or another, whether in classrooms or over backyard fences. If you agree with me that our lives are richer for the existence of dangerous animals, that the Earth is wilder and more wonderful because of their presence, then learn what you can and tell others something good about rattlesnakes. ☺

Harry Greene is a professor of ecology and evolutionary biology at Cornell University. His book *Snakes: The Evolution of Mystery in Nature* won a PEN Center West Literary Prize for Nonfiction and in 2000 he received the Edward Osborne Wilson Naturalist Award.



Another Dead Diamondback

by Reed F. Noss

ALTHOUGH I'VE BEEN TAUGHT that scientists are supposed to be dispassionate observers, I've had problems living up to that ideal.

It is impossible for me to view nature as a collection of unfeeling objects. I'm not just interested in living organisms and curious about their lives—I really love them. I especially adore the eastern diamondback rattlesnake (*Crotalus adamanteus*), the “king of rattlesnakes,” as Manny Rubio calls it in his book, *Rattlesnake*. Just why I have an affinity for this species I can't say, but it goes back to my childhood, when I watched Ross Allen entertain tourists

in Silver Springs, Florida. Ross would hold out balloons for his snakes to strike, and their speed was amazing. To me, everything about this species is admirable—its power, beauty, confidence, and most of all its *adamance*, in the sense of being “firm in purpose or opinion; unyielding” (*American Heritage Dictionary*). The eastern diamondback is the largest venomous snake in the United States, heavy-bodied and reaching a record length of eight feet, although they do not commonly exceed six feet. I always longed to see one of these big guys in the wild.

When I moved to Florida in the early 1980s, I began to encounter wild diamondbacks on a fairly regular basis, and every experience was like the very first—a burst of adrenalin, an intense feeling of admiration and reverence, and a deep sadness in knowing what the fate of the snake would be if it crawled onto a road or anywhere near a “cracker” (i.e., a Florida redneck, named after the cracking of whips of the early Florida cowboys). Apparently, I had a good eye for rattlesnakes, as I saw more of them than many field biologists I knew who’d spent more years than I in the Florida wilds. This snake has become uncommon, a victim of habitat loss, roads, and relentless persecution.

My most memorable experience with a diamondback was a seemingly telepathic one. I was walking slowly along a transect in San Felasco Hammock, near Gainesville, conducting early morning bird surveys for my dissertation research. I was gazing up toward the treetops, listening for songs and calls, when suddenly the image of a diamondback came into my head, like a daydream. I glanced down, and right at my feet where I was about to step was a large diamondback in a resting coil. The strange thing was that neither the diamondback nor I were the slightest bit alarmed by this state of affairs. I sat down cross-legged about a foot from the snake, and for several minutes we silently communed, the snake slowly flicking its tongue and I just watching. I then stood up, stepped around the snake, and continued my survey. There’s probably a rational explanation for this experience—perhaps I caught a glimpse of the snake out of the corner of my eye or a whiff of its characteristic odor. It’s more fun, though, to think of this as a sixth-sense experience or a transcendental meeting of minds.

I recently moved back to Florida from Oregon. The opportunity to see more diamondbacks definitely figured into my decision to move. A few days ago, October 17, 2002, I was

driving back south from a meeting in Tallahassee. I had my wife, Myra, and sons, Clay and Max, along with me, as the kids were out of school for fall break. We took the back roads home, following the curve of Florida’s “Big Bend” coast (now called the “Nature Coast” by promoters of ecotourism), the longest stretch of undeveloped coastline in the 48 coterminous states. Why undeveloped? Because it is a low-energy coastline with virtually no beaches, just a maze of salt marsh, small barrier islands, shell middens, and tidal channels against the ocean. Most of the coastline, and a good ways inland, is now protected, thanks to The Nature Conservancy and state and federal agencies. We were driving down SR 347, which skirts the Lower Suwannee National Wildlife Refuge, Cedar Keys National Wildlife Refuge, and Cedar Key Scrub State Reserve. It was a gorgeous day. The first cold front of the year had just passed through. The temperature in mid-afternoon was in the lower 70s, the humidity low, and not a cloud in the sky. These were ideal conditions for finding snakes, I told my boys, because the cooler weather brings them out more in the daytime, seeking the warmth of the sun. The last diamondback I had seen, a huge individual freshly killed on the road, had been in this area a couple years earlier when I passed through. I was getting that telepathic feeling again—I just knew we were going to find a diamondback.

Sure enough, up ahead on the road we saw a snake stretched out. I hurried to it, stopped the car in the road to block any traffic that might come, and got out. It was indeed a diamondback, a moderately sized individual about 4.5 feet in length, handsome, and very much alive. I called the kids out to look at him (or her; I didn’t get a chance to check), while Myra cautioned them to keep their distance. Myra considers my behavior around snakes a bit reckless and doesn’t want the boys to follow my example. Although the boys got a pretty good look at the snake, we did not have time for leisurely admiration. My main concern was getting the snake off the road before someone came by. People around here go out of their way to kill snakes. Unfortunately, I did not have a snake stick in the car, and it’s generally not wise to stroll up to a diamondback and pick it up. I searched the immediate area for a stick, without success—it was mostly saw palmetto, with no trees nearby. I yelled at Myra to find something in the car. All we could come up with was the DeLorme Atlas and Gazetteer for Florida. I made an attempt to shoo the snake off the road with the atlas, but it did just what I expected—

snapped into a tight defensive coil with rattle blazing and head cocked back, ready to strike. Admiring its attitude, I then realized that the snake's effective striking distance exceeded the length of the atlas I held in my hands, so I jumped into the car and tore down the road in search of the nearest tree that might yield a stick. I found one about a quarter mile away. No vehicles had come down the road so far, but just as I was turning around, a pickup truck came by, headed for the snake. We hurried behind. The pickup slowed, swerved a little to the side, and pulled over 100 yards past the snake. We came to the snake, which was still unharmed, but now facing the direction from which he'd come. I got out and lifted him gently with the stick, which was just barely strong enough to support his thick body. Rattlesnakes and other pit vipers become eerily calm on a stick, balancing themselves perfectly when lifted in this manner and making no attempt to bite or flee. It seems as if you could just reach out and lift them off the stick, cradling them in your arms like a pet boa. (In fact, I tried this with a captive copperhead years ago without incident, but that's another story. I don't recommend anyone try it.)

I had just placed the diamondback safely off the road when I saw the man approaching from the pickup truck that was parked up ahead. At first glance he looked like a reasonably intelligent fellow, in his 60s, clean and neatly dressed. His pickup truck was relatively new and had no obnoxious redneck bumper stickers, not even a confederate flag. I naively assumed he might be concerned about the welfare of the snake, as he had not run over it. As he walked toward me, he asked "What was that, a rattlesnake?"

"Yeah, a nice diamondback. I've moved him off the road so he doesn't get killed."

"You mean he's still alive?" the man asked in amazement. He was now standing next to me. At this point I realized that I had been wrong in my initial appraisal of his character. The dull glaze in his eyes, the drooping edge of his lip, the blank look of utter stupidity across his face gave him away as a stone-cold cracker.

"Yeah, he's fine," I replied. I later wished I had told him the snake was dead (although, in that case he might have wanted to skin it, as the hides have some value).

"Why the hell didn't you kill it?"

"Why would I do that? He's not bothering anyone. Diamondbacks are becoming rare, even out here."

"Well, I'm going to get my shovel and kill the son of a bitch before he kills somebody," the man said and started to turn away.

"You're not going to kill that snake," I said firmly, beginning to get angry but still trying to be friendly. "He's not going to hurt anyone—there aren't even any houses around here." I neglected to point out that the chances of being bitten by a rattlesnake in the wild are extremely remote, and besides, we were on the edge of a nature reserve, where the snake was apparently living.

"The hell I ain't gonna kill him," he said. "Are you gonna stop me?"

"I sure am," I replied.

"You're telling me you're gonna kick my ass?"

"Yep, if that's what it takes to protect the snake."

The man turned away and headed toward his truck. I hurried over to the snake, who was in no hurry at all and had not moved since I set him down. I lifted him with the stick, walked over to the edge of the wide but shallow, water-filled ditch, and tossed him as far toward the opposite side as I could. The snake landed in the aquatic vegetation and still appeared perfectly calm and happy. These guys are too adamant for their own good, I thought. At that moment another truck appeared. A guy got out, and as he came closer I saw that he was wearing a Levy County Deputy Sheriff shirt, although he was probably off duty, as he was not driving a police vehicle and I did not see a badge. He was a rather big fellow, with the puffy face, beer gut, and neatly trimmed mustache stereotypic of a southern lawman. Nevertheless, I was happy to see him, as I thought he might be able to keep the old idiot from killing the snake and save me from engaging in an act of physical violence.

"What's going on here?" the cop asked.

"Nothing much. I just moved a rattlesnake off the road and this guy over here wants to kill it."

The cop was incredulous. "You didn't kill it?"

"No."

"Well, I'm going to kill it before it hurts someone." The cop turned and walked over to his truck to get his gun. By this point, Myra was becoming agitated. "Don't you dare kill that snake," she said, walking up the cop. "We'll turn you in to the wildlife officer for discharging a firearm on a public road and killing a non-game species." We both knew that diamondbacks are not a protected species in Florida, but

thought maybe there was a law against what the cop was about to do. The cop was apparently wondering about that, too, as he hesitated, closed the door to his truck and said, "Why don't y'all just head down the road and let me take care of this." He wanted us out of there so he could blow the snake away with impunity.

Meanwhile, the old cracker had returned from his truck, shovel in hand. Suddenly, two battered and muddy pickup trucks with monster tires appeared on the scene. A half dozen redneck hunters dressed in camouflage hopped out and approached us. Cheeks stuffed with Red Man and guts hanging over their greasy belts, they pointed to the snake, uttering incoherent but menacing comments. While Myra and I tried to convince the cop not to shoot the snake, and he tried to convince us to leave, I looked over and saw the old man. He was a pathetic sight. With the shovel clenched in his hands, he was wading out toward the snake, a look of absolute terror thinly disguised on his face. Finally, it was too much for him. He backed away and chuckled nervously, "Damn, I should have worn my other boots." This was the signal for the hunters, who had been observing the incident, to go back to their trucks and get their rifles. These were some scary-looking fellows. Scenes from *Deliverance* came to mind. The cop had gone over to talk with the old man.

Watching the hunters warily approaching the snake, Myra had seen enough. "Y'all are big, tough men," she hollered, "Go on in there and kill that snake. What's the matter, you scared? You scared of that little snake?" You have to understand, Myra is a bit of a redneck herself and can't help letting loose a little frustration now and then.

"Don't taunt them, Myra," I said, but realized it didn't make any difference. They were going to kill the snake no matter what we said or did. The scene was surrealistic—the group of heavily armed crackers warily approaching the snake, which still lay calmly in the vegetation, soaking up the sun. This was a big deal for the crackers. They obviously had not seen a diamondback for a while, but never thought to wonder why. Irrational and superstitious, they considered this poor creature a threat to themselves and their families, whereas in fact the opposite was true. The human fear of snakes may have a genetic component, although this hypothesis is controversial. It seems to me that cultural conditioning plays a bigger role. Venomous snakes are indeed dangerous, but much less so than many



I kept picturing in my mind the firing squad scene that must have occurred after we left, a half dozen or more guns raking down on one innocent and, in this context, defenseless snake.

things crackers gladly bring into their lives, such as monster trucks, ATVs, guns, pit bulls, and corn liquor. Even if the fear of snakes is genetically based, why is it that some people turn fear into hatred and others turn it into respect?

My family and I seemed so out of place on that county road that day. There they stood, big guys with big guns and monster trucks. And there we were, barefoot and in shorts, standing next to our little BMW with Oregon plates (our Florida plates were still on order). Yet I knew we were more at home in these flatwoods than they were. As field biologists, we had probably spent far more time off-road and off-trail in this country. Although they acted tough, these crackers were just scared little boys inside. Bringing the absurdity of the situation to a still higher level, the cop then approached me and accused me of threatening the old man, implying that he would arrest me right there on the spot. I started to explain that I was only trying to protect the snake, but was interrupted by Myra and the hunters shouting back and forth at each other.

"Go home, Yankees," they yelled. "G'on back to Yankeeland."

This comment touched a raw nerve with Myra, who is from Tennessee. "Who are you callin' a Yankee?" she hollered. "I didn't get this accent in Yankeeland. I was born and raised in the South. I grew up with ignorant people just like you...."

Raised in southern Ohio, just 30 miles or so from Kentucky, I never considered myself much of a Yankee, either. I, too, was offended. Hell, I spent half of my wayward youth hanging out in seedy redneck bars, and I still generally prefer the company of rednecks (the smart ones, anyway) to that of most of the liberal intellectuals I've met.

At this point I knew it was time to leave. I didn't want my kids to see the carnage. If I were arrested, they'd just kill the snake after hauling me away. We did what we could, or at least that's what I told myself. We drove on down the road, watery-eyed.

It's the afterthoughts that eat you alive at night. I couldn't sleep. I thought I hadn't done enough to help the diamondback. I should have put my body between it and the hunters, daring them to shoot me first. Most likely, they wouldn't have. I cursed myself for tossing the stick away after I had flung the snake across the ditch. If I would have kept the stick, I could have waded across, picked up the snake, and tossed him deep into the palmetto where the cop and the hunters would be way too afraid to venture. I cursed myself for not lying to the old man in the first place, for not telling him the snake was dead. When will I learn to stop trusting people? I kept picturing in my mind the firing squad scene that must have occurred after we left, a half dozen or more guns raking down on one innocent and, in this context, defenseless snake.

At least my kids learned something that day. They learned how beautiful and vulnerable a wild rattlesnake is. They learned just how stupid and malicious rednecks can be. They learned that hunters are not necessarily conservationists. They learned that cops are not always the good guys. These are hard lessons. It is conceivable that the crackers learned something, too. They might have learned that there are people in the world who feel differently about snakes than they do. Perhaps if they meet enough of us, they will begin to wonder why we feel this way.

Species can go extinct faster than human attitudes can change. Hence, the eastern diamondback rattlesnake has the best chance of persisting in large wild areas with limited access to people. The diamondback historically was most closely associated with the great longleaf pine-wiregrass ecosystem, which once dominated the southeastern coastal plain but has been reduced to only a couple percent of its former area. The species still occurs in several other kinds of

habitat, such as scrub, hardwood hammock, and coastal strand, but all of these are being fragmented by continued development. I strongly suspect that, today, the greatest threat to the diamondback is roadkill and direct human persecution. Large, roadless reserves and connecting habitat corridors must be created and kept off-limits to motorized vehicles of all kinds. Trail density must be minimized. Although I am not generally opposed to hunting, the hatred toward rattlesnakes runs so deep in rural southern culture that many areas may have to be closed to firearms in order to protect them and other predators.

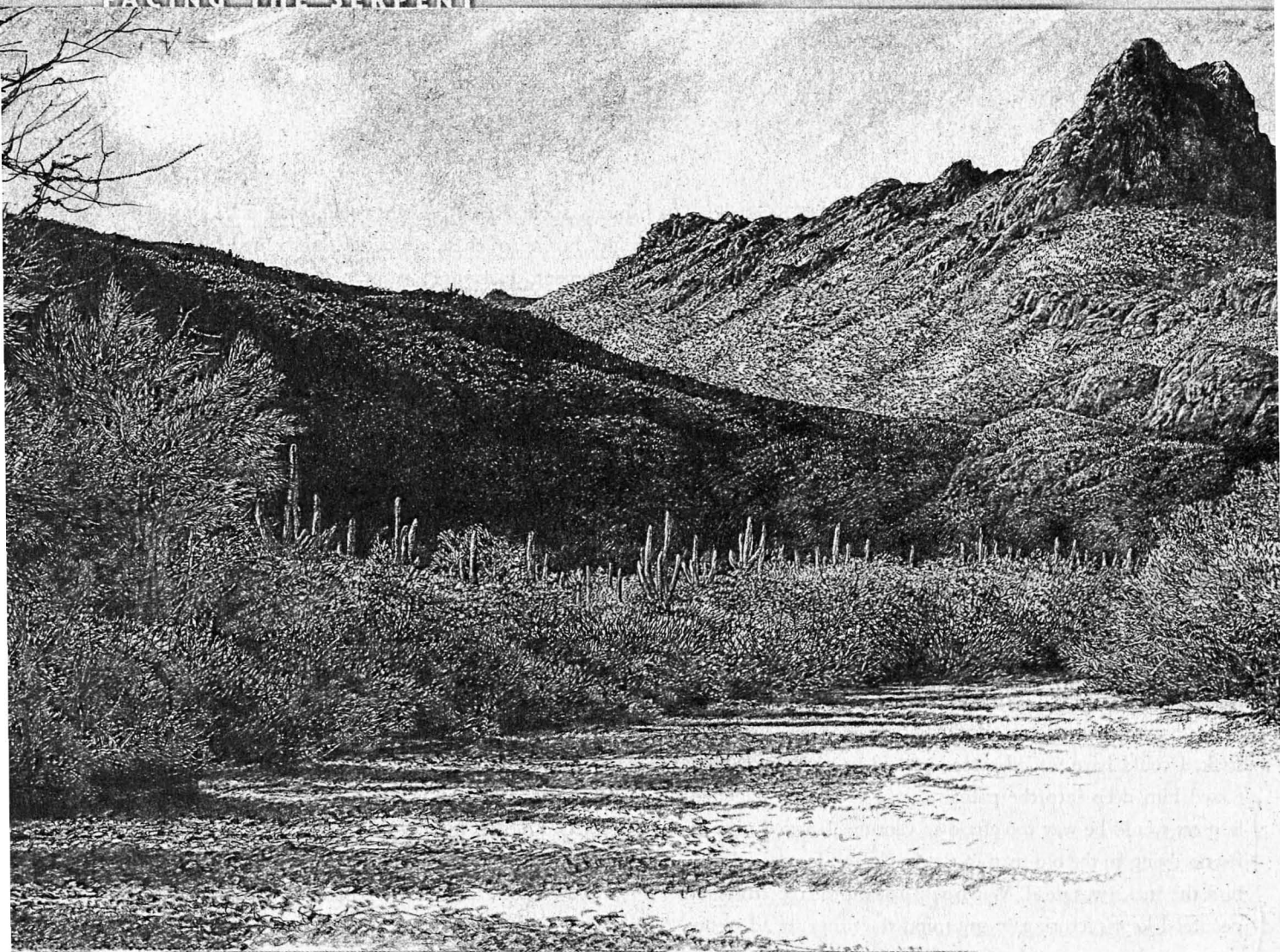
Biologists such as Bruce Means and Walt Timmerman have conducted excellent studies of local diamondback populations, but no authoritative rangewide assessment of the species' conservation status or needs is available. Research on diamondback ecology has not been sufficient to determine how much area of suitable habitat is required to maintain a viable population. We know next to nothing about the dispersal behavior, metapopulation dynamics, or recent population trend of this species—except that the latter seems to be a downward spiral virtually everywhere. I would love to mount a major research effort on these topics, but it is doubtful that any agency or foundation would fund such work. After all, the diamondback is not a listed species, and is unlikely to be protected under the current political climate. It is hard to find anyone with an ounce of compassion for rattlesnakes.

I keep seeing that poor diamondback in my mind, recently shed and sharp in his diamond suit, soaking up the sun on that brilliant blue day. His last day. Conservationists must do all they can to forestall the last day for his entire species and every other species sensitive to human persecution. ☾

Reed "Diamondback" Noss is the Davis-Shine Professor of Conservation Biology at the University of Central Florida and long-time science editor of *Wild Earth*.

SOURCES

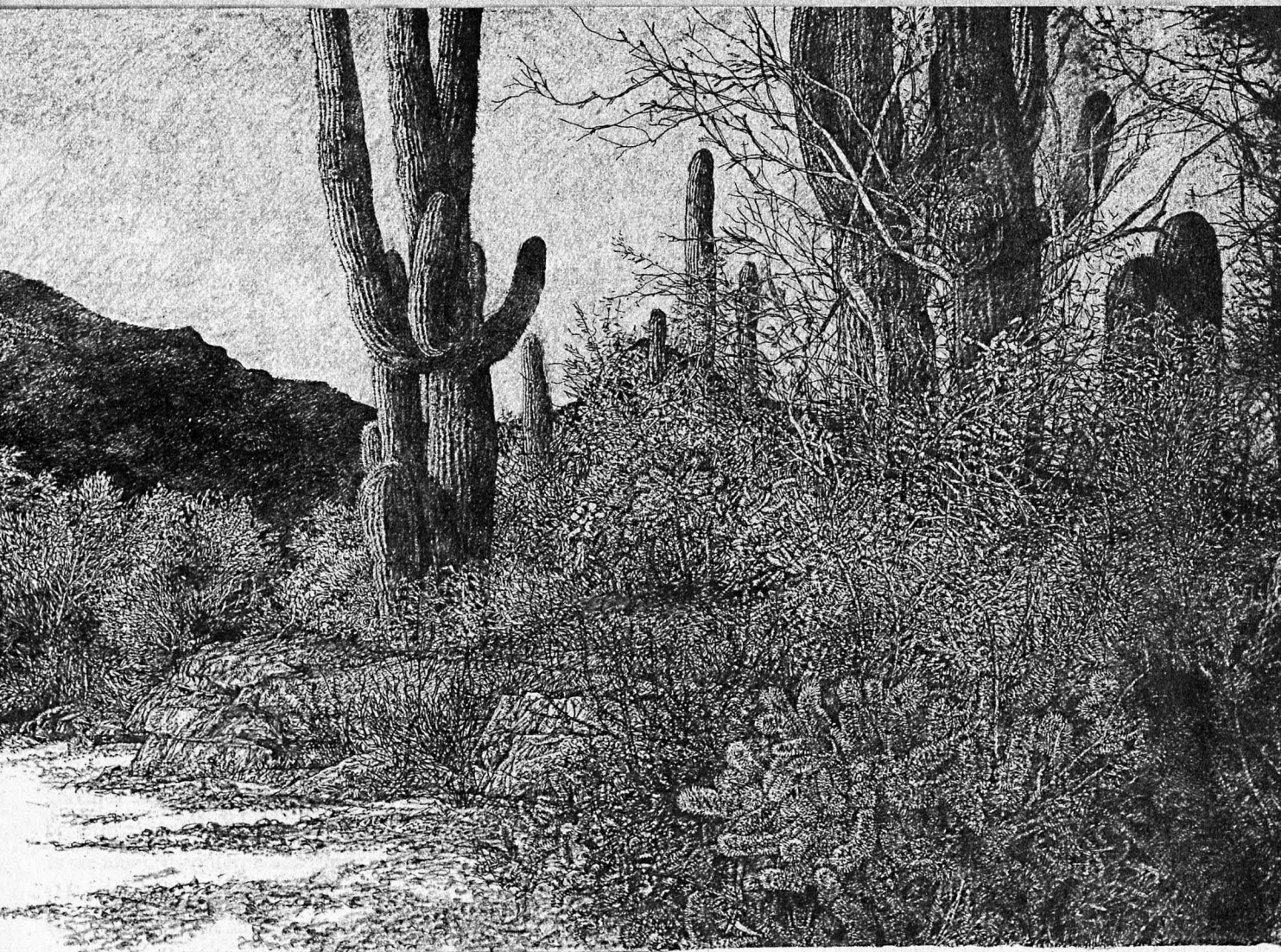
- Conant, R. 1975. *A Field Guide to the Reptiles and Amphibians of Eastern and Central North America*. Second edition. Boston: Houghton Mifflin.
- Gopher Tortoise Council. Undated. Eastern diamondback rattlesnake: A species in decline. Brochure, available digitally at www.gophertortoisecouncil.org/edr.htm
- Natureserve. 2001. Nature Explorer: An Online Encyclopedia of Life. www.natureserve.org/explorer/
- Rubio, M. 1998. *Rattlesnake: Portrait of a Predator*. Washington, D.C.: Smithsonian Institution Press.



Snaketime

by **Charles Bowden**

SHE ARRIVED AT THE RANCH HOUSE in May during a bad drought. I was living four or five miles from the Mexican border when one day a visitor found a coiled rattlesnake in the flowerbed by the porch. I walked over and looked down and was unnerved.



The snake, well camouflaged, was all but invisible to me; in fact my visitor had been squatting to urinate—an effort to save water from the dying well—when she noticed it. I let the snake be. I was coming off a dark season and had outlawed all guns and all acts of violence from the ranch. The earth was burning from lack of rain and the brown range was beaten down. The snake stayed and eventually moved up on the porch where it would sleep all day near my chair. She was a western diamondback, the species credited with the most bites and deaths in the United States. I never could tell the snake's sex but I named it Beulah for no particular reason.

IT'S ALMOST ten years later and I am in the Chiricahua Mountains near a blacktail rattlesnake, one of over a hundred in a study group that has been examined for 15 years. Part of what brings me here are nagging memories of Beulah and other moments from my collisions with rattlesnakes. I've been dropping by the study site for two years and in that time I

never see the snake of my dreams and fears, the serpent moving like lightning with fangs extended. I have entered snake-time and in this time I never see one snake make a fast move.

For the snake a few feet from where I sit several things are obvious: I am large, and this is certain because of my footfall. She can hear the footfall of a mouse. I am rich in odor. She can pick up the faintest scents, identify them, and follow one single strand as clearly as if it were signed on an interstate highway system. I am clumsy, she can see that with her eyes, though she hardly relies on sight. And I am warm, she forms an image from her ability to pick up and analyze body heat thanks to the pits on her snout. I become a shape with a field of temperatures of different intensities, one so finely felt that she can perfectly target any part of my body. And I am irrelevant unless I get too close. She will ignore me if I stay six feet away. She will ignore me if I become motionless for 180 seconds. If I violate the rules of her culture, she will try to work through a sequence of four tactics. First, she will pretend to

be invisible and hope I do not see her. If that fails, she will try to flee. If that fails, she will act aggressively in hopes of frightening me away. And finally, if I am completely ignorant of simple courtesy and get within a foot or so of her, she will attack me. I have failed at least a dozen times in my life in observing these boundaries—I've never been struck but I have caused alarming rattles. I am truly a barbarian.

She herself is cultured. In her lifetime, she will attack infrequently, a few dozen times at most. She will never attack any member of her own species. She will never be cruel. She is incapable of evil.

I never walk my ground without her being in my thoughts. I never make night moves on my desert without a hyperalertness to her. She never wants to meet me. She never stalks me.

Sometimes I sit in the dark trying to imagine how I look to her. I can only brush against such powers of perception. I cannot hear the footfall of a mouse. My powers of catching scent are feeble in comparison. I can barely sense the presence of others through heat. I am almost always full of aggression barely kept in check.

I have always feared her. That is why I have come here.

WITH BEULAH, things began slowly. First, I had to deal with my fear. I was in an addled state that spring and I had decided to erase boundaries in an effort to calm myself. For example, each evening I would put Miles Davis on the stereo, pour a glass of wine and sit on a chaise lounge on the porch in my shorts. Clouds of bats would come to my hummingbird feeders, and they would hover all around my mostly naked body and brush my arms and legs and chest and face with their wings. When I arose to refill my glass, the cloud of bats would magically part and when I returned they would continue their exploration. Beulah became part of this careless web I was weaving. At the same time, deer would come near the house, twirl and make their evening beds. I lived alone, made no fuss over anything, including the rattlesnake.

As the weeks went by, I began to notice little facts about Beulah. I would be out on the porch in the blazing heat of May and she would be curled by my chair as I read. I'd get up and go get another glass of water, and she would not stir. She was coiled but seemingly at peace.

I would rummage through my limited snake lore, the various myths that different cultures had employed to deal with serpents. I noticed they all had one common feature whether

they saw snakes as good or evil: snakes possessed potential menace. Of course the Christian version with its Garden of Eden, serpent and apple, baffled me the most. I could see the loss of nakedness as a serious matter. But I could never understand how knowledge was part of any meaningful fall from grace.

With Beulah, I learned to move slowly out of courtesy. Once or twice visitors popped in unannounced and saw the snake on the porch. I offered no explanation. But then I was already considered eccentric for living so far out, living alone. Without a gun.

THEY ARE RIGHT over there in the shelter of the rock on this hillside on the eastern flank of the Chiricahua Mountains near the Arizona and New Mexico line. I am sitting on the ground six feet away. The two pregnant females are piled atop the other and this arrangement does not seem random. Each female has that section of her body, where the fertile eggs are lodged, exposed and gestating in the sun. The rest of their bodies cool in the shade. The sunlight will hasten gestation, just as having their bodies piled on each other will raise the temperature and accelerate the eventual live birth of the young.

I'm with Dave Hardy who is busy making notes. He carries gear on his back for tracking the snakes in the study population, each of which has been surgically implanted with a transmitter and antenna. This means two simple things: the subjects can always be found by their individual signals and the subjects are almost never alarmed. In the 15 years of the study, the snakes have rarely displayed aggression except when they have been grabbed for battery changes, a maintenance task that must be done every eighteen months. So far Dave and his partner Harry Greene have amassed thousands of field observations of *Crotalus molossus*, blacktailed rattlesnakes. For thousands of years, human contact with rattlesnakes in the wild has gone like this: we collide with a rattlesnake or we have no contact with them at all. For our kind, rattlesnakes are coiled, tail vibrating, fangs at ready to poison us. It is as if we formed our entire knowledge of automobiles from head-on collisions.

What Dave and Harry have found is a separate nation. One thing stands out about how our nation sees their nation. We see rattlesnakes as menacing, as simple-minded eating machines. In 15 years, the study has witnessed only one kill. It happened on August 21, 1997. Dave was radio tracking a female, No. 21. She was an almost three-foot-long adult and

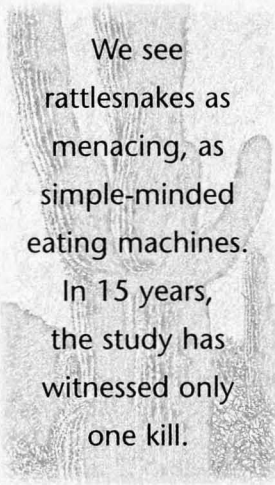
that day was coiled and in hunting alert when a cottontail came by. She struck it in the left shoulder. The rabbit jumped into the air and ran about 12 feet away, paused and started making distress cries and spinning in circles. No. 21 returned to her hunting coil. Then the rabbit ran off about 20 more feet and the rattlesnake slowly began pursuit following the scent trail. For the next two hours, Hardy followed the snake as she followed the rabbit. Sometimes the snake would get within three feet of the rabbit before it would tear off again.

When Hardy came back the next day, the snake had a bulge, undoubtedly from swallowing the cottontail. She stayed in place for 11 days, and then on September 1, 1997 moved about 30 feet to the east. The flash of the strike, and then endless ribbon of languor that seems to be snaketime.

After about a half-hour, Dave and I stand and move off. He flips his radio receiver to another frequency and we go to visit with another rattlesnake. The two females are still, just as we found them, as if we had never existed or mattered to their world. When I look back I cannot even make them out on their rock ledge. They fit in a place I visit but do not know.

MY FEAR never left me. I'd thought of snakes as things and so Beulah, for a long time, remained for me some kind of robot that was fully programmed at birth and could unleash her toxins at any moment and poison me. I began to worry about her diet, and would look closely at her each morning hoping to see a bulge from some kill made in the night. But the drought was a lean season for everything. I wondered at times why she was there. I would tick off the possible answers. A house is built by disturbing soil and loose soil is good habitat for rats and thus draws snakes. The drought, I would think, might have something to do with it even though rattlesnakes have low moisture needs, and they hardly need to eat for that matter. But mainly, I did not think about it at all. There was a great horned owl along the wash that roosted each day by a trail I took. At first, the owl would break cover when I went by. Then slowly its reaction time narrowed and it would only take off at the last moment. Finally, it ignored my daily passage completely. I became like the owl. Leery, but slowly adapting to Beulah.

One day, someone came to the ranch I had not seen in years, an old buddy from high school. He'd gotten deep into



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Eastern religions and had just come back from a pilgrimage to India and Nepal. By that season the great horned owl had mated, built a huge nest just below the ranch house in a cottonwood along the wash and now the two of them had a clutch of hatchlings to feed. For a week or two, I'd been going down to the nest with a drink in the late afternoon and sprawling out on the ground as I watched the owls. I sent my friend down there to see the birds and the nest while I stayed up at the house on the hill and cooked dinner. The owl instantly

attacked him and knocked the hat off his head.

I realized he was a stranger to the owl.

That is how I began to relate to Beulah. She did seem to react to my presence. She was not a pet but somehow I was part of an accepted landscape. She coiled next to my chair as I read in the heat of the afternoon. I moved slowly so as not to alarm her. We seemed to learn each other's ways.

After awhile, I began to notice something startling to me. Increasingly, when people came out to the ranch, Beulah disappeared. I would be sitting with her during the inferno of the afternoon—and one day it hit 117 degrees—and I would hear a car pull up, the clunk of the doors, and then arise to see who had come. When I came back, Beulah would be gone from her post by my chair. If no one came, she'd spend the afternoon out there with me. But if strangers descended, she seemed to hide.

I began to wonder if she could tell me from other people.

FOR A LONG TIME the desert was nothing but snakes to me. When I slept on the ground in the desert, I thought they would come for me. When I walked the summer nights, I thought they are out there, coiled and ready to strike my flesh and fill me with poison. Once I crossed a dune and repeatedly put my foot down near coiled sidewinders half buried in the sand. Ribbons of snake tracks covered the swells. At dusk, I threw my bag down and slept, the sleep of surrender. I think that marked the turning point, the moment when I grasped two facts: that there was nothing I could do about the snakes and that there were no snakes in my desert hunting me because I was too big to swallow.

Later, random facts gave me further comfort. Some of the bites that come into local emergency rooms are dry, devoid of poison. Poison is expensive for the snakes to create and one

possible assumption is that they are reluctant to waste it on the likes of me. I doubt this fine discrimination, but still there are these dry bites.

It is a June long ago, and the air runs 90 degrees as I stumble through the desert without a trail around midnight. My bare legs bleed from small scratches left by thorns and no matter how much I drink I am sinking into dehydration. My pack weighs a good 70 to 80 pounds. This is when I step on the rattlesnake. The sound of the rattle, the feel of the snake under my running shoe, my movement away—all this is one single memory. The snake does not strike and remains coiled. I sit down a few feet away and stare at it in the half-light of a world revealed by stars.

That's it. An anecdote that illustrates nothing except possibly the luck of fools.

I ceased to think of snakes as enemies. I started thinking of them as part of a web, something I dimly belonged to, a reality I shared. And this dim sense of kinship fed another sensation: otherness. They were not my friends, they were not my enemies. They were not like me; they simply were.

I lost interest in their mouths with the two long fangs that could inject venom into my tissues. I began to consider them another nation, one with a culture about which I had not a clue.

There are lines we are warned not to cross. Ethics teaches us we cannot consider other life forms as things. Science teaches us we cannot project our human natures onto other living things. I am from another place. I am not like the snake. But I am not below or above the snake. I lack any sense of hierarchy in the natural world regardless of the charts drilled into my head since boyhood of the odyssey of evolution. I don't see my species as the culmination of anything, nor do I look at a rattlesnake as a failed ancestor.

That night in the long ago June heat, the air is dry in my nostrils, the snake stays coiled, I drink water and the safe ground formed by the beliefs of my people erodes out from under me. I continue for years to move at night across the desert floor. A part of me is never relaxed, another part of me is always resigned.

I do not accept rattlesnakes. That attitude would have me assuming a power that is beyond my reach or my right. Rattlesnakes do not need my approval. Sometimes people ask me about problem snakes hanging around their houses and

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threatening their dogs and themselves. I tell them to live with them or kill them.

Some years back a woman was horseback riding near Phoenix when she fell on a rattlesnake, took a hit with massive venom and died. That is just as likely to happen to me as to someone who hates every snake on Earth. There is no justice in this matter. Or malice. Or virtue. But there is this place without friend or foe, the place where rattlesnakes live with their internal drives and terrain and infrequent meals of rats. I am of that place. As dusk deepened at the ranch that spring and early summer,

the roar of hummingbirds at my feeders on the porch would slacken. I had about ten species of hummingbirds and hundreds in the population. I would have exactly 64 at a time feeding and a mob swirling around them waiting in turn. Orioles would come also and I delighted in the clack of their bills as they devoured honeybees on the feeders. Beulah would be seemingly oblivious to this roar of life and appear to sleep through the day—though to my knowledge no one knows by any brainwave study if rattlesnakes really sleep.

But as the night came on, at that moment when I could still see but the sun was down, Beulah would uncoil and slowly slither across the porch, passing within inches of my foot, tongue flicking and body undulating. Once she actually crossed my bare foot. She would go down the steps and vanish into the wild grasses and then be gone from my view. When I arose in the morning, I would find her at first light by my chair. I never knew where or why she went—I assumed her expeditions were about hunting. But there was this part of her world locked off from me.

THE YEAR neither begins nor ends. There is no harvest moon, nor appointment calendar. Time is a ribbon, or perhaps time is a moment. There is a future tense, the snake coils by a game trail and waits for prey. So there is a future. The past is beyond our speculation. We simply cannot decide if a rattlesnake has a past. Except that there are clues: young eastern timber rattlers, born some distance away, have been observed following the trails of adults to winter dens. Is this learning? And if something is learned does it constitute a past?

Blacktail rattlesnakes have home ranges roughly 200 meters wide and 500 meters long in the study area. If they are

transported several miles from their home range and released, they inevitably starve to death. If they are moved less than two miles, they return. This implies they know the resources of their home range, which in turn implies they learned them, which in turn implies they have a remembered past. Snakes that are moved tend to keep cutting right angles, as if they were looking for some known geography, perhaps a horizon line.

They live in a world with little temperature variation. The winter dens run in the sixties and when outside they use sunlight or shade to keep their blood at a fairly constant heat. Calling them cold-blooded means that they cannot generate their own heat, not that they are cold. In the study group, each individual eats only a few wood rats and other small mammals a year. Given a life span of 20-plus years, this suggests that the strike—that image burned into human consciousness—is a minor part of a blacktail's life. The strike takes less than a second and happens only a few dozen times in a snake's life. This adds up to at most one minute of time in decades of life. The barnyards would rejoice if our appetites were this restrained.

Dave Hardy and Harry Greene are closing in on 4,000 field observations of their subjects and have seen precisely two strikes—one successful, one a miss. Mainly, they find the snakes moving slowly, or inert. The rattlesnakes have no conflict with the researchers, or with other snakes. Once they reach some size at age two or three, almost nothing tries to kill them (excepting people). They live a life with acute sensitivity to the world around them, slight food needs, almost no climatic stress, and huge swatches of time.

That is the brute life of a blacktail: sensation, time, lack of stress, scent, color, and light.

The partly overcast sky dapples the hillside above Silver Creek. I know No. 39, a female, is very near from the radio receiver beeping in Dave Hardy's hand but still I cannot see her. She is in the middle of a wash, clearly outlined by the gravel and sand and near a dark limestone rock when I finally make her out. She is coiled, rattles tucked out of view, head held slightly back, the classic hunting posture. No doubt she is by some game trail detected by her fine sense of smell. We know male snakes can figure out which way a female snake has gone by noticing the scent differences on each side of a blade of grass or a pebble where she passed. A bug lands on her, she flinches ever so slightly, then goes still again in her camouflaged ambush posture. Rattlesnakes must wait for

prey. They cannot run them down. Which raises an interesting question: how much time do they spend hunting?

They are normally coiled in order to save body heat and so to our eyes almost always appear in a hunting posture. They are often poised by a game trail but then they must be somewhere, so why not sit by one of the many strands marking the earth that rats have created? And they appear sleepy and yet alert. Harry Greene used to keep a bushmaster, a huge Central American viper, in his lab at Berkeley. He fed the snake every month or so. The snake never seemed to move; it was like a pet rock in its cage. And yet when Harry tossed in a mouse the bushmaster invariably caught it in mid-air. Imagine that state of rest and yet alertness. So far, we lack the words for such a state and, certainly, we lack any analogy in our own personal experience. And what does hunting mean to an animal that hardly eats? To an organism that can in hard times literally skip eating for a year or more.

No. 39, like all the snakes in the study, has a known and mapped home range, a winter den (and blacktails either winter alone, or with one or two others), a birthing den, and a known pattern of travel from each site to the creek where in August the rats are thick and the mating season occurs in what seems a little like a blacktail Woodstock. In the courtship season, males hungrily follow the scent trails of females, sometimes traveling 500 meters a day. Their testosterone levels also rise during the mating season. All but two of the snakes in the study have been captured and equipped with transmitters because of their attraction to females with transmitters during the mating season. In the case of females, they have been revealed by lusty males with transmitter implants seeking them out.

The famous combat of rattlesnakes where two males rise, intertwine and fight for females, is more like arm wrestling. The larger male invariably knocks down the smaller male and wins. Combat with no physical damage involved. Copulation can go on for a day or more—in the study group, Dave and Harry faltered and got tired of watching somewhere after the twentieth hour. The sperm is stored, the eggs fertilized the following spring, and young born live thereafter. The mother stays with the young until they shed their skins and can see—this takes about two weeks. This offers one of the tantalizing and rare examples of parental behavior observed in some reptiles. The litters are three or four young, and the females generally go two or three years between birthings. Apparently,

almost none of the young survive, but then blacktails, with a 20-plus-year life span, require a very low replacement rate.

In the fall, the snakes migrate uphill in the valley to their winter dens and largely stay within them until spring. That is the year for a blacktail.

Few real enemies. No problem with food—the snakes in the study group are almost all of good flesh. A relatively constant temperature due to using natural shade or holes in the ground to even out the weather. As I mentioned, we do not know if they sleep, we are ignorant of how much stress they experience. But we do know this calendar and within it, there seems lots of time for things besides the struggle for survival.

We go down the hill to the creek and find No. 34, a female, basking in the sun. Three days ago she ate and the bulge is still clearly visible. Blacktails eat so infrequently that their stomachs shut down. After a kill, it takes three or four hours to reactivate their digestive juices so that they can absorb the fresh nutrition. We find No. 46, a male, about 15 feet from the female and gliding up and down the rocks of the creek bank apparently following her scent trail. No. 46 had surgery for his transmitter replacement ten days earlier. I sit on the ground and watch him and then decide to sprawl on my belly to better take the snake's view of things. He is a fat snake and as he glides he slowly moves his head from side to side, tongue flicking, searching for scent of the female. The air is still, the silence so total a fly buzz seems the only sound. The male is maybe four or five feet from me gliding as I make notes.

He is alert and yet somehow relaxed as he wanders back and forth nosing out the scent trail. The female is 15 feet away basking and finally, after a good long spell, the male gets to within one or two feet of her and then coils on the opposite side of a log and rests. Later that afternoon, he is in the same position, and again the next morning. I have brushed against snaketime where even the imagined urgencies of mating follow protocols whose outlines we barely know. Fourteen days later, days spent together, often within a foot of each other, they finally mate.

FOR YEARS I lived with a desert tortoise named Lightning. Early each November, he went into his burrow and emerged the following spring. While he hibernated my yard seemed dead to me. For a spell, I worked by a floor-to-ceiling window and Lightning would come over, get on his hind feet

and stare at me. Once in a while, I put out plates of greens and vegetables. Eventually, I learned he had a savage hankering for bananas. But what I really realized was that he reacted to people differently. He'd follow me around like a dog as I worked in the garden. He liked the electrician and would paddle around after him as he worked. He hated the plumber who always seemed to be digging up old pipes; Lightning would go underground for days once he appeared on his turf. In short, he could distinguish between people and this was a revelation to me since I initially thought of him as a pet rock. I never picked him up. I never made him into a pet. Once a cat got into his food and he seemed enraged and chased the cat around in circles for more than a minute. He was my first bridge into what is called cold blood. I hooked up with a woman and he repeatedly charged her on sight—possibly, as one visiting herpetologist offered, part of a mating drive. The woman concluded the tortoise and I had a homo-erotic bond.

Beulah was a deeper current for me because I was afraid of her. I have no illusions about rattlesnake venom—a bite will not likely kill a healthy adult but the ride will be very rough and a visit to the hospital can easily run 20 grand. And yet here I was whiling away days with a rattlesnake. I began to feel badly when company came and she disappeared, as if I were a bad host, or at least a thoughtless roommate.

I would slip into snaketime for hours, doing nothing as the snake beside me did nothing. But wait. It was not simply losing track of hours or days. It was diving deep into the moment and yet at the same time finding each moment immense and full. I had the bats and Miles Davis at night, but during the day, I had the frenetic pace of hummingbirds on the porch and Beulah, at rest and yet ready to spring in an instant, teaching me a different sense of time. I know now that in the study area, a snake basking in the sun and sitting out on ledge, the common way people sometimes see snakes, takes up only about five percent of their schedule. The rest is this state of being I witnessed with Beulah each afternoon. And of course, we know so little. In the 15 years of the black-tail study, only two or three blacktails have entered the study area from outside the mapped home ranges. Does this mean the group in the little valley are some genetic pocket, a tribe perhaps? We don't know.

One June day about four A.M., I make coffee at the ranch, throw on a shirt, and paddle barefoot and bare assed onto the

porch to see the death of the morning stars. I feel something under my foot, hear a rattle, and look down at Beulah stretched out as she is apparently on her way to the woodpile and a brief canvass for rats. I lift my foot and she slithers off.

I remember the alarm at the rattle, the heat and scent from the coffee rising in my face. I do not remember deep fear—I think it happened too fast for a rational response. But mainly I remember this: looking down and thinking, Beulah, I'm sorry, I didn't mean to step on you. I think I said something out loud to her about my clumsiness.

That afternoon she is back at her post by the chair as I sit and read as if nothing had happened.

I HAVE A PILE of notes from Dave on the life histories of several blacktails. The snatches of behavior caught in the field form a kind of false history of months of calm punctuated by events—movement, denning, birthing, courting. Every time I string the notes together into a biography I get that false speed that is characteristic of nature films, the montage of eating and fornicating and darting here and there. This montage misses the state of grace that covers what we cannot understand or learn.

But of course, grace cannot be within the reach of snakes because it is a divine gift and they are beneath the cares of God. Nor can grace be possible for snakes because they are organisms with Latin names and locked within a logical schema we have created that bars God at the door. So I am left with the calm of the blacktails, the long silences and slow motion, the apparent lack of anxiety, the appetite that seems not linked to hunger as we know it, the courtship that is alien to our frenzied notions of love, the endless ribbons of time that seem a bower within which the snakes crawl and repose and live a peace we can never know. We are left with the fangs and venom and the strike, rare moments that reassure us of a kinship. We are left with these tiny seconds of violence to estrange us from our comfort zone.

In the end, two things remain. Our knowledge of blacktail rattlesnakes is very slight. And no matter how much we learn of them the fear never completely leaves. They do not hunt us, they have no apparent interest in us, they hardly ever harm us, certainly not nearly as much as we harm them. We can no more

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kill all of them than they can kill all of us. We are together in this thing called life.

Nothing makes a person completely safe in rattlesnake country. Nor does anything make a snake completely safe. Certainly not being the research subject of eminent herpetologists in the Chiricahua Mountains. Last year, a group of illegal Mexicans camped along the creek while awaiting their ride from a smuggler. Such bands of illegals had never visited the study area before but this year at least a dozen parties had descended on the out-of-the-way little valley. Apparently, the Mexicans stumbled upon No. 26. All Dave found was the transmitter with no remains. Harry specu-

lates that they discovered the snake, killed it out of fear. And then ate it. This was the third human killing of an adult blacktail in the 15 years of the study. Years ago, No. 1 was killed with a shovel by two men who found it crossing a dirt road. No. 11 perished when it was accidentally run over. Most likely it was the first and last time No. 26 had a confrontation with a human in its life.

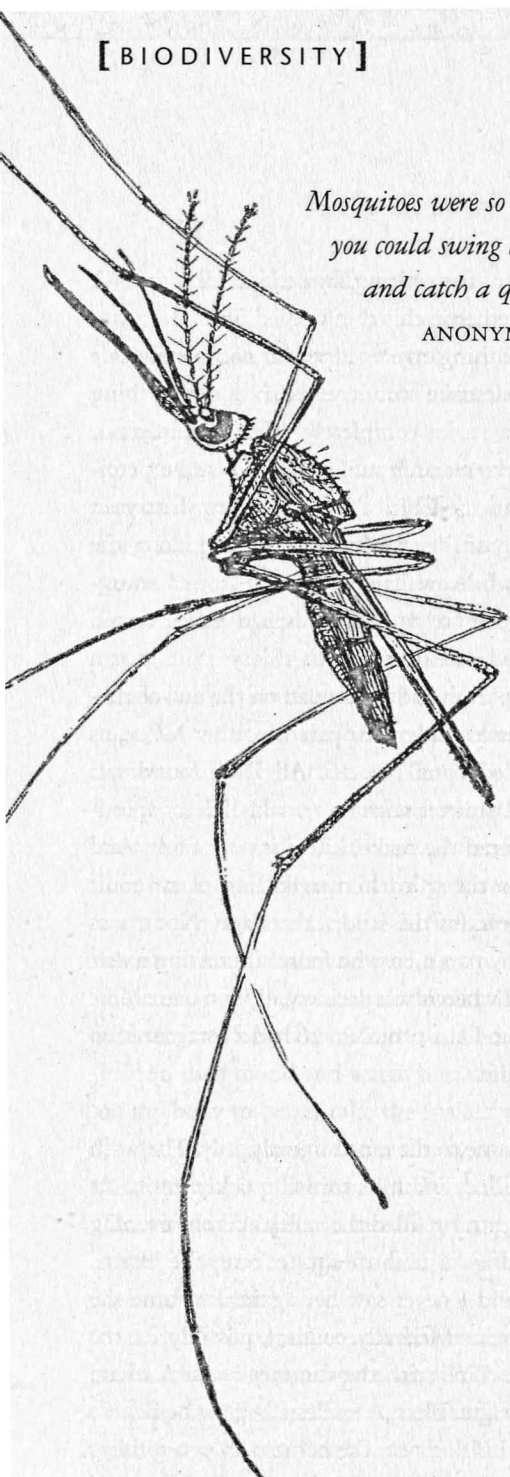
THE RAINS finally came to the ranch in early July. The wash ran, the stock tanks filled, and hills turned quickly green. At night thunder and lightning filled the valley and one evening huge bolts shattered oaks and mesquite near the house. Beulah disappeared and I never saw her again. I assume she moved out into a new and friendly country, possibly for the courtship rituals that come with the summer rains. A friend moved onto the ranch after I left. A rattlesnake, maybe Beulah for all I know, killed his dog near the house.

She could still be alive, patiently tasting the days and nights on the ranch. But mainly she lives inside my head, especially in the evening when I sit alone in the dark out in the yard and share the lessons she taught me of snaketime. She slithered away from my life leaving no track except for undulating strands across my mind. ☾

Chuck Bowden is the author of more than a dozen nonfiction books, including *Down by the River*, *Blues for Cannibals*, *Blood Orchid*, *The Sonoran Desert*, *Frog Mountain Blues*, and *Killing the Hidden Waters*. Winner of the Lannan Literary Award for Nonfiction, he lives in Tucson, Arizona.

*Mosquitoes were so thick
you could swing a cup
and catch a quart.*

ANONYMOUS



LATE ONE APRIL AFTERNOON two surf casters wet their lines in the Gulf of Mexico, off Cape Sable. They fished for sharks and between them caught five black-tips, all over six feet long. As twilight descended, salt marsh mosquitoes arrived in force. Every few minutes their numbers seemed to increase exponentially. The fishermen retreated to their tent and stayed inside drinking beer and listening to sharks cut the surface. At two in the morning, in his haste to get outside before his bladder burst, one man broke the zipper on the tent, which allowed inside a biblical cloud of mosquitoes. Then, in a Florida rendition of the cliff scene in *Butch Cassidy and the Sundance Kid*, the two men ran yelling into the Gulf of Mexico and kept company with the accommodating sharks till sunrise, sandpapery fins brushing their bare skin. At that point, only their lips were showing above the surface of the water.

The two fishermen who told me this story at least had each other for commiseration. Everglades National Park rangers tell of a lone fisherman whose skiff broke down in nearby Whitewater Bay. He spent the night submerged, breathing through a straw.

The late George Craig, a Notre Dame biology professor who was considered a preeminent authority on mosquitoes, once estimated that it would require 1,120,000 bites from the pesky insects to drain all the blood from an American adult. (Only female mosquitoes, which need high-protein meals to produce eggs, suck blood; males sip plant juices.) Craig never said where to test his supposition nor which of the world's approximately 3500 species of mosquitoes would be up to the task of exsanguinating a human, but one of his former graduate students, George O'Meara, had an idea.

Mosquitoes

Swatting 45 Species Across Florida's Everglades

by Ted Levin

O'Meara, a professor of entomology at the University of Florida's Medical Entomology Laboratory in Vero Beach, is one of a team of scientists at the laboratory whose careers hover around mosquitoes. He chose Flamingo, on Cape Sable, in Everglades National Park to test Craig's hypothesis. At the height of the rainy season, shallow pools in the mangrove forest alternately flood and dry. If the cycles happen to be spaced five or six days apart, two species of salt marsh mosquitoes, *Aedes taeniorhynchus* and *A. sollicitans*, proliferate in astronomical numbers. Their eggs, laid singly on damp ground—those of *sollicitans*, in open coastal prairies; those of *taeniorhynchus*, mostly in shade—mature in five days. A colleague of O'Meara's once estimated that more than 10,000 eggs per square foot of soil carpeted one site near Flamingo. The mosquito embryos are fully developed one to three days after the

eggs are laid, and the eggs of both species hatch within minutes of flooding, even after months of exposure.

I once saw a jar of larva-filled water that was as thick and dark as motor oil. Five days later, when the larvae completely metamorphosed, biologists found an average landing rate of 300 mosquitoes per minute on a white-shirted human volunteer. When the landing rate approached 2,000 per minute, the air was so saturated with bugs that the researcher had to wear a surgical mask to keep from inhaling mosquitoes.

In the predrainage Everglades, the high volume of flowing water would have held mosquitoes in check for much of the year, as most species lay eggs in stagnant pools. Infestations became worse after 1948, the year Congress approved funding for the Central and Southern Florida Flood Control Project. Then, after more than 30 years of manipu-



lated delivery and flow patterns throughout the entire watershed, water tables had been lowered by four or five feet in the eastern periphery of the Everglades, and parts of the central Everglades had become so dry that they often burned to their limestone underpinnings. The volume of water reaching Everglades National Park was so low by the 1950s that depressions in the saline mangroves were draining and refilling with tides and rainwater and had become ephemeral pools, the ideal breeding grounds for salt marsh mosquitoes.

Here is a story to place Flamingo's insect life in perspective. One summer in the early days of Everglades National Park, a pesticide-fogging truck had to spray five times a day to make Flamingo tolerable for the few summer staff members who lived there. Driven to distraction by biting insects—there are at least 40 species in the park—rangers radioed park headquarters near Homestead, a comfortable 38 miles away, and asked permission to pull back. Apparently, that summer, mosquitoes near Homestead were tolerable, and headquarters denied the request, suggesting that the rangers were sissies. To make a point, one Flamingo ranger followed the fogging truck and filled a large grocery bag with mosquito carcasses. He sent the bag back to headquarters. The next day a reply reached Flamingo: Pull back.

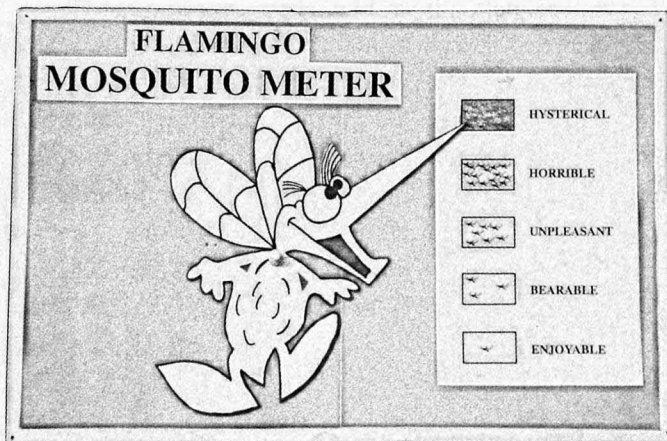
Fixed to the bulletin board in the Flamingo Ranger Station is the FLAMINGO MOSQUITO METER, which characterizes for park visitors the day's population of biting insects. The meter features a picture of a large, nasty-looking mosquito whose proboscis points to one of five categories: enjoyable, bearable, unpleasant, horrible, hysterical. Next door a gift shop sells a popular bumper sticker that looks like a cross between an ad for an exterminator and one for the Red Cross. It reads, I GAVE AT FLAMINGO.

AEDES TAENIORHYNCHUS ranges down both coasts of North America, from New England to Brazil and from California south to the Galapagos Islands. Florida females are facultative blood-feeders, which means that if they feast on algae, bacteria, protozoa, rotifers, and fungal spores during the larval stage, they can produce their first clutch of eggs on nectar alone, skipping a blood meal. Blood is required, however, for the production of all other clutches after the first. If a pool is overcrowded and begins to recede beneath the heat of the subtropical sun, *taeniorhynchus* may hurry metamorphosis and emerge small and wanting. Then the first clutch of eggs is made of blood. Although each female carries about 150 egg follicles in her ovaries, she lays only between 25 and

75 eggs on a blood-free diet. Blood more than triples the number of eggs produced.

For *sollicitans* there is no choice. It takes blood to make eggs. Males and females of both species derive energy for flight and other nonreproductive activities from sugars, mainly the nectar of black mangrove, white mangrove, and buttonwood, whose tiny flowers they pollinate in return.

Salt marsh mosquitoes avoid breeding in the red mangrove zone where tidal action would quickly wash away their eggs. They prefer the slightly higher swamps that are dominated by black and white mangroves and the adjacent marshes. Nature is a teeter-totter of checks and balances, and the narrow band of prime habitat that salt marsh mosquitoes seek has its own survival hurdle. When the moon is full or when a great wind pushes Florida Bay inland, small, hungry fish—



ALLYSON POLCZ/EVERGLADES NATIONAL PARK, FLAMINGO DISTRICT

marsh killifish, Gulf killifish, bluefin killifish, sheepshead minnow, gambusia, sailfin molly—surf into the mangroves and coastal prairie and feast on larvae. Several days later, when adult mosquitoes emerge, the mollies and minnows switch to a vegetarian diet. The other fish species continue to eat invertebrates. All wait for the tide to rescue them. As water evaporates, fish begin to coalesce, triggering one of America's grandest spectacles, the feeding frenzy of wading birds. A few appear at first—some egrets, perhaps some ibis, a spoonbill, a trio of green herons, a half dozen storks—arriving from parts unknown. Eventually flocks appear, whirling fragments of color, and the mangroves become snow white, the brown-water pools highlighted by living, moving blues and pinks and purples and russets, a fairy tale of birds whose presence is directly tied to the biorhythms of mosquitoes.

Salt marsh mosquitoes are not selective feeders; they're opportunists. Several years ago I watched scores of them

engorge in the nostrils and around the eyes of an eight-foot-long crocodile, which basked in the sun, seemingly oblivious to the attack. When loggerhead sea turtles crawl out of the Gulf of Mexico to nest in the bone-colored sand of Cape Sable, each sports an entourage of mosquitoes. With surgical precision the insects work their stylus-mouths between the scales of diamondback rattlesnakes. Mosquitoes torment birds, particularly wading birds, whose long naked legs present inviting targets. Some biologists believe that the density of salt marsh mosquitoes on the mainland may have driven colonial wading birds to nest and roost on the isles of Florida Bay. Around Flamingo, mosquitoes thrive on the blood of marsh rabbits, whose crepuscular pattern of activity matches that of the mosquitoes. I've watched these poor creatures grazing along the edge of the park service road, their ears pin-cush-



Mosquitoes are far more varied than the average halter-topped tourist in Everglades National Park realizes.



ioned by fat, blood-red mosquitoes. Raccoons, which are abundant in the mangroves and coastal prairies but active later at night than the rabbits, encounter far fewer mosquitoes and consequently shed less blood. O'Meara, who has vacuumed *A. taeniorhynchus* off black mangrove pneumatophores at rates in excess of 10,000 per minute, found that in Flamingo eight percent of the females he captured had recently had a blood meal. Of those, nearly three percent carried human blood.

Outside George O'Meara's office is a mosquito flight cage in which he and other biologists have tested the responses of various bird species to hungry salt marsh mosquitoes. Birds that rely on stealth or camouflage to capture food—barred owls, green herons, black-crowned night herons, and great blue herons, for instance—stand stone still, rarely flinching while clouds of mosquitoes ply their trade. Active feeders, such as white ibises and snowy egrets, twitch and snip, often eating

the bugs that try to bite them. Cattle egrets stomp their feet. Raccoons and marsh rabbits accommodate, but nibbly cotton rats and cotton mice do not. Mosquitoes avoid young opossums, but not their parents. Woodpeckers and songbirds, except for Carolina wrens, are too jittery to be good hosts.

IN JANUARY 1996 I met with George O'Meara in Vero Beach. He showed me the walk-in flight cage, which is built like a large wood-framed screen porch. Some years earlier, O'Meara had enlarged his study population to include two officials of the Accutronics Corporation, which at the time marketed an antimosquito device called the Mosquito Hawk. The company claimed that the Mosquito Hawk mimicked the noise made by the beating wings of a dragonfly, a major mosquito predator, and thus kept the mosquitoes at bay. The inventor agreed to a test in the cage. To prepare for the event, O'Meara starved several thousand female salt marsh mosquitoes. The inventor of the Mosquito Hawk entered the flight cage, four buzzing black boxes fixed to his belt. The mosquitoes began to feed, undeterred by the high-pitched sound. Within seconds the man turned to flee, but the door had jammed. Panic reigned until O'Meara rescued him.

George O'Meara has been bitten by salt marsh mosquitoes so many times in the course of his research that he has become immune to their bites—no slapping, no itching, no swelling. Inhaled mosquitoes, however, can still cause discomfort. A hungry female mosquito is attracted to carbon dioxide and lactic acid, both of which are given off by the respiration and activity of birds and mammals. She also may key in on an animal's profile and on dark clothing, like the olive-green uniforms worn by rangers in Everglades National Park. Drinking ginseng tea or eating bananas, vitamin B, garlic, brewer's yeast, or Mrs. Paul's Fish Sticks—all suggested as can't-miss home repellents—will fail to keep mosquitoes away. Commercial bug repellents may keep mosquitoes from biting, but they contain DEET, the active ingredient in most repellents, which is absorbed by the skin and has been linked to seizures and deaths. It also dissolves plastic and vinyl, rendering binoculars and cameras permanently sticky. Although acquired immunity may be reliable and safe—the Zen approach to living with mosquitoes—who would want to get bitten the requisite several thousand times each year for many years to become desensitized?

Even though a small percentage of salt marsh mosquitoes survive to adulthood, the number is "still enough to get your attention," O'Meara assures me (not that I need assurance). To



encourage coastal development in the 1930s and 1940s, Florida leveled and filled mangrove forests and ditched and drained salt marshes. The faint image of old mosquito ditches still crosshatches satellite photos of coastal Florida. The wetlands that did not drain were liberally doused with Paris Green, a larvicide made of copper arsenic. After World War II Florida switched to the magic bullet, DDT, in an effort to win the mosquito war. As DDT-resistant strains of mosquitoes began to evolve, Florida repeatedly upped the dosage until chemicals could no longer dissolve in solution. By 1959 DDT had damaged the ovaries of fish-eating brown pelicans and had turned palm fronds yellow, but it was no longer effective against *Aedes taeniorhynchus*. Throughout the 1960s, mosquito control once again relied on Paris Green.

Several years ago on Key Largo, I watched a plane pass up and down the island spewing the pesticide malathion from the armpit of each wing. At the sound of the plane I rushed outside to see a trio of fluffy gray kingbirds perched on an electric line. The mother kingbird, a dragonfly in her bill, flew in to feed one chick in a descending veil of pesticide. As the sun rose above the hardwoods, fingers of sunlight pierced the chemical mist like floodlights in a smoky arena. The air smelled like industrial cleaning fluid. For three days, I was not troubled by mosquitoes. How the kingbirds fared is another question.

Behind O'Meara's office is a web of canals sliced into a frost-stunted mangrove forest that feeds Indian River, a mile or so away. On this day it is sunny and warm, low 70s, and would have been good weather for salt marsh mosquitoes except that it hasn't rained in more than a month, and the temporary pools have dried out, leaving tableaux of opossum and raccoon tracks in the caked mud. Above the tide line, shaded by black mangroves, are the long, curved burrows of the great Atlantic land crab. The burrows, which extend to the waterline, are also the home of the crabhole mosquito, one of O'Meara's favorites. He pours water down a burrow, and a congregation of mosquitoes rises from the hole. The males' long antennae, which droop forward like an extra set of legs, are used to shepherd females still in their pupae stage. When an adult female sheds her pupa case, she is quickly bred by her tending male. Both sexes rest on the walls of the burrows by day and feed by night, the males on nectar or fruit juice, and the females on either blood or the sugar of fruits and flowers. Unlike the salt marsh mosquito, the newly emerged crabhole female always produces her first clutch of eggs on a blood-free diet. If she has stored enough food in her body from her youthful days as a filter-feeding larva

in the bottom of the crabhole, she may stay with sugar for the second clutch and never suck blood. "They're nice mosquitoes," O'Meara chortles.

Returning from the salt marsh, O'Meara walks me along a trail through a live oak hammock. The trees are tall and festooned with Spanish moss, and for the most part they block the sun. Here and there pines and cabbage palms accent the oak woods. Some of the rough-barked trees support tank bromeliads, air plants that look like the tops of pineapples and hold water between the tight weave of their long, tapered leaves. O'Meara pulls a turkey baster from his back pocket, squeezes the ball, and inserts it into a bromeliad, removing half a dozen mosquito larvae, which he squirts into a petri dish.

One larva is nearly a half-inch long and has an oversized head that is four times the size of the others. The big one is a predator of other species of mosquito larva. Its prolonged development puts it in contact with several hatches of prey, which it devours before maturing. Later, in a warm, humid cage in the center's laboratory, O'Meara pulls out the adult incarnation of the same species. These are huge and beautiful, more like tiny butterflies than large mosquitoes—blue-black bodies with phosphorescent stripes, iridescent purplish wings. The lower legs are white, as though the mosquitoes are wearing stockings, and the males' antennae are bushy. As adults the females drink only plant juices. O'Meara squirts the big one into a bromeliad and wishes it well. "Go, do your job," he says.

Mosquitoes are far more varied than the average halter-topped tourist in Everglades National Park realizes. Forty-five species occupy 45 niches across the Everglades, some so subtly different from each other that it requires the patience and perseverance of George O'Meara to notice any difference at all. A few species bite only during the day, others at night, and still others—like the salt marsh duo—prefer twilight, except when a bright moon extends their hours of feeding.

Some lay eggs in permanent freshwater, some in floodwater. One mosquito prefers pools cradled in cypress knees; treehole species choose egg-laying sites by the height of the cavity or the pH of the water. Two species of *Wyeomyia* are bombardiers, dropping eggs like depth-charges while hovering over a bromeliad. Another lays eggs on the undersurface of floating plants. Members of the genus *Anopheles* place their eggs singly on water; the *Culex* mosquitoes glue theirs into iridescent floating rafts that curl up along the edge and drift about like Lilliputian dugouts. The eggs of *Aedes* wait for water—even those that breed in bromeliads depend on rain to wash their eggs into the tank. Too much rain, however, may

wash them out again. (To avoid a similar fate, larvae settle to the bottom of the tank where there is less agitation.) The two species of *Wyeomyia* include powdery catopsis, a carnivorous bromeliad, in their list of nurseries; their larvae frolic amid the fermenting carcasses of less fortunate forms of insects. The larvae of three species of freshwater mosquito live in ooze and siphon oxygen from the interior of root hairs. Other types dwell at the water surface, suspended like inverted question marks. Still others rise from the depths, take a breath, and then sink again.

Some species of blood-hungry mosquitoes specialize in birds or mammals, either big or small, or turtles or frogs. O'Meara says he would not be surprised if the connoisseurs of amphibian blood tune in on the pulsating sound of frog operas. Other species, like the salt marsh mosquitoes, are catholic feeders, their diet reflecting whatever is available at the moment.

Culex nigripalpus, a mosquito associated with summer showers, is the main vector for St. Louis encephalitis, a disease sometimes fatal to humans. In 1990 there were 230 clinical cases and 20,000 subclinical cases in Florida. Although *nigripalpus* bites frogs, snakes, turtles, raccoons, armadillos, humans, owls, egrets, herons, and pelicans, the viral reservoir is predominantly dooryard birds—cardinals, mourning doves, blue jays, and boat-tailed and common grackles—all of which are widespread and abundant. The disease travels from mosquito to bird to mosquito to human. Fifty-eight percent of the black vultures in South Florida tested positive for St. Louis encephalitis, but their spotty distribution did not amplify the disease. Grackles had a banner year in 1990. A year later, when the population of both grackle species crashed, St. Louis encephalitis all but vanished from Florida.

Mammals, from black bears to rodents, are the reservoir for Venezuelan equine encephalitis. In the Everglades a hammock-loving *Culex* transmits the disease from cotton rats to cotton mice. Some viruses are indigenous to Everglades National Park and are named for the site of discovery, such as Mahogany Hammock virus and Gumbo-Limbo virus. Fifty percent of the Seminole tested had antibodies for Venezuelan equine encephalitis, a splendid adaptation for a culture intimate with the Everglades.

AS I LEAVE VERO BEACH after seeing O'Meara, I remember a previous trip, in 1993, during which it rained a long, hard rain. When the storm finally blew out to sea, the sun reappeared, and the million raindrops on a million leaves

made South Florida sparkle. The air smelled fertile. Four days later in Everglades National Park much of the Christian Point Trail, which winds through a storm-torn buttonwood forest, lay beneath six inches of stagnating rainwater seething with life. I dipped a mayonnaise jar into the opaque broth, held it to the light, and watched thousands of salt marsh mosquito larvae snap up and down like grains of rice in a rolling boil.

Six days after the rain, adult salt marsh mosquitoes began emerging from the flooded ground. Every hour their numbers swelled. I had a flat tire that morning and, unfortunately, changed the tire dressed in sandals, shorts, and a paper-thin shirt. By midafternoon, my ankles and arms looked like a relief map of the Appalachian Mountains, and I was scratching my back against a tree like a bear. ☾

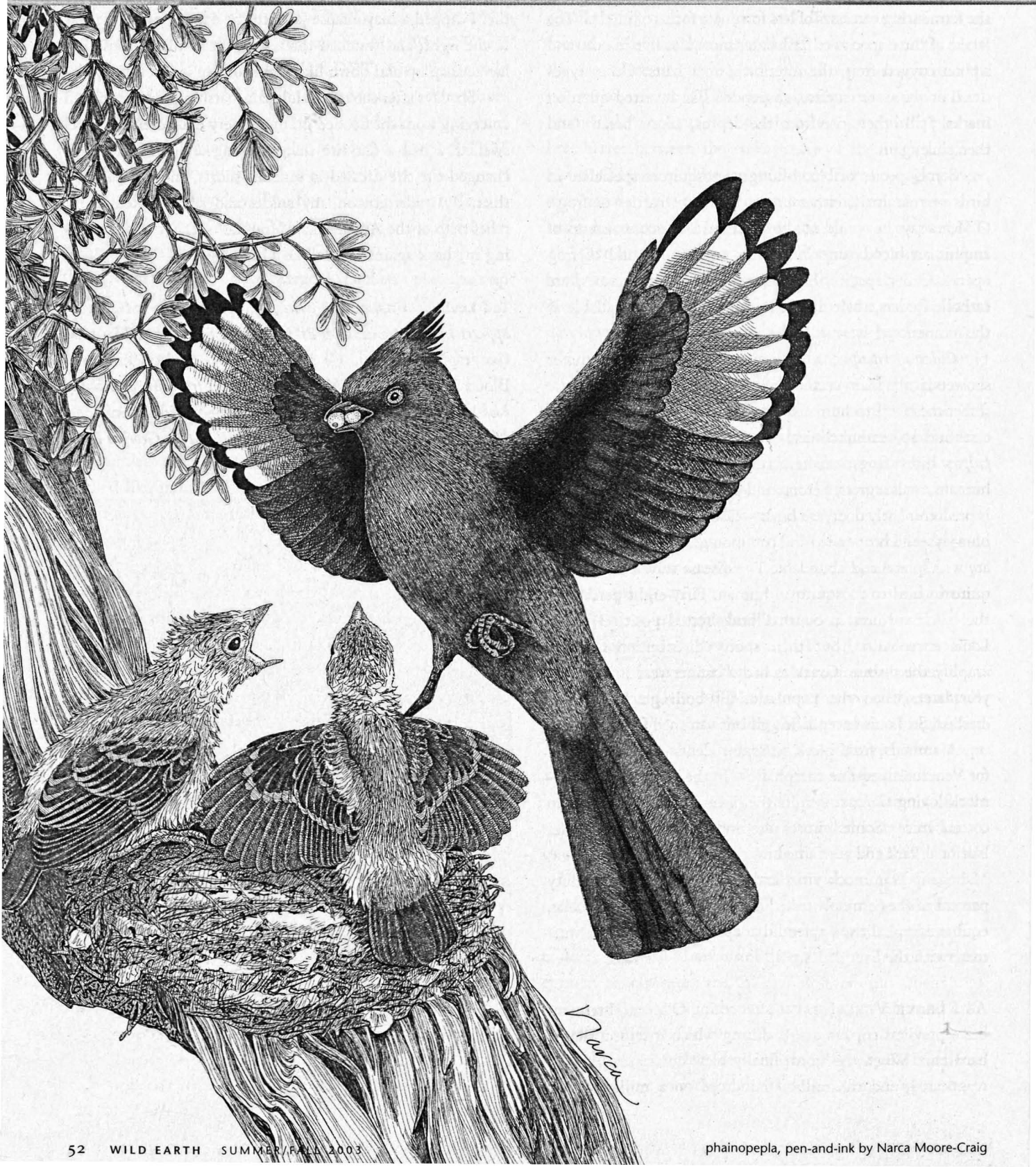
Ted Levin is a naturalist, writer, and photographer whose work appears in such publications as *Audubon*, *Sierra*, and *National Geographic Traveler*. He is the author of *Backtracking and Blood Brook*. ☞ This essay is adapted from his forthcoming book *Liquid Land: A Journey Through the Florida Everglades*, which will be published this fall by the University of Georgia Press.

[POETRY]

This was the summer
the trees stood
with their feet
in water
looking at themselves.
Now they get ready
for winter's desert
changing color
when no one
is looking.

☞ **Elizabeth Caffrey**

PAUL EHRLICH



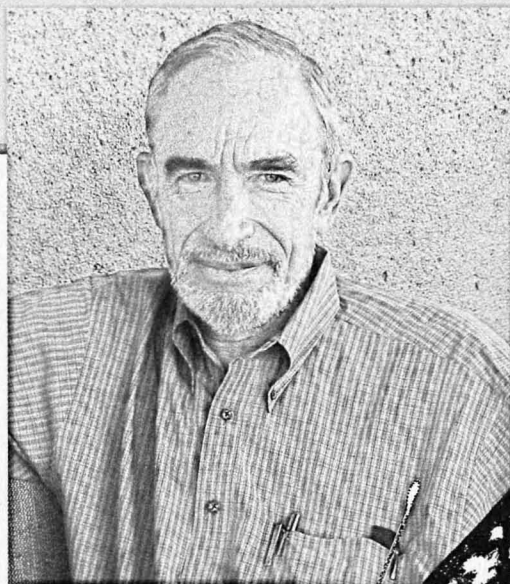
At age 70, **Paul R. Ehrlich**—Bing Professor of Population Studies and Professor of Biological Sciences at Stanford University—almost ran across the stage to start his lecture at Middlebury College, Vermont. The Iraq war had opened hours earlier. He smiled, leaned forward until his head was just over the lectern, looked out at the hundreds of assembled undergraduates and academics, and asked, “How do you like being a citizen of a rogue nation?”

Since the publication of *The Population Bomb* in 1968, Ehrlich has combined a staggering erudition in the biological sciences with an unflinching willingness to ask uncomfortable questions about public policy and the social order.

As a teenager, Ehrlich spent his days collecting thousands of butterflies, which he later donated to the American Museum of Natural History, where he worked with the Curator of Entomology, Dr. Charles Michener, mounting insect specimens. He followed Michener to the University of Kansas where he explored the evolutionary processes that led to DDT-resistance in insects and completed his Ph.D. on the higher taxonomy of butterflies. In 1959, he joined the faculty at Stanford and began a study of checkerspot butterflies (*Euphydryas*) in central California that continues to this day. A distillation of this work, *On the Wings of Checkerspots: A Model System for Population Biology*, edited by Ehrlich and Ilkka Hanski, will be published next February—another addition to his list of 38 books and more than 800 papers.

Ehrlich's studies of insect genetics, plant/herbivore interactions, and numerous other facets of ecology have taken him into the field on every continent. But he has always returned to his efforts (often in collaboration with his wife, Anne) to focus public attention on the connections between human population growth, consumption, extinction, and the fraying of the planet's ecosystems. “The population explosion is going to come to an end; will it be by humanely limiting births or will we stand around as the planet cooks and the death rate goes way up?”

Wild Earth's assistant editor **Joshua Brown** spoke with Paul Ehrlich after his lecture on March 20, 2003.



COURTESY PAUL EHRLICH



©Diana Dee Tyler

WILD EARTH: At 5:30 this morning U.S. forces launched an attack against Iraq. In times like this an age-old debate about the nature of humankind surfaces: are we inherently aggressive? I know you have been skeptical of theories that suggest there is a “militaristic gene” or that there is a simple equation to explain the ongoing repetition of warfare across human history. So why do we fight?

PAUL EHRLICH: For as many reasons as there are stars! First of all, we do not understand cultural evolution anywhere near as well as we understand genetic evolution—and we still have a long way to go on genetic evolution. What we do understand about genetic evolution tells us that complex behaviors—like warfare and other aggression—cannot be fully coded into our genome. You could say we have a tendency to be aggressive about as easily as you could say we have a tendency to be cooperative. After all, human society is a form of cooperation; that's what makes the society work. We have many tendencies and few fixed behaviors.

There is great value—since we don't understand how the systems work—in maintaining large amounts of the biosphere that are self-willed.

The same thing goes for chimps; they can be very aggressive and they can also display reconciliation and cooperation of various forms. In both cases we have smart organisms dealing with their environments—making choices—and that sometimes leads to aggression and sometimes leads to cooperation. Certainly warfare of one sort or another goes way, way back in our history and you can see that even chimps get into conflict that looks like warfare.

The popular media overestimate the capacity of genetic traits to direct behavior?

Vastly. It's not just the popular media, it's a whole discipline—or pseudo-discipline—called evolutionary psychology, which is made up mostly of psychologists who really don't understand evolution, and certainly don't understand genetics.

There aren't enough genes to do the job. There aren't enough genes to program our everyday behaviors, and even if there were, evolution wouldn't have worked it that way. We have large, conscious brains to act as a buffer against environmental variability, to allow us to respond adaptively in different situations.

The brain is the only organ in the body that requires gigantic amounts of environmental input before it will even function. If you blindfold a cat or human being at birth and take the blindfold off five years later, they can't see even though their eyes work. They get impressions but they can't tell a star from a square.

I breathe more easily not picturing my DNA as the "master puppeteer." But are we merely looking up the wrong set of strings—or is the entire enterprise of seeking a deterministic explanation for human behavior a false framework?

If it is genetic determinism, it is clearly a false framework. If it is an effort to understand how our genomes interact with our environments to produce behaviors, that is a valid enterprise.

Here is an example of where genes do affect our behavior: we are sight animals primarily because we used to live in trees and snatch bugs with our fingers—and the individuals that tried to smell where the next branch was before they jumped didn't reproduce as well as those that looked.

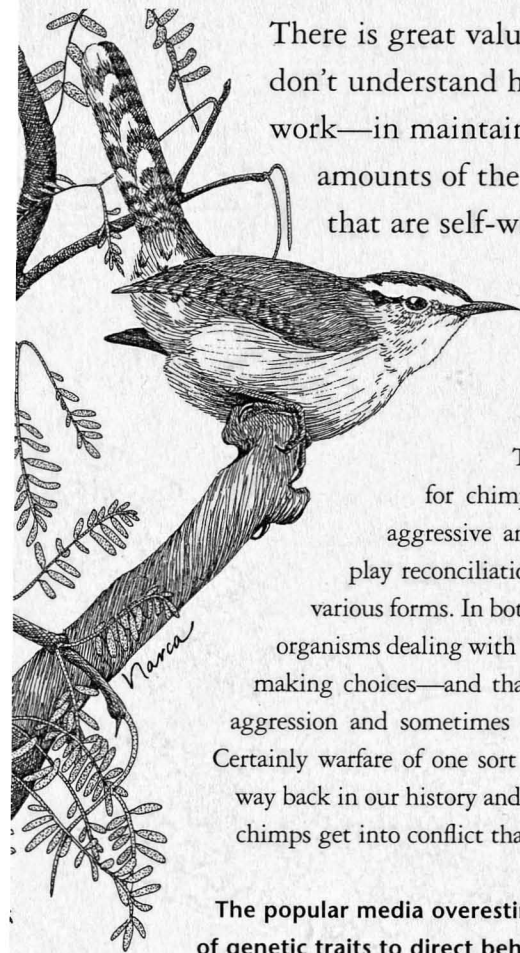
Think of our racial prejudices. They are based on a trivial characteristic that happens to be visual: skin color. Skin color has no connection to intelligence, no connection to behavior. It has to do with the amount of solar energy our ancestors were exposed to, and yet it is a huge factor in our society partly because our genetic evolution made us extraordinarily sensitive to visual cues—to things that hit us in the face.

We may even see our biological biases in expressions like "in your face." It is much more dangerous to have a little bit of chlorinated hydrocarbon on your apple, but you are struck by the litter along the road because you see one and don't see the other. This bias influences our whole view of environmental problems: visible messes attract concern more than poisons you can't see.

If people and chimps have, at least, a measure of choice, of will power, do you think this extends to larger systems in Nature? I find the term "self-willed ecosystems" to be poetic but useful. Is the aspiration for self-willed ecosystems—ecosystems that are largely left alone by people—an illusion? I think it is a useful illusion. The entire planet has now been modified by *Homo sapiens*. If there is any place that hasn't felt human influence, it might be the very deepest ocean trenches—but if we went down to find out we would influence them! Every other cubic centimeter of the biosphere has been influenced by radionuclides that didn't exist before we exploded atom bombs, atmospheric pollutants, and so forth. On the other hand, there is great value—since we don't understand how the systems work—in maintaining large amounts of the biosphere that are, as you want to say, self-willed, or as close to self-willed as we can have it.

Of course we can't restore the Pleistocene megafauna in North America, and the world is changing all the time. But the idea that we know enough to control the evolution of ecosystems—upon which we are utterly dependent for our lives, for ecosystem services—is a level of chutzpah that takes the breath away.

One amusing proof in the pudding is that dome in



Arizona, the Biosphere II. Here they tried to make an ecosystem of just a few hectares and it went promptly to hell. They didn't understand what they were doing; we do not know enough. We're crazy to destroy the functioning ecosystems that we have with the idea that we can easily replace them.

But that view is not going to take hold in Washington these days; I doubt George W. Bush could spell "ecosystem."

Your work as an entomologist is helping us to understand how some population systems, if not whole ecosystems, work. I understand you have been studying checkerspot butterflies for the last 42 years—and that this is perhaps the longest continuously studied species in science. What does this timespan tell us that other shorter studies would miss?

One of the reasons that the fields of ecology, evolution, and taxonomy are so far behind genetics is that geneticists have concentrated their efforts on a few systems for a long time. Intense study of four or five organisms has contributed 99% of our knowledge of how genetics works.

We owe a great debt to the fruit fly.

That's right. And to *Escherichia coli* and a few others. We haven't done the same sustained study of systems at the population biological level. I deliberately started the checkerspot work trying to establish the dynamics of one population system that can illuminate a wide variety of other systems. Ecologists, evolutionists, and taxonomists have scattered their efforts over a wide variety of systems and groups and get little bits of information from lots of short-term studies. We often don't know what all these little bits mean.

As an amateur birder, I have long loved *The Birder's Handbook*, with its friendly, intelligent essays on all manner of bird behavior and its hundreds of entries on avian natural history—but it was only yesterday that a friend pointed out to me you are one of the co-authors. When did you first take an interest in birds?

Most of my work has been with butterflies—I have worked on reef fishes and mites and a lot of other stuff—but my main research had been on butterflies until about 20 years ago when we started doing fieldwork in the Great Basin, comparing birds and butterflies.

I had casually birded when I was a kid, but only in the Arctic—I had Ross's gull on my list before I had the cardinal. I didn't bird when I was down here, because I am color-blind.

I thought it would be too much of a handicap. But when I said that to Jared Diamond, around 1983 or 1984, he said, "Aw, it's not that big of a barrier, come on." He gave me a pair of binoculars, we went out in his backyard, and we saw a phainopepla and a Bewick's wren. I was hooked.

A year later, my department at Stanford got a lot of pressure because all of our courses were principle oriented, rather than organism oriented—and students wanted an organism-oriented course. I had followed the bird literature casually but not intensively. I thought, "One good way to really get on top of some material is to teach a course in it and try to stay ahead of a bunch of smart undergraduates." So I started offering a biology of birds course: all the principles of population biology and ecology and evolution—as illustrated by birds.

That went for a couple of years, and then it dawned on me that every question that the students asked about the birds—except, what does its song sound like, what does it look like, and where does it live geographically—were not answered in any of the standard bird guides. They wanted to know: where does it nest, what is its nest like, how many eggs does it lay, and that kind of thing. So we decided it would be fun to write a book that answered all those other questions. The result was *The Birder's Handbook*.

Let's jump into the metaphysical for a moment. You have written, "Science tells us we are creatures of accident clinging to a ball of mud hurtling aimlessly through space. This is not a notion to warm hearts or rouse multitudes." Do you think that this bleak conception of existence, at least in part, explains why conservation biology has largely failed to stop the destruction of Nature: people will not rally to a banner whose metaphysics are uninspiring at best and despairing at worst?

Yes. That's why I have said elsewhere—and been heavily criticized for it—that we need a quasi-religious transformation to get us to save Nature. What else do we have to love? We evolved in Nature and are in some sense fitted to it.

People don't rally to the idea that we are doomed; that we don't know where we came from and that we are doomed to go back to the same place; that thirteen billion years ago there was a great explosion and four and a half billion years from now the sun will have expanded and we will have fried. (Fortunately, it is billions of years; you know the old saw where someone says, "You mean we're all going to be destroyed in four million years?" "No, no, it's four *billion*." "Oh what a relief, I thought you said four million.")

Do you see yourself as a creature of accident hurtling aimlessly through space?

It depends on what you mean. Accident, yes. But a creature of accident can take on purpose. You can build purpose. I don't think human life has any intrinsic value. I am against the death penalty, but not because I don't believe there are people the world would be better off without. I think a human life acquires value based on behavior. On the other hand the attitude that the society ought to be able to easily, capriciously kill people hurts the society.

We could make an ethic for our society that would greatly increase the value of Nature—just like we made an ethic that overthrew slavery. Attitudes toward Nature have changed dramatically in the United States in the last 150 years.

Then this quasi-religious transformation you envision is primarily a personal ethical reformation?

Yes, our ethics evolve. You can see them evolving in our attitudes toward animals. One of the saddest things is that the animal rights movement puts so much emphasis on pets and deer—and it doesn't pay the slightest attention to the flora or the many kinds of not so charismatic animals that depend on the flora and so on—but we could evolve it further.

And learn to love the mosses and the spiders.

Right, we can learn to relate to the mosses and the spiders the way people now relate to their domestic animals. I think most of my ethics came from my mother, who used to discuss the value of life. I don't like killing butterflies. I do it. I like killing birds even less.

Less than butterflies?

The average lifespan of butterflies we work with—these are adults that have lived most of their lives when they become adults—is about ten days. Some birds can live for decades. Still we try to avoid killing butterflies. We get into battles with one guy who runs a field station who thinks you have to have a voucher specimen of everything even if we know perfectly well what it is. We say, "No, we're not going to kill one."

Isn't one of the best ways to protect butterflies and birds—and many other life forms—to protect large chunks of connected wilderness and let natural processes run their course?

Sure, people need to learn to love wilderness and we need more of it and the small pieces should be connected up.

But given that we are not going to convert half of the United States to wilderness in the next 10 years, or even 50 years, what can we do to make this landscape [indicates plowed farm fields out window] more hospitable to biodiversity without having to change other values to the point where you hit huge resistance?

Gretchen Daily [Ehrlich's colleague at Stanford] has been working on this in Costa Rica. The field of countryside biogeography which she invented—looking at how you can improve already highly transformed and degraded landscapes to make them more hospitable to biodiversity and the ecosystem services they provide—needs to be a top priority.

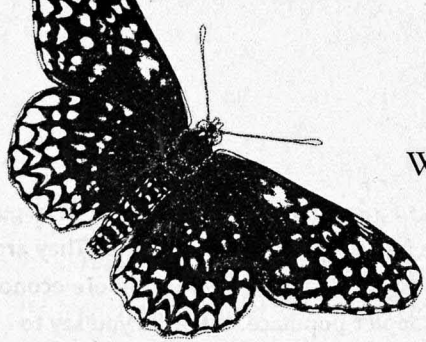
We get too focused on species diversity as being the ultimate value. This overvaluing of species certainly pollutes taxonomy and pollutes conservation biology to a degree as well. It is good we are starting to move away from this perspective and talking much more about whole landscapes and how they work. The wolf is not in danger of extinction at the moment, but we would like to have wolves over much more of the country. We'd love to have mountain lions to eat the deer and the joggers, both of whom are in surplus. (I'll probably get it for that comment on joggers; our enemies are not overwhelmed with senses of humor.)

Speaking of enemies, if restoration ecologists are being pitted against people trying to protect more intact ecosystems, then the forces of anti-conservation are winning. We need both.

Exactly. Some of the results from our work with checkerspots have been critical to intelligent reserve design—as well as restoration efforts.

One discovery, which doesn't seem like much now, but was 40 years ago, is that population extinctions are very common. There tends to be a metapopulation structure, so population units must be defined before we can conserve them. Otherwise your harvesting strategy or protection strategy is likely to be just wrong. Also, for some creatures, habitat area may be much less important than habitat quality. In particular, for a lot of insects and small mammals and some birds, topographic heterogeneity is critical.

In our checkerspot work at the Jasper Ridge reserve, the two study areas get basically the same macroclimate every year—but what matters to the butterflies is the *microclimate*. The timing of the butterflies and the plants they feed on can easily get screwed up in a spot with just one slope exposure—say a flat place. If there is a year in which the phenology is off,



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the butterflies go extinct. But if you have a varied landscape then every year there is at least one area that has perfect phenology for the butterflies and plants. A few subpopulations of butterflies do very well and a few fail—and so the overall population doesn't go extinct. Topographic heterogeneity is an important consideration in trying to evaluate what places to protect for insect preservation.

How do we get biologists and the public more interested in population diversity?

Consider this: If you could take every plant and animal on the planet and reduce it to one minimum viable population—which could persist for 100 years—you'd have preserved species diversity. But we'd all soon be dead. You have one good minimum viable population of wheat, one minimum viable population of rice. One of each pollinator: one minimum viable population of honeybees and so on. All the ecosystem services would collapse. All life would soon be gone.

Or this: If you are living in a valley in Colorado and the population of blue spruce that's on the slope above you is cut down it does not mean blue spruce is in the slightest danger of extinction as a species. But when the avalanches come you'll be stone cold dead because that population was removed.

It's not just all politics that is local.

That's right. Gerardo Ceballos and I wrote a paper for *Science* [vol. 296: 904–907] a year ago on the massive loss of mammal populations, and one of the things we discussed is what we call political endemism. That is, if you have a fairly widespread species, but its range is restricted to Uganda and Idi Amin is in the saddle, it is in greater danger than if it gets restricted to Sweden or Switzerland. These are smaller countries, but with stable politics and an interest in conservation. You've got to think not just about the distribution and populations of a species—but how it relates to the local political situation.

The idea that we're doing alright if we turn the world into a zoo where each species persists is not going to work. I believe what Aldo Leopold said: the first rule of intelligent tinkering is to save all the parts. We should do everything we can to avoid massive species extinctions—because you can't tell

what's needed. Even if one species today is not playing a critical role it may be the one that can take over that role when the main-role player is wiped out by climate change. I'm not saying for a minute that species diversity and hotspots are not important, but these should be one part of a bigger story that includes thinking about population diversity and maintaining ecosystem services over as much of the planet as we can.

When you let yourself imagine a best case scenario for North America in 100 years, what do you see in terms of human population and landscapes?

Best case? Oh, 80 to 100 million people, something like what we had around the turn of the nineteenth to twentieth century. A paper that Gretchen Daily and Anne [Ehrlich] and I wrote years ago figured an optimum population would mean a world with many opportunities: enough people to have vibrant cities, symphonies, great food and so on, but few enough people that you could have wilderness areas where people who wanted to live away from big cities could—without having airplanes overhead all the time and snowmobilers on every trail.

That would mean shrinking the U.S. population to something on the order of a third of its present size—and the same for the global population. When I was a kid nobody felt there was a shortage of people. The East Coast was heavily populated, and out West you could find some wilderness (more or less; even then there were many roads). I was first out West in 1947 and it was wilder then.

One hundred million people with more careful attention to what is left in wilderness so those areas aren't destroyed by overgrazing and overharvesting of timber. Imagine if we had a third of today's population with today's knowledge. We know that the West didn't look like a desert when the Spaniards arrived; there was grass over the horses' bellies. Have you ever been to the Audubon Ranch in Arizona where they have brought much of the grass back? The difference between that and the neighboring cow-turd vistas will make your eyes pop.

Sam Hurst of NBC News and I used to do a five-minute segment on environmental issues for the *Today Show*—until

they got fed up with us. We did one on the cattle industry and overgrazing. The waste of the West is unbelievable—just to subsidize about 30,000 ranchers. Most U.S. beef is produced in the East of course, but few people know that. The desertification of the West is what the cattle industry does best.

We were in this arroyo—Sam, and a cameraman, and I were filming because there was not a visible blade of green, the cattle had eaten everything and it was a carpet of cowshit. As we're filming, this cowboy comes out—we'd gone through a fence saying "no entrance"—six-shooter on each hip, two pit bulls following him on his horse, and I thought, "Oh no." The cowboy says, "What you fellas doing?" and Sam says, "We're photographing the wildflowers." This guy looks around and there is not a blade of grass anywhere; he says, "Really?" Sam says, "Yeah, we're making a TV film." (I am busily putting on my adidas. You know that one: I don't have to be faster than his horse, I just have to outrun Sam.) Sam says, "Would you like to be in the picture?" And the cowboy says "Yeah!" Sam says, "Why don't you ride off into the sunset?" So we filmed this guy proudly riding away through the "wildflowers." We got enormous flack from the cattlemen's association.

What role do you see for governments in working toward a lower human population?

I have very little faith in governments to effectively control population, probably less today than when I wrote *The Population Bomb*. I have argued long and hard that we ought to get onto this [population] problem before governments wake up because when governments wake up they tend to do things that are bad or silly.

I don't now believe everything I wrote in *The Population Bomb*. Any scientist who believes everything that he or she wrote 35 or 40 years before is in a very slow moving science! But I have never had enormous faith in governments and that lack of faith has been justified over the years. I think that's why more and more of us are looking toward market mechanisms to do a lot of the work—leaving government to the simpler problem of trying to level the playing field.

For example, we have been negligent in the development of better contraception, partly due to our very litigious society. The government has not stepped in to make the playing field work for pharmaceutical corporations, so the risks of developing more effective contraceptives are simply too high. That is a good place where market mechanisms should be modified to make it possible to develop much better contraception.

Some optimists suggest that the warnings about population growth are hysterical and wrongheaded. They argue that a growing population will only mean more economic growth and a happier populace. What do you say to this view?

It is self-evident to me that there is no sensible reason to expect the United States to be any better in 50 years—with 409 million people as projected—than it is today. In fact, if you take a standard measure of utility, that is, an index of people's perceived satisfaction—while we have expanded our population and our GDP for the last 50 years—satisfaction has declined. Measures of happiness have certainly not increased. There is a long series of social and economic studies that bear this out. So I see no reason to believe expanding to 409 million people is likely to increase our well-being—quite the opposite.

If you're going to have everybody else in the world go into deeper and deeper poverty, then you might make 409 million future Americans better off than today's 293 million Americans, but the costs will be huge: use of the atmosphere as a sink for carbon dioxide and methane, destruction of our soils, the pressure we put on the rest of the world so we can import food from absolutely anywhere we want at any time of the year. Americans, per capita, put by far the heaviest stress on the non-sustainable systems of the planet.

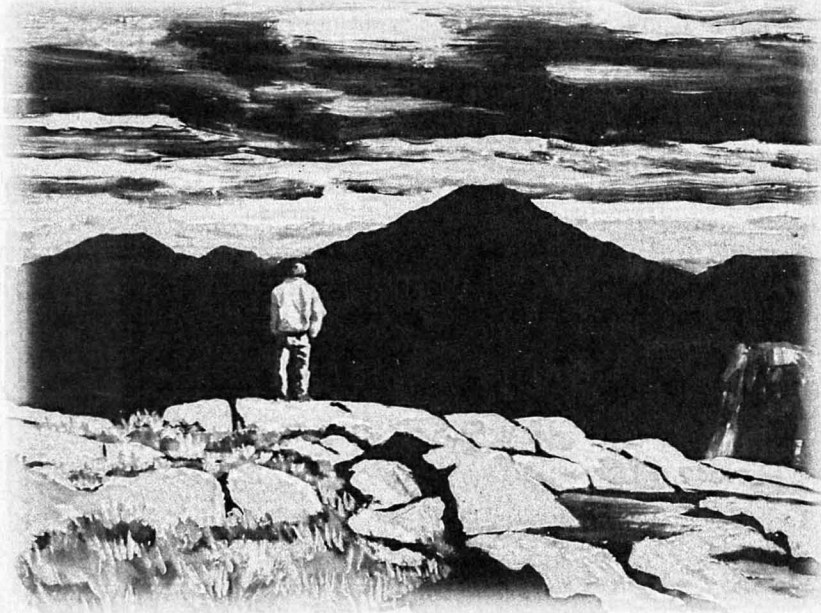
If you think we can continue to shift more and more of the world's resources to the United States, then it might be possible to support 409 million people, assuming you think the rest of the world will sit still for it. But I don't imagine they will sit still. Many nations, and soon many sub-national groups, are going to have nuclear and biological and chemical weapons. I think our chances of success at that game are very small.

But there is no way you can prove this; we could have some sort of miraculous breakthrough—be able to make wine out of water. Make it Chateau Mouton '45 and I'm really in favor of just waiting around for that miracle.

I imagine you are not persuaded by the claims that Americans have a right to their way of life.

Arguing about basic rights is not an argument; it's a discussion. What are the rights that everybody ought to have? If we agreed, for instance, with the rights for life, liberty, and the pursuit of happiness, does that mean for only our nation? All people? All life forms? The heart of the matter is what your *behavior* is going to be in response to these rights. What are your obligations to a starving child in Africa? To the vanishing forests? How will we choose to live? ☺

In 1901, a cultural revolution dawned in the United States of America. That revolution challenged the assumption that had dominated national development for generations: that the American land was a mere storehouse of inexhaustible resources, made solely for the indulgence of the present generation of its most privileged species.



CONSERVATION AND THE PROGRESSIVE MOVEMENT

by CURT MEINE

TWO THOUSAND AND ONE marked the 100th anniversary of two signal events in the annals of American politics and conservation. On January 1, 1901, Robert M. "Fighting Bob" La Follette was inaugurated as the governor of Wisconsin. Later that year, on September 14, Theodore Roosevelt assumed the U.S. presidency following the assassination of William McKinley. These events marked the arrival of the Progressive Era, during which conservation first emerged as a coherent movement. For several decades, the voices for reform had been swelling: Grangers, Greenbackers, and Populists across the rural Midwest; socially conscious urbanites and anti-monopolist businessmen; civil service crusaders and progressive educators; suffragists and settlement workers; forest advocates, wilderness preservationists, concerned scientists, and conscientious sportsmen.¹ With the rise of Roosevelt and La Follette, reform moved to the center stage of politics. In the decade that ensued, conservation flourished.

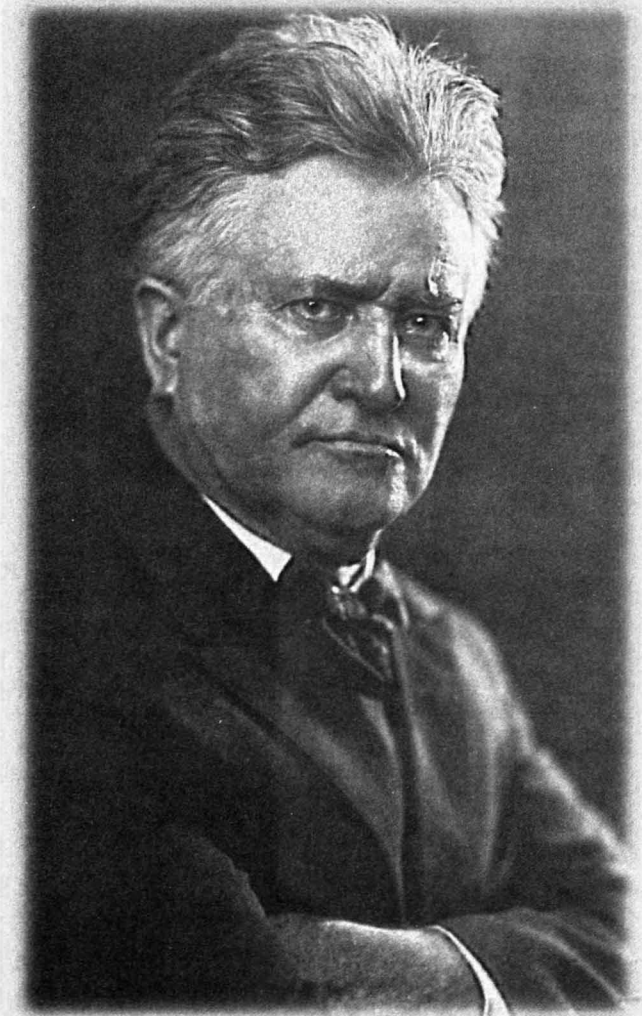
Before Theodore Roosevelt assumed the presidency, "conservation" was an obscure word and concept, barely linked to the idea of stewardship. By the time Roosevelt left the White House in 1909, it was a national watchword, policy, and ethos. Roosevelt's immense conservation legacy is well known: the proclamation of more than 200 million acres of national forests, monuments, parks, and wildlife refuges on the public domain; appointment of high-level commissions through which his administration shaped the nation's first coherent conservation policy; enactment of new laws "to preserve from destruction beautiful and wonderful creatures whose existence was threatened by greed and wantonness"; and the bolstering of federal agencies to carry out these policies and enforce these laws. We have never had, before nor since, a president more knowledgeable in the natural sciences, or one who took closer to heart the conviction that, as concerns conservation, "the Executive is the steward of the public welfare."²

La Follette's conservation legacy is more diffuse. A committed supporter of conservation measures throughout his political career, La Follette gained renown primarily for his uncompromising dedication to political reform. To appreciate his contribution to conservation, one must read it in the broader context of the times. Wisconsin's timber barons, who in 1901 were stripping off the last of the great stands of white pine, had (along with their equivalents in the rail, insurance, and other industries) dominated state politics for three decades. La Follette's rise to the governorship and later, in 1906, to the U.S. Senate marked the end of the pine logging era as plainly as did the vast stump fields of the cutover North. Consumed by its own excess, the era of forest exploitation in the upper Great Lakes—and of the political influence and corruption that accompanied it—was bound to pass (as it did, to the South and the Pacific Northwest).³

Under La Follette and his followers, Wisconsin became a national leader in policy innovation in fields from education and labor law to public health and electoral reform. Roosevelt and La Follette clashed regularly as their political fortunes intersected—an ongoing battle of progressive titans. During a moment of détente, Roosevelt praised "the movement for genuinely democratic popular government which Senator La Follette led to overwhelming victory in Wisconsin," and recognized Wisconsin as "literally a laboratory for wise experimental legislation aiming to secure the social and political betterment of the people as a whole."⁴ For his part, La Follette judged the president's leadership in conservation as "the

greatest thing Roosevelt did, undoubtedly...Inspiring and actually beginning a world movement for staying terrestrial waste and saving for the human race the things upon which, and upon which alone, a great and peaceful and progressive and happy...life can be founded."⁵

The Roosevelt and La Follette anniversaries passed by with no fanfare, no high oratory. It is no surprise, given the way our contemporary political constituencies line up. Few Republicans seem interested in emulating their party's progressive forebears—Roosevelt and La Follette, of course, were both Republicans—and are content merely to invoke TR's legacy in sure-fire applause lines. Few Democrats, who rely on urban and suburban environmentalists as sure votes, seem aware that there was once a broad-based conservation movement based in rural America, without which environmental-



"Fighting Bob" La Follette, 1922.

ism as we know it today would simply not exist. Few of the contemporary heirs to Progressivism seem to envision their place in politics as anything but pushing and pulling Democrats further toward the traditional left. Few Libertarians seem to care as much about their public responsibilities as their private rights. All are bound by the tired mental image of a one-dimensional left-to-center-to-right political spectrum. All are inclined to render environmental issues into predictable politics.

By contrast, consider Wendell Berry's careful words: "Our environmental problems...are not, at root, political; they are cultural....Our country is not being destroyed by bad politics; it is being destroyed by a bad way of life. Bad politics is merely another result. To see that the problem is far more than political is to return to reality..."⁶ The Progressive Movement was indeed an intensely political response to a cultural problem. Roosevelt himself described the problem as a century-long "riot of individualistic materialism, under which complete freedom for the individual...turned out in practice to mean perfect freedom for the strong to wrong the weak."⁷ In the conservation arena, it meant unrestrained power to plunder a continent's natural wealth.

But, however political its means, the Progressive Movement did not arise from within a single political party, and was not identified with one (at least not until the tumultuous presidential election of 1912). Progressive forces fought within and between and outside the Republican and Democratic parties. Difficult as it may be, we must somehow try to imagine a time when the spirit of reform, fairness, equity, public service, and the primacy of the public good defined and pervaded political debate.

The conservation movement was among the fruits of that time and spirit. The twentieth century would bring fundamental changes in our understanding of ecosystems, the ethical foundations of conservation, and the social and economic connections within our lives and landscapes. These changes would call into question the scientific assumptions and utilitarian slant of Progressive Era conservation policies regarding development of the nation's forests, rangelands, minerals, and waterways. But the events of the first decade of the 1900s ensured that there would in fact be a movement capable of evolving with time.

IN 1901, a cultural revolution dawned in the United States of America. Among its other contributions, that revolution challenged the assumption that had dominated national

development for generations: that the American land was a mere storehouse of inexhaustible resources, existing solely for the indulgence of the present generation of its most privileged species.

There is much confusion and debate over the way that revolution has played out in the decades since. How did we get from 1910's "conservation as wise use" to the anti-environmental opportunism of the Wise Use Movement in the 1990s? From "sustained yield" to "multiple use" to "ecosystem management"? From "fish and game" to "wildlife" to "biodiversity"? The answers are murky, even for careful observers of the history of conservation and environmentalism.

Take, for example, Peter Sauer's 1999 lament in *Orion* magazine that the environmental movement had deteriorated into "a cacophony of bickering ideologies." "What happened to its unity and idealism," he wondered, "and when did it fall into disarray?" In Sauer's experience, the movement was once characterized by seamless connections between our concern for human rights and for Nature. Sauer recalled a golden moment in the late 1940s when, amid post-war chaos, we began to recognize our joint obligations to the human community and the biotic community. He cast a worried (and nostalgic) look upon a movement that had "[lost] its grip on the principles declared by [Rachel] Carson and Aldo Leopold." That hold, he suggested, had begun to slip with the death of Carson in 1964—two years before *A Sand County Almanac* became available in paperback, six years before Earth Day put environmentalism on the political map. Younger generations, Sauer feared, would never really know what the environmental movement "once stood for."⁸

Take, too: the caricature of environmentalists, popular in postmodernist critiques, as deluded naifs, dismissive of human concerns, neglectful of local landscapes, seeking escape from history, denying people a place in Nature, and waxing sentimental for a North American wilderness that never existed in the first place. This view, rising through the 1990s, underlay the "great new wilderness debate," at the core of which rests the contention that environmentalism, if it is to right itself, must be purged of a false and romantic fixation on an unpeopled wilderness.⁹ Proponents of this view posit (in a typical statement) "an emerging environmentalism that moves beyond merely preserving pristine wilderness and also calls for clean air and water as human rights as well as environmental necessities."¹⁰ By this reading, the environmental movement never "stood for" any kind of broad conception of social obligation or justice. It never had anything

like a unifying ideology, except perhaps a false one premised on securing opportunities for privileged white folks to contemplate and recreate in the great outdoors. It implies that protectors of the wild and defenders of human justice have never had, and could not have had, much of anything to say to each other.

These opposing "takes" reflect a broader confusion. They indicate that something is amiss in our reading of conservation and environmental history. We can lay out evidence both for and against their interpretations. We can point out the lax and often anachronistic use of the terms "conservation" and "environmentalism." (Neither Carson nor Leopold, for example, would have recognized the term "environmentalism." Leopold used the word "environment" no more than a handful of times in his entire corpus.) We could note that neither position adequately accounts for the complex interplay between social justice and conservation through the twentieth century. We could cite lesser-known verses from conservation's texts to both prove and disprove their premises—and to enrich the dialogue. (One of my favorites: the 1954 statement by the great wildlife biologist and wilderness defender Olaus Murie, comparing conservation's modest ethical development to "our heavy-footed progress in toleration of 'other' races of men," and calling for "tolerance for the views and desires of many people.")¹¹

The point is that in the rush to criticize, deconstruct, salvage, advance, and reform "the movement," those who care about such things have not yet achieved a satisfactory story. For all the work and writings of a generation of environmental scientists, advocates, historians, journalists, and critics, our narrative still has major holes, still misses the mark. The difficulty derives in part from the massive challenge of covering all the relevant bases. We have no comprehensive history of conservation—much less one that captures both the continuity and disparity between conservation and environmentalism.

Ironically, this may reflect the fact that environmental history as a field achieved definition even as the baby-boomer, Earth Day–inspired, counterculture-tinted, increasingly politicized, ever more globalized environmental movement grew through the 1970s, 1980s, and 1990s. Historians and other observers in this generation could be expected to view the past through the lens of the environmentalism they grew up in and with, to overlook or underemphasize important aspects of earlier conservation history, and to see plainly the conspicuous flaws in their own generation's environmental worldview. The effect, moreover, is

not confined to environmentalists per se; "conservative" skeptics and outright anti-environmentalists see through the same lens, just from the other side.

In short, before we can "reconstruct" conservation, we need to lift the lens and see conservation and environmentalism with fresh eyes: as a dynamic amalgam of science, philosophy, policy, and practice, built upon antecedents in the U.S. and in cultures and traditions throughout the world, but responding to conditions unique in human and natural history.¹² During the Progressive Era, these constituent elements of conservation came into alignment and a new movement materialized. That movement has evolved continually ever since in response to expanded scientific knowledge, emerging ecological realities, shifting political pressures, and a constantly changing cultural context.

CONSERVATION in the Progressive Era rested on utilitarian and anthropocentric premises. "The first principle of conservation is development, the use of the natural resources now existing on this continent for the benefit of the people who live here now," Gifford Pinchot wrote in his 1910 book *The Fight for Conservation*.¹³ In order to provide (as the guiding philosophical mantra had it) "the greatest good to the greatest number for the longest time," natural resources were to be efficiently managed and developed in a manner informed by science. The "science" of the time was disciplinary, applied, production-oriented, pre-ecological. It sought and provided raw numbers: tree growth rates for the forester, stocking rates for the range specialist, acre feet for the water engineer, tonnage for the mining engineer. It did not seek or provide much insight into systemic social, cultural, economic, or ecological impacts.

Policies were geared to assuring the orderly administration of resources and the prevention of waste. Such policies were to be adopted and applied "for the benefit of the many, and not merely the profit of a few."¹⁴ The policies would be developed and carried out by professional civil servants working within government agencies responsible for particular resources. Removed from direct political influence, trained in the relevant science, government experts would discharge their administrative duties with impartial, business-like efficiency. Pinchot oversaw the premier manifestation of Progressive Era conservation, the U.S. Forest Service. The Forest Service quickly became "the prime marker of the executive branch's consolidation of authority" and the standard by which other efficiency-driven federal agencies were judged.¹⁵

With their commitment to enlightened, honest, and restrained use of resources, the new conservationists stood in *opposition* to the rank exploiters of public lands and water, forests and minerals, game and grass. With their emphasis on long-term development and management of resources, they stood in *contrast* to those who placed priority on the preservation of wild Nature. The preservationist impulse had grown through the 1800s, focusing on special landscape features, unique scenic sites, and dwindling game populations. The rapid destruction of the Great Lakes pineries swelled the preservationist call through the 1870s and 1880s (and, significantly, drew attention not just to rarities like the redwoods, but forestlands more generally). In the 1890s, the call was answered with the designation of the nation's first forest reserves.

The contrast between proponents of wilderness and the proponents of rational resource use would intensify during Roosevelt's presidential years and beyond, coming to a head in the celebrated battle between John Muir and Gifford Pinchot over the damming of the Hetch Hetchy Valley in Yosemite National Park. It is an episode, and an ideological fissure, deeply incised in the history we have told ourselves. The very drama of the episode, however, has distorted our view of the broader Progressive conservation crusade, of the events leading up to it, and of the subsequent role of wilderness protection *vis a vis* the conservation movement (and ultimately environmentalism). Only recently have historians begun to look at the

Muir-Pinchot schism more carefully, and to understand how it has colored our understanding of the relationship between utilitarian conservationists and wilderness preservationists.¹⁶

For those whose support for reform grew out of the direct experience of rampant resource exploitation, the Progressive conservation crusade was an appropriate response of national authority to private, corporate irresponsibility. The enhanced role of the federal government in conservation, Theodore Roosevelt informed Congress in December 1908, arose out of necessity. "It represents merely the acknowledgment of the patent fact that centralization has already come in business. If this irresponsible, outside business power is to be controlled in the interest of the general public, it can only be controlled in one way—by giving adequate power of control to the one sovereignty capable of exercising such power—the National Government."¹⁷ Roosevelt had a fine gift for being simultaneously coy and convincing. Of course his policies strengthened centralized authority. Of course that centralization was evoked by decades of corporate collusion, unchecked resource exploitation, and government corruption.

And, of course, stronger federal authority was anathema to those still busily profiting from exploitation, those who had known nothing for decades but the doctrine of laissez-faire, those who were among the "locally powerful."¹⁸ They tended not to reside (at least not in their former numbers) in the wasted pineries of the upper Great Lakes. They were legion in the wide-open West. As Daniel Kemmis has written, "At the heart

For all the work and writings of a generation of environmental scientists, advocates, historians, journalists, and critics, our narrative still has major holes, still misses the mark. We have no comprehensive history of conservation.



of the burning (and still burning) western resentment [toward the Forest Service]...lay a repeated exercise of centralized authority, one that has always made large numbers of westerners feel abused—feel, in fact, colonized.”¹⁹ Roosevelt, Pinchot, Secretary of Agriculture James Garfield, and their supporters built conservation into a movement, and they built it by strengthening the hand of federal authority. It may be said that they *had* to build it. It must be said in the same breath that the tension between local and federal authority—and responsibility—was built into conservation from the get-go.

The tension was already long established in American history and identity. It pitted two great channels of American democratic commitment against each other. One channel issued forth from Jefferson’s dictum that that government is best which governs least (not forgetting Thoreau’s addendum from “Civil Disobedience” that “that government is best which governs not at all”). Flowing through colonial rebels, Jacksonian democrats, states’ righters, freeholding farmers, westering homesteaders, and even Theodore Roosevelt’s own hunting, ranching, and rough-riding compatriots, it was “decentralist, localist, agrarian,” resistant to powerful governmental authority.²⁰ The second channel issued from Jefferson’s other words: that “in order to secure certain unalienable Rights.... Governments are instituted among Men.” Flowing again through the colonial rebels, and then through abolitionists, prairie populists, Mugwumps, unionists, suffragists, and Teddy Roosevelt’s own fellow conservationists and scientists, it turned to governmental authority to secure political rights, honest administration, and fair economic play.

The two channels were not separate or distinct. They had long intermingled within the American soul, on American land. During the Civil War, the tension between them became profoundly unbearable.

Conservation in the Progressive Era, however, gave a new twist to the old tension. It linked the condition of the body politic to the condition of the land itself. It demanded that Americans, having drawn so much of their political identity from the land, now recognize their responsibility *for* the land. The conservation movement may have been primarily utilitarian in its genesis, but it insisted that there was a connection between the ultimate sources of wealth and the morality of the means by which that wealth was secured, distributed, and used. That, in time, would make all the difference in the world.

From the moment the Progressive agenda began to play out on the ground, it was subject to adaptation and amend-

ment. The conservation movement was continually reshaping itself long before Aldo Leopold’s *Sand County Almanac* or Rachel Carson’s *Silent Spring*. To assume a static view of conservation’s early decades is to miss the opportunity for a more nuanced account of its later relationship to environmentalism.

Over the next three decades, roughly 1910 to 1940, conservation’s utilitarian philosophical foundations began to shift as practitioners and policy-makers explored a broader range of values. The science underlying conservation received its first strong influx of more integrated, ecological approaches. Policies established to encourage conservation addressed an ever-broadening array of issues, including protection and management of wildlife, outdoor recreation, wilderness protection, water pollution, soil and water conservation, and urban planning. Conservation became the province not only of the federal agencies, but of state agencies, local governments, and a growing private and nonprofit sector. And perhaps most significantly, conservation became a matter of concern not only in terms of the nation’s public lands and resources, but its private lands as well.

ALWAYS, THE CONVERSATION must return to the core concept of responsibility. The latest “riot of individualistic materialism” and corporate avarice cannot last forever; the peak of Enron’s stock price may well have served as its high-water mark (or so we may hope). In any case, a renewed commitment to conservation values must, sooner or later, find a home in our civic life again, under a form of political leadership that does not yet exist. Where might we find it? How might we encourage it? As historian Donald Worster has suggested, “A history that is more alert to the landscape around us, looking for clues there about our past behavior and acknowledging the agency of nature in human life, is...a good place to start. It can help overcome one-generation thinking. It may even promote a wider area of responsibility, which is all that conservation asks.”²¹

Conservation emerged in the Progressive Era, effectively broadening the “area of responsibility” in American life. It has evolved continually ever since, one dominant strain having mutated to help create what is now a global environmental movement.

Conservation emerged in the Progressive Era, effectively broadening the "area of responsibility" in American life. It has evolved continually ever since, one dominant strain having mutated to help create what is now a global environmental movement. Changes in science and in ethics, in society and in the world, continue to prompt us to reconsider our responsibilities; not merely in terms of long-term economic self-interest, but in terms of our obligations to our neighbors, our communities, future generations, and non-human Nature. In the long run, our own well-being is wound up in these broader responsibilities in intricate and inescapable ways.

The Progressives of the early 1900s could not foresee the utter transformation of the world that the ensuing century would bring. Nor, for that matter, could the stalwarts and plutocrats and reactionaries they fought. In three generations we have built a world that their generation would not recognize. The solutions that the Progressives devised to meet the

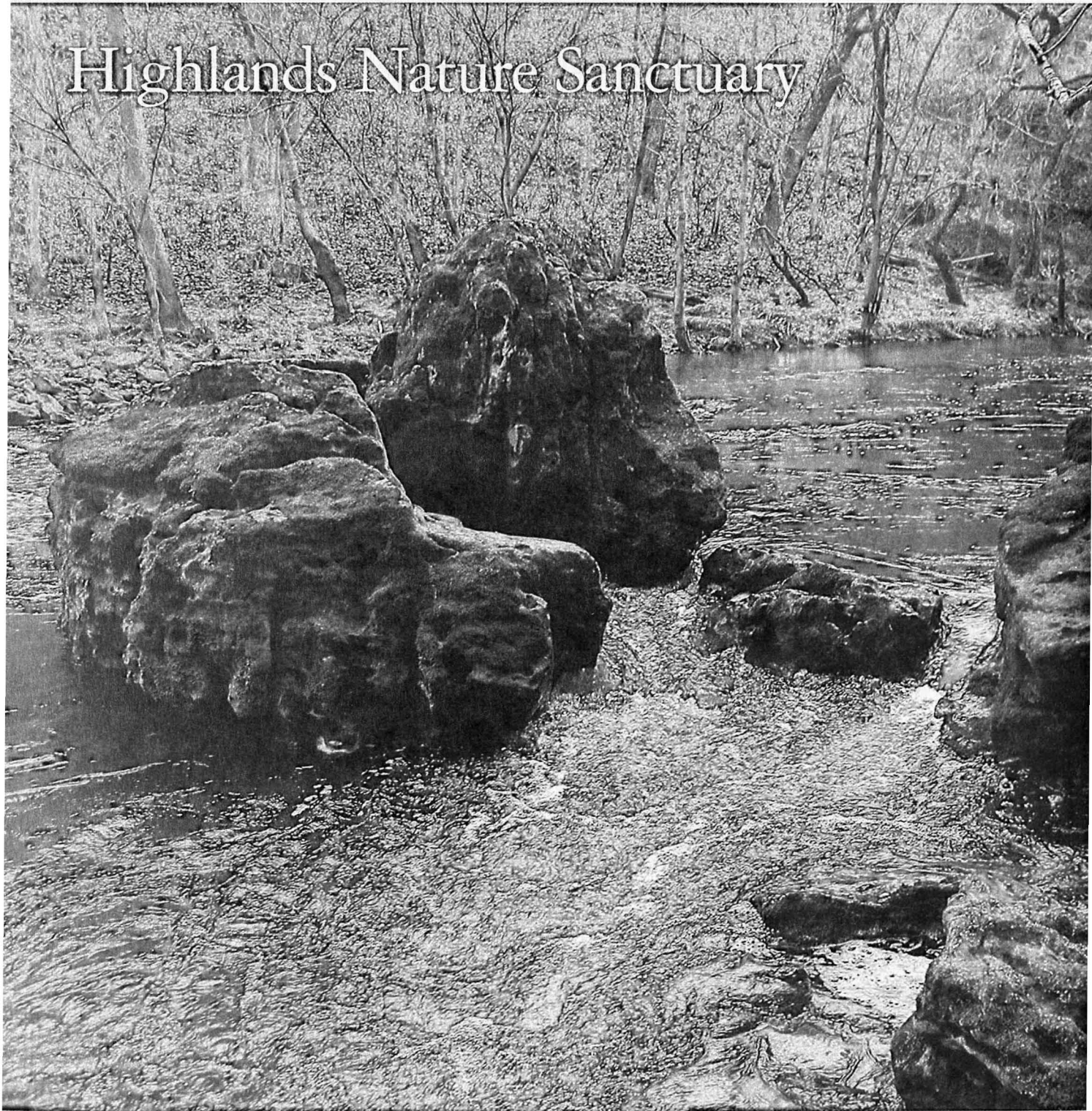
problems of their time will not suffice for us to meet ours. However, the basis upon which they acted is of the essence. They saw the need, as we must again, for public responsibilities to keep pace with private privilege. To that end they made democracy work, as we must again, "to secure the social and political betterment of the people as a whole." ☾

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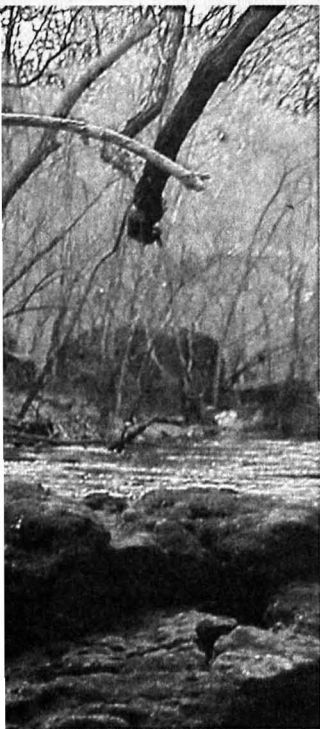
NOTES

- Shelton Stromquist, 1999, *Prairie Politics and the Landscape of Reform*, in *Recovering the Prairie*, ed. Robert Sayre (Madison: University of Wisconsin Press), 107–123. We have recently received a windfall of biographical and topical coverage of these times. See: David Lowenthal, 2000, *George Perkins Marsh: Prophet of Conservation* (Seattle and London: University of Washington Press); Char Miller, 2001, *Gifford Pinchot and the Making of Modern Environmentalism* (Washington, D.C.: Island Press); Edmund Morris, 2001, *Theodore Rex* (New York: Random House); John Reiger, 2001, *American Sportsmen and the Origins of Conservation*, 3rd edition (Corvallis: Oregon State University Press); and Donald Worster, 2001, *A River Running West: The Life of John Wesley Powell* (New York: Oxford University Press).
- Theodore Roosevelt, 1985, *Theodore Roosevelt: An Autobiography* (New York: De Capo Press), 408–436. See Curt Meine, 2001, Roosevelt, Conservation, and the Revival of Democracy, *Conservation Biology* 15(4): 829–831.
- The most recent biography is Nancy C. Unger, 2000, *Fighting Bob La Follette: The Righteous Reformer* (Chapel Hill: University of North Carolina Press). For an account of the shift in the lumber industry away from the Lake States, see Michael Williams, 1989, *Americans and Their Forests: A Historical Geography* (Cambridge, U.K.: Cambridge University Press), 193–330.
- Theodore Roosevelt, 1912, Introduction to Charles McCarthy, *The Wisconsin Idea* (New York: The Macmillan Company), vii.
- Quoted in Roosevelt, *Theodore Roosevelt: An Autobiography*, 406–407.
- Wendell Berry, 1996, A Few Words in Praise of Edward Abbey, in *Resist Much, Obey Little: Remembering Ed Abbey*, ed. James R. Hepworth and Gregory McNamee (San Francisco: Sierra Club Books), 3.
- Roosevelt, *Theodore Roosevelt: An Autobiography*, 437.
- Peter Sauer, 1999, Reinhabiting Environmentalism: Picking Up Where Leopold and Carson Left Off, *Orion* 18(3): 31.
- J. Baird Callicott and Michael P. Nelson, eds., 1998, *The Great New Wilderness Debate* (Athens, Ga., and London: The University of Georgia Press). See also William Cronon, ed., 1995, *Uncommon Ground: Toward Reinventing Nature* (New York: W.W. Norton) and Michael Soule and Gary Lease, eds., 1995, *Reinventing Nature? Responses to Postmodern Deconstruction* (Washington, D.C.: Island Press).
- Kevin DeLuca, 2002, Environmental Justice, *New York Times*, 18 July: A22.
- Olaus Murie, 1954, Ethics in Wildlife Management, *Journal of Wildlife Management* 18(3): 292, 293. See Curt Meine, 2001, Murie's Choice: An Introduction to the Essay "Ethics in Wildlife Management," in *The Muries: Voices for Wilderness and Wildlife*, ed. Nancy Shea, Steve Chase, Mark Madison, and Matt Daly (Shepherdstown, W.V.: USFWS National Conservation Training Center), 51–52. Two useful explorations of the relationship between social justice and conservation are Wendell Berry, 1989, *The Hidden Wound* (New York: North Point Press) and A. L. Herman, 1999, *Community, Violence, and Peace: Aldo Leopold, Mohandas K. Gandhi, Martin Luther King Jr., and Gautama the Buddha* (Albany: State University of New York Press). For a helpful discussion of the need to clarify the "linguistic muddle" in environmental history, see James Morton Turner, 2000, Charting American Environmentalism's Early (Intellectual) Geography, 1890–1920, *Wild Earth* 10(2): 18–26.
- Curt Meine, 2001, Conservation Movement, Historical, in *Encyclopedia of Biodiversity, Volume 1*, editor-in-chief Simon Levin (San Diego: Academic Press), 883–896.
- Pinchot, *The Fight for Conservation*, 43.
- Pinchot, *The Fight for Conservation*, 46.
- Miller, *Gifford Pinchot and the Making of Modern Environmentalism*, 11. The classic commentary is Samuel P. Hays, 1959, *Conservation and the Gospel of Efficiency* (Cambridge, Mass.: Harvard University Press).
- James Morton Turner writes in "Charting American Environmentalism's Early (Intellectual) Geography, 1890–1920" (*Wild Earth*, Summer 2000): "Little evidence exists that in the 1890s [the] 'preservationists' considered themselves the foes of any emerging group of 'conservationists.' Ambiguities in the 1890s language have made it easy for historians and environmentalists alike to overemphasize [these] early divisions underlying the nation's environmental movement." See Curt Meine, 1992, The Utility of Preservation and the Preservation of Utility: Leopold's Fine Line, in *The Wilderness Condition: Essays on Environment and Civilization*, ed. Max Oelschlaeger (San Francisco: Sierra Club Books), 131–172. See also Miller, *Gifford Pinchot and the Making of Modern Environmentalism*, 1–12.
- Theodore Roosevelt, Annual Address to the Senate and House of Representatives, 8 December 1908.
- Arthur Schlesinger, Jr., 2001, A Question of Power, *The American Prospect* 12,7 (23 April).
- Daniel Kemmis, 2001, *This Sovereign Land: A New Vision for Governing the West* (Washington, D.C.: Island Press), 38.
- Kemmis, *This Sovereign Land*, 25.
- Meine and Knight, 1999, *The Essential Aldo Leopold* (Madison: University of Wisconsin Press), 239.

Highlands Nature Sanctuary



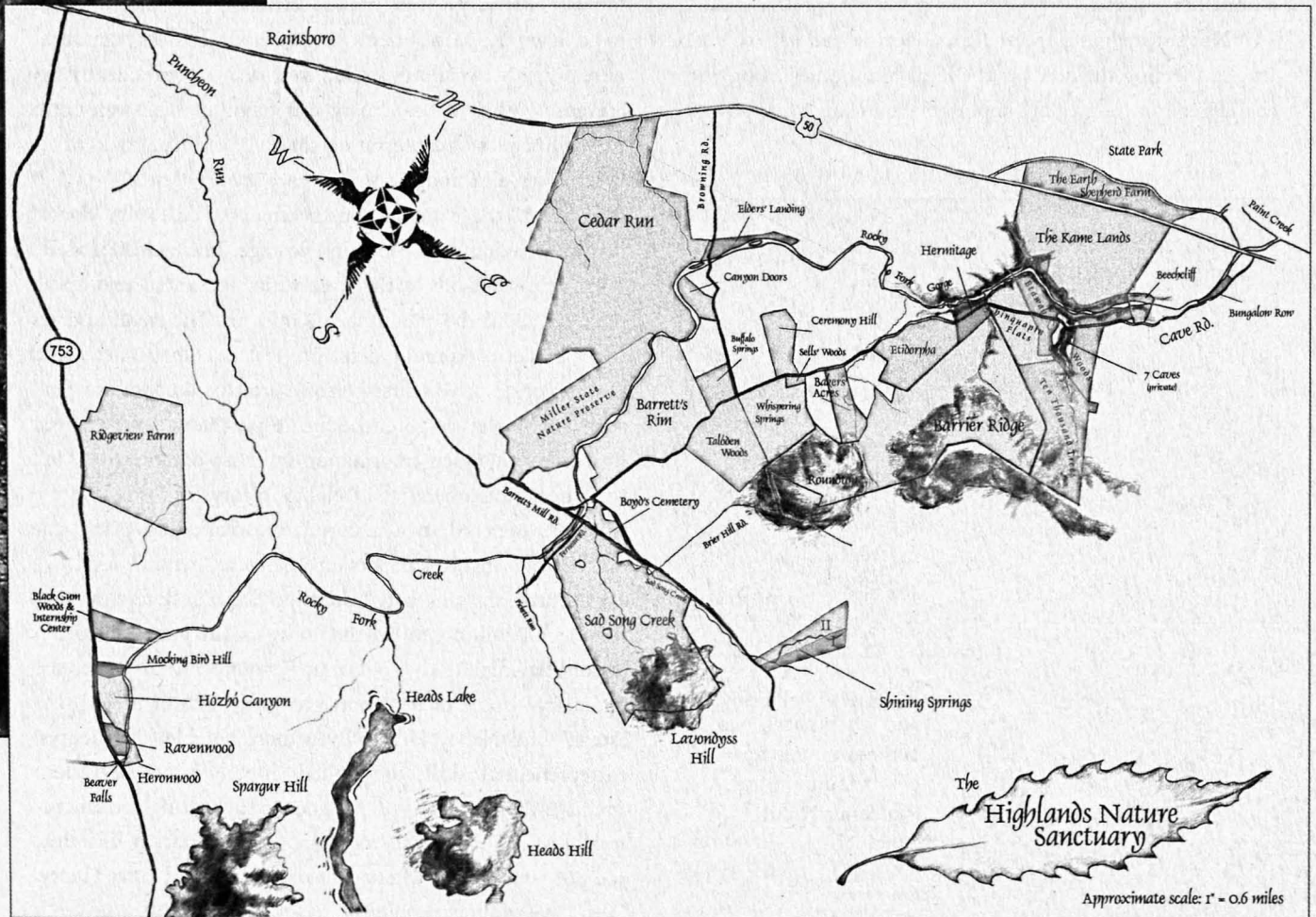
Ethics Reflected in Action by Rob Boley



AT FIRST APPEARANCE, southwestern Ohio seems an unlikely place to restore wilderness. Fragmented habitat, population pressures, and a dearth of public land are just some of the challenges facing regional conservationists. One grassroots conservation organization, the Highlands Nature Sanctuary, has an interesting, effective approach to the challenge of eastern wilderness recovery and is incorporating strong conservation ethics into every level of its daily functioning.

The Highlands Nature Sanctuary lies in the Rocky Fork watershed on the edge of the Appalachian foothills. Its long-term goals are: "to create a 10,000 acre bio-reserve for the Eastern Deciduous Forest in south-central Ohio, to restore pre-European-settlement biodiversity in this forest, to provide wilderness experiences for our human visitors, and to put the intimacy of nature back into peoples' lives." By marrying beliefs with actions, the sanctuary has developed some unusual practices, and more importantly, has made much progress in a relatively short time toward achieving its goals.

THE HIGHLANDS NATURE SANCTUARY was founded in 1995 by Larry and Nancy Henry, former naturalists with the Ohio State Parks system. While visiting Costa Rica some years ago on a backpacking trip, the Henrys found themselves immersed in wilderness. "We were always searching for a place bigger, quieter, and more pristine. In Costa Rica we found it," said Nancy



Henry. "We saw skies broken only with the flight of paired-off macaws. We went to sleep with the brush of vampire wings upon our face, and awoke to the chorus of howler monkeys in the morn."

Upon their return to Ohio, the Henrys felt transformed by their wilderness experience and compelled to help preserve and restore natural lands. "In the months that followed we chose our home state, Ohio, to be the challenging place we would work," said Nancy Henry. "If a state, like a person, could be life-hungry, then Ohio is a region that is starving. If we could restore wilderness here, it could be done anywhere else on the continent." One advantage the Henrys had in establishing a nonprofit was their business experience with Benevolence and Co., a bakery and café in downtown Columbus, Ohio. "Naturally, running a small corporation—personnel hiring, bookkeeping, payroll, and taxes—was instrumental in sustainably and frugally running a nonprofit corporation," said Nancy Henry. "It really isn't much different, and we already knew how to do it *ourselves* without hiring a bunch of experts."

Not surprisingly, operating a nonprofit had its own challenges: meeting the needs of the local community along with the larger community of supporters, confusion with govern-

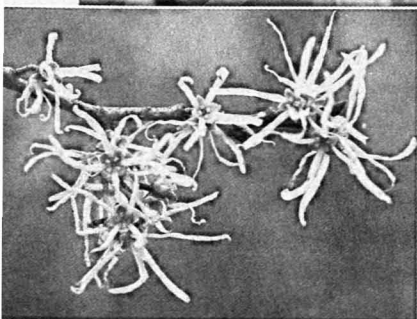
ment requirements, dealing with unsympathetic people, and, of course, fundraising. "At first we talked to others, thinking we didn't know how to fundraise ourselves," said Nancy Henry. "Fundraising was a very scary word to us, as it is to most people. However, the well-meaning advice we received seemed too predatory and mental for us. We wanted a sense of magic, a feeling of *sharing* the experience with others, including the high of actually saving the land. So we decided to follow our hearts and work with donors the way we would want to be treated ourselves by other well-meaning organizations."

To do this, the sanctuary has four principles that guide its dealings with donors. "First and foremost, we never target people—*never*," said sanctuary co-founder Nancy Henry. "We simply share the story with anyone that will listen, regardless of whether we think they are *worth* investing in."

Second, the sanctuary sends only one mailing per year, a comprehensive newsletter summarizing the past year's achievements, future goals, and upcoming events, along with a fundraising reminder. The organization does not purchase mailing lists or send out mass-mail solicitations. "We didn't want it to go down the path of destroying natural resources because we were doing five mailings a year," said sanctuary president Patty Stevens. "When the sanctuary was founded there were some basic principles of conservation that we held true to and they were woven all through the sanctuary at every level."

Third, the sanctuary uses email to keep its donors involved, saving both paper and postage. These email updates tell stories of lands with conservation potential and speak honestly about the organization's mission. The email updates and newsletter contain descriptive detail about new land acquisitions, such as first-person narrative accounts of land auctions, as well as potential future purchases. "We tell our supporters as much information as most organizations tell their board members," said Nancy Henry. By using sincere words as opposed to a manipulative marketing pitch, the organization involves donors on a personal, genuine level.

Fourth, the sanctuary leadership doesn't ask for anything they aren't willing to do themselves. "Larry and I are big donors, having already given much of our personal land to the sanctuary—some of it as outright gift, some of it with life estate," said Nancy Henry. Even more notable, the Henrys' entrepreneurial skills are linked directly to conservation: 100% of their business profits goes to supporting the sanctuary's mission. "Anytime you start an organization like this, you put your money where your mouth is," said Larry Henry. "You have to show people you're sincere."



Solomon's seal (above) and witch hazel, two common understory plants found in the Highlands Nature Sanctuary.

TOP: BETH RABB
BOTTOM: ROBERT MILLER

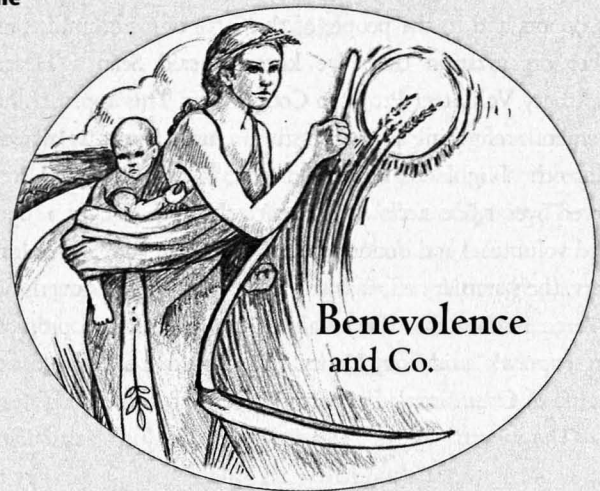
SMALL BUSINESS, BIG VISION by Jill Hindle

Nancy and Larry Henry's socially conscious business model is daring, pro-active, hopeful, and it's working. Two years ago, they drew up a contract officially pledging that 100% of the profits generated by Benevolence and Co., their bakery and café in Columbus, would be donated directly to the Highlands Nature Sanctuary. They advertised their mission and invited people to take part in a difficult but critical mission to save a suffering ecosystem. Their customers responded and word began to spread.

Since the sanctuary's inception, Nancy and Larry have personally dedicated themselves to promoting "woodland sprawl," helping the sanctuary to grow. In 1995 they donated a 40-acre parcel named Etidorpha, home to the second largest cave in the region. Its original \$56,000 purchase price was made possible by Benevolence. The next land acquisition was a partial funding of a spectacular property along the Rocky Fork Gorge; \$75,000 was applied toward the property's \$200,000 total value, thanks again to Benevolence. Later, joining with other friends who were committed to land preservation, Larry and Nancy formed a partnership to buy Earth Shepherd Farm, a key 35-acre farm that linked the sanctuary to an adjacent 14,000-acre state park. Most recently, the 35-acre Chinquapin Flats was donated to the sanctuary.

In two additional cases, the business purchased and held the mortgage on properties until the sanctuary could raise enough money to buy the land. Quick action by Benevolence held a strategic connector piece between two pre-existing preserves, as well as a small but significant remnant old-growth forest. Today, both properties are now safely in the sanctuary's hands. All told, Benevolence and Co. has generated \$265,000 of funding to purchase approximately 120 acres of natural habitat now permanently protected by the Highlands Nature Sanctuary. (Even the money jar left on the café counter for small change contributions does its part; the jar alone accumulates roughly \$4,000 annually for land protection.)

While Nancy and Larry's conservation work with the sanctuary is consistent with a long tradition of wildlands philanthropy in America, as entrepreneurs they are nontraditional. To maximize income for the sanctuary, they voluntarily cap their salaries from the business at \$26,000 and do all their work for the sanctuary as volunteers. The sanctuary's



few paid employees share donated office space or work out of their homes. Benevolence-funded interns work at the business in the city 24 hours a week, learning a variety of skills, and spend four days a week in the sanctuary, learning natural history skills as well as organic gardening and natural foods cooking. Intern volunteerism is an important part of the sanctuary's daily operation. Otherwise, the small business and the nature preserve are separate entities.

Cooperative effort, dedication, and a positive wilderness vision have accomplished more in eight years than the Henrys thought possible. Thus far, over 1500 households have contributed more than four million dollars to purchase approximately 1,600 acres of bio-reserve in the Rocky Fork watershed of south-central Ohio. Piece by piece, the dream of wilderness recovery in the region is coming true.

For conservationists thinking of emulating the Henrys, here's their distilled list of essentials: Apply your business experience, or find a friend who has some. Work within your own realm of influence, whatever that may be. Trust your instincts, even if this requires inventing a maverick organizational model. Attract potential donors by demonstrating positive constructive action instead of appealing to fear and desperation. Lead by example, using your heart as well as your head. And finally, have faith in your ability to create, as Nancy puts it, "islands of hope where the seeds and the beauty and the giving is intact."

Jill Hindle is a writer from Huntington, Vermont, currently studying southwestern and Native American literature in Santa Fe, New Mexico.

"The Highlands Nature Sanctuary has a commitment to its donors and to the people of the State of Ohio unlike any other organization that I've known," said Sean O'Hearn, Sanctuary Volunteer Program Coordinator. This approach has been both refreshing and successful. In just a few years of operation, the Highlands has raised over \$4.5 million and conserved over 1,600 acres of land with the help of over a thousand volunteers and donors. By using a small staff and volunteers, the sanctuary effort is succeeding despite low overhead. "We guaranteed that the money donors give us will promote forest sprawl," said Larry Henry. "Less than five percent goes to overhead. Over ninety-five percent goes to buying land."

The sanctuary's staff and volunteers include naturalists, botanists, biologists, and herbalists, allowing the sanctuary to offer various events each year, including workshops, hikes, and retreats on such diverse topics as natural foods, sustainable living, cultural studies, and natural history. The sanctuary also organizes volunteer outings to help build and maintain trails. All of these events tie in directly with the sanctuary's goal of reconnecting people with the land.

The organization's approach to supporters is intertwined with its approach to buying and managing land. While larger tracts with high biodiversity are targeted, the sanctuary also conserves road frontage property. "If you're going to preserve land in the East, buying road frontage is essential," said Nancy Henry. "Buying road frontage is incredibly expensive as the tracts are usually smaller and are priced at residential values. However, each vacant site purchased removes an additional house site—protecting the region from immeasurable human impact."

To ensure protection of new land purchases in perpetuity, the Highlands Nature Sanctuary puts voluntary state conservation easements or, when feasible, Ohio Natural Area status on the lands. Under natural area status, the land is protected by the state completely from owner development and almost 100% from the governmental use of eminent domain. "By putting tight controls in place now that are irreversible—controls that are governed by a second outside entity—the sanctuary, in effect, has a watchdog organization to make sure that it never strays from its mission," said Nancy Henry. Volunteers have constructed over 14 miles of hiking trails on much of the land; however, the sanctuary restricts access by requiring a limited number of pre-approved, free wilderness permits. Holders of permits must submit an application and agree to the sanctuary's principles and philosophy of harmlessness. For example, visitors are asked to stay on designated trails, walk and

speaking quietly, and leave electronic equipment at home. "In an area as densely populated as Ohio, a preserve must be protected from the human recreational and utilitarian pressures of the region," said Nancy Henry. "If a nature preserve expects to endure, it must educate both legitimate visitors and trespassers to the founding intentions of the preserve. It must demonstrate the difference between a park (human-recreation centered) and a preserve (biodiversity centered)."

Much of the purchased land has human structures that are either torn down by volunteers, fixed up and rented, or turned into visitor lodging or education centers. True to its mission, the four lodging areas are designed and decorated to encourage contemplation and connection with the surrounding preserve; there are no televisions or radios, but plenty of relaxing places to rest and plenty of naturalist literature. The sanctuary also has a campground available for overnight visitors. "Visitors are frequently amazed by the diversity and the health of the ecosystems that are found in the sanctuary," said O'Hearn. "I think that when folks come from the city, live in the city their whole lives, and only read about the natural world and all its mysteries, it surpasses their expectations of a wilderness experience."

Once land is purchased, Larry Henry sums up their approach to the land in three words: "Do no harm." The Highlands Nature Sanctuary's overarching approach to wilderness restoration is simply to let the land heal itself. "This is an area set aside for nature to do its thing. All you have to do is leave the land alone," said Larry Henry. "All the pieces are in place. All you have to do is put them back together. It's like a jigsaw puzzle." In the past years, the approach has been working; the sanctuary has witnessed healthier populations of wild turkeys, rabbits, mice, squirrels, and coyotes. Each year, sanctuary members discover new populations of turtles, salamanders, and frogs.

"It is not that we steer away from all forms of management, but rather we find—with this approach—that traditional management often is unnecessary," said Nancy Henry. "Nature managed her forests and prairies just fine before we came along. We try not to be too presumptuous." ☾

Rob Boley coordinates alumni relations for the Wright State University School of Medicine and is a trustee for the Beaver Creek Wetlands Association. He lives in Kettering, Ohio. ☞ For more information about the Highlands Nature Sanctuary's conservation projects or future events, call 937-365-1935, e-mail director@highlandssanctuary.org or visit www.highlandssanctuary.org.

The Not-Quite-Sober John Muir

by Kit Stolz

Kindred and Related Spirits

The Letters of John Muir and Jeanne C. Carr

edited by Bonnie Johanna Gisel
University of Utah Press, 2001
394 pages, \$34.95

John Muir's Last Journey South to the Amazon and East to Africa

Unpublished Journals and
Selected Correspondence by John Muir
edited by Michael P. Branch
Island Press, 2001
350 pages, \$28

The High Sierra of California

Poems and Journals by Gary Snyder
Woodcuts and Essays by Tom Killion, with
excerpts from the writings of John Muir
Heyday Books, 2002
144 pages, \$50

God's Wilds

John Muir's Vision of Nature

by Dennis C. Williams
Texas A&M University Press, 2002
272 pages, \$39.95

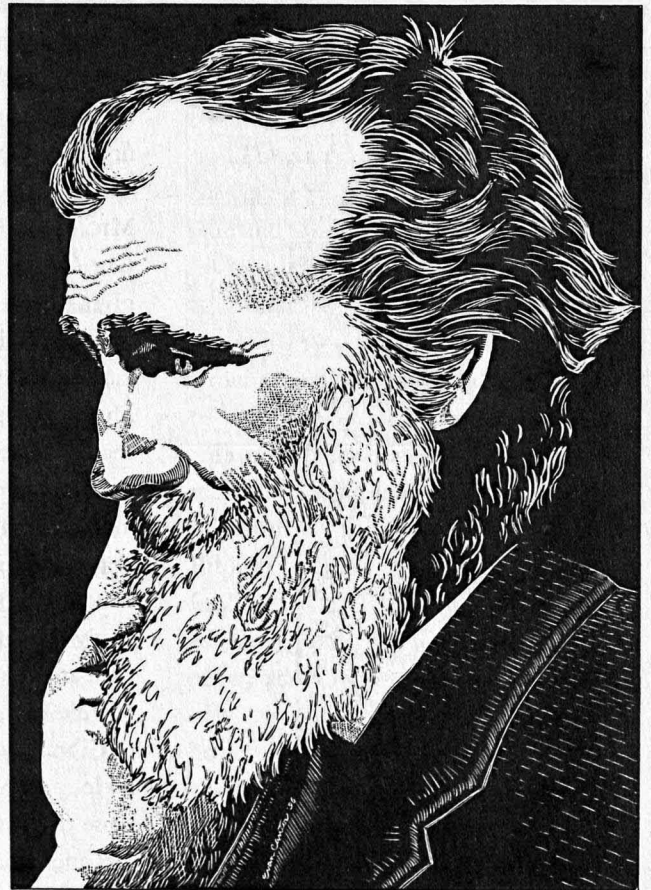
JOHN MUIR'S first publisher was an admirer—and a thief.

In Canada, on an exploration of the uncharted woods around the Great Lakes, the lonely 24-year-old Muir wrote to his soon-to-be best correspondent, the 37-year-old Jeanne Carr. For days he had been pushing through forests and wading through swamps, searching for the calypso borealis, a rare lily, the "Hider of the North." When he found two of these lilies, he sat down and cried.

"There, upon an open plat of yellow moss, near an immense rotten log, were these little plants, so pure," he wrote in his first letter to Mrs. Carr. "They were alone. Not a vine was near, not a blade of grass, nor a bush. Nor were there any birds or insects, for great blocks of ice lay screened from the summer's sun by deep beds of moss, and chilled the water. They were indeed alone."

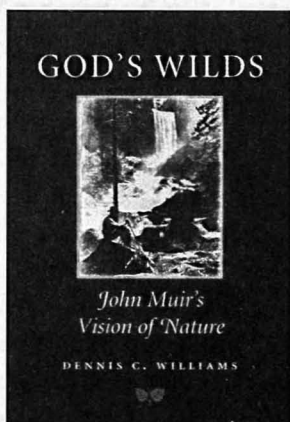
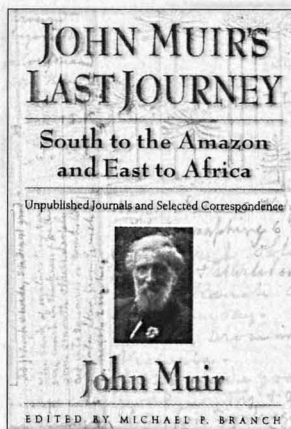
Professor James Butler, who knew both Muir and Carr, saw this letter on her desk, liked it, and—according to Mrs. Carr—without a word "carried it off." A week later, in December 1868, it was published as an example of "Botanical Enthusiasm" in the *Boston Recorder*.

Mrs. Carr was "indignant," according to Bonnie Gisel's authoritative *Kindred and Related Spirits: The Letters of John Muir and Jeanne C. Carr*. Muir did not object. Although the piece did not name him, otherwise he could not have received a warmer introduction. Butler compared Muir



to Thoreau and spoke of him as a "genius [who] added a precious seeing to the eye, transforming every week into a flower, and transfiguring every flower with seven-fold beauty."

Inspired, Muir went on to write Carr hundreds of letters. They are the fount of some of his best work, and have been in print for almost a centu-



ry—at least in part—but only in bits and pieces has Carr’s side of the story been heard. Gisel has balanced the scales, giving us both sides of the correspondence, as well as a much fuller picture of the relationship. She briskly scotches rumors of a fling between the two, but comes up with plenty of delightful new details (Muir once felled an 80-foot pine with a hatchet to make a bridge across the Merced River for a party including Carr—only to see it break upon landing!). Her scholarly attention to fact ensures that this book will find its place in libraries; for those eager to know Muir first-hand it will be invaluable.

MICHAEL BRANCH, in *John Muir’s Last Journey*, with equal thoroughness gives us an elegiac picture of Muir at the end of his days. Included is a previously unpublished letter in which Muir, age 74, declares to his sister that he has enough material for 100 books, “but of course I won’t live long enough to write that many.” Yet he had time to journey to South America, cross the continent, impulsively sail for the Canary Islands, and then around Africa, through the Middle East, and homeward by way of Gibraltar. No longer young, and no longer able to adventure wherever he so choose on foot, these are the letters and notes of an older, saddened man. Because Muir is weary, his writing here cannot offer the excitement of his earlier works, but *John Muir’s Last Journey* does allow the admirer to see the enormity of his curiosity, and hear again the metaphors by which he lived.

He was near the end of his life; he had lost the titanic struggle to save Hetch-Hetchy, as well as his devoted

wife. When after eight months abroad he returned, he found his two daughters had put the family home, a mansion surrounded by a substantial fruit ranch, up for sale. His wife had left it to the children. Muir bought it back from them “for the sake of the dearly cherished memories about it and the fine garden grounds full of trees and bushes and flowers that my wife and [her] father and I planted.” He continued, “but there’s no good bread hereabouts and no housekeeper, so I may never be able to make it a home, fated, perhaps, to wander until sundown.” This sort of dashed-off poetry rarely appears in the natural histories he wrote, mostly in middle age, for what he once described as “muddy purposes.” In his most professional work, he leaves his impetuous self out of the picture, overstuffs his sentences, and ends up with pieces that can be as laborious to read as they were for him to write. The harder he drove himself in his “scribble den,” the more plodding his books became. Yet in his outbursts—especially in journals and letters written while under the influence of the Sierras—the exuberant, spontaneous Muir soars to unsurpassed heights of natural rhapsody.

This paradox was more apparent to friends at the time than it is to readers a hundred-odd years later. When Muir the young man complained to Carr that he could not bring the mountains down to people on little scraps of paper, she threatened to make an article out of his letters herself. When he continued to stall, she slapped together two of his letters, and—with minimal editing—sent the final result to *The Atlantic*, where the lyrical masterpiece was published unaltered as “A Geologist’s Winter Walk.”

IF IT IS TRUE, as critic Harold Bloom has famously argued, "that the meaning of a poem could only be another poem," then, by extension, when Gary Snyder found a new poem inside Muir's story of a near-fatal climbing of Mt. Ritter he found, in effect, a new Muir. This is the Muir seen in Tom Killion and Gary Snyder's *The High Sierra of California*. He sounds less like his Puritanical father and more like the poet Han-Shan; what's more, this new Muir speaks with a clarity as timeless and captivating as the mountains themselves:

After scanning its face again and again,
I began to scale it, picking my holds
With intense caution. About half-way
To the top, I was suddenly brought to
A dead stop, with arms outspread
Clinging close to the face of the rock
Unable to move hand or foot
Either up or down. My doom
Appeared fixed. I MUST fall.
There would be a moment of
Bewilderment, and then,
A lifeless rumble down the cliff
To the glacier below.
My mind seemed to fill with a
Stifling smoke. This terrible eclipse
Lasted only a moment, when life blazed
Forth again with preternatural
clearness.
I seemed suddenly to become
possessed
of a new sense. My trembling muscles
Became firm again, every rift and
flaw in
The rock was seen as through a
microscope,
My limbs moved with a positiveness
and precision
With which I seemed to have
Nothing at all to do.

In Muir's account of the mountain climb from which the above poem was drawn, he admitted he did not understand how he survived, and he wondered if he might have been

saved by "bygone experience, Instinct, or Guardian Angel." Snyder took the past experience, the instinct, and the angel out of Muir's passage, added line breaks but not a single word, and let the result stand as a poem.

In this new light, many of Muir's most startling passages look as mysterious and Buddhist as they do awed and Christian. His devotion to wild things of all varieties—from the hardest of rocks to the tiniest of beings to the furthest rays of light in the sky—becomes as revolutionary as it is loving. After an introduction to Killion's extraordinary prints, interspersed with Muir's mountain-inspired rhapsodies, comes a selection from Snyder's backpacking journals, as well as a sprinkling of his poems and haiku. About the journal entries Snyder is becomingly modest; in his introduction he calls them "over-laconic." Though too sketchy to coalesce into a narrative, these notes nonetheless glitter with shards of on-the-spot poetry, sharp comments, and evocative descriptions of bold mountaineering. Snyder gave Killion his journals for publication because, he admits, the prints "stole his heart." He will not be alone: Killion captures the starkness of the mountains and their skies with exacting precision and great love. Were Muir to see the book, he might nit-pick. Killion takes liberties with color: Muir kidded his painter friend William Keith about the Impressionistic smears that Keith occasionally allowed into his Sierran landscapes. He might also object to some of Killion's content, such as the naked women in "Kern River Hot Springs." But he might surprise us; Muir's outbursts frequently were too sensual or frank to be published in his prim, Victorian era.

Only now, nearly a hundred years after his best books were published, is it apparent how mercurial was the nature of Muir's talent, and how badly his writings could be damaged by editors, including himself. "There is no pain here for me, no dull empty days, no fear of the past," might have been too raw an admission in 1887, when Muir first transcribed his early Yosemite journals. Twenty-three years later, having already exclaimed over bears and glaciers and squirrels, Muir published the journals of his own conversion experience, trimmed but little rewritten, as *My First Year in the Sierras*.

This is the book most admirers consider his best, complete with the pain and loneliness usually left out of his more settled, middle-aged work. It's Muir's penultimate book, and one of his least—or most subtly—structured. Snyder's journals and notes in *The High Sierra of California* are similarly spontaneous, and even more hard-headed. He challenges not just Muir's habitual reliance on Biblical metaphors, but also his love for Nature without people. This edginess gives the book spine; the poetry adds insight, and even a hint of climax. Despite his complaints, however, Snyder is quick to declare that "Yosemite Valley and the High Sierra were created from chaos by the minds of John Muir and Joseph LeConte." This becomes apparent, albeit obliquely, from a comparison of their notes. The sparseness of Snyder, gathered over a period of 40 years, compares poorly to the outpouring from Muir, whose journals from the years 1868–1875 require 84 chapters, according to the microreel records available in University of California libraries.

Thankfully, Killion and Snyder include many Muir passages rarely seen, including a haiku-like journal entry he wrote while camped near water. Once in a letter he admitted to Jeanne Carr that "I never can keep my pen perfectly sober when it gets into the bounce and hurrah of cascades, but it never has broken into rhyme before." This was one of those not-quite-sober times.

Later.

The night wind begins to flow and
sigh over rocks and through
the clumpy trees. The rush of the
waterfall blends
with wind and fire.

[August 1, 1876]

In his Sierran landscapes, Killion finds a unity—a balance between jagged and smooth, high and low, dark and light—that implies a spirituality. This oneness is not always evident in photographs of these mountains, but it is always present in Muir's writing.

"MUIR'S DESIRE to protect the wilderness was a way of preserving what he believed [were] the primary sources of God's word," writes Dennis Williams in *God's Wilds*, his thoughtful exploration of Muir's faith. Williams digs out the roots of Muir's spirituality, showing how to the fierce fundamentalism of his father—a lay preacher for the Disciples of Christ—Muir grafted the much sweeter Presbyterian fruits of his mother. From his father came the wholehearted and unembarrassed evangelism; from his mother, a trusting. Because his disagreements with his overbearing father were so dramatic—and so well-told in his *Boyhood and Youth*—Muir's agree-

ment with his mother has been almost completely forgotten.

Williams takes us back to the rock of natural Presbyterianism, the Belgic Confession of 1619, which declared that we know God first by "the creation, preservation, and government of the universe; which is before our eyes as a most elegant book." Not only does the literary metaphor reoccur repeatedly in Muir's writing, especially about Yosemite, but so too does the underlying faith—that to be truly wild is to be led by God. This faith made possible a fearlessness that enthralled his contemporaries. Who else would charge a bear, or climb a tree in a windstorm, or ride an avalanche? One night he clambered out under Yosemite Falls, about five hundred feet above ground, only to be battered when the huge column of water shifted and pelted down on him. Somehow he survived. He wrote about it to Mrs. Carr, claiming that he "supposed" he was "in a trance," but adding, "How little do we know of ourselves, of our profoundest attractions and repulsions, of our spiritual affinities!" For another man, this would be a rhetorical question: for Muir, it meant betting his life, often against his own better judgement. "We never know where we must go, nor what guides we are to get—men, storms, guardian angels, or sheep...," he wrote in *My First Summer in the Sierra*. "Almost everybody in the least natural is guided more than he is ever aware of."

Muir did not so much write this book as release it, just as he did not so much conquer the Sierras, as allow them to conquer him. Having been transformed by faith, Muir came to trust in the spiritual power of the uni-

verse to guide, change, and renew, according to a wisdom past human understanding. As a young would-be geologist, Muir bet his reputation on the idea that Yosemite Valley had been sculpted over the eons by glaciers, not made in a day by a disastrous earthquake. Though he conducted experiments to prove his point, Muir's scientific argument, paradoxically, grew out of an essentially theological understanding of the world.

"I feel strong to leap Yosemite walls at a bound," he declared in an 1872 letter to Mrs. Carr. "Hotels and human impurity will be far below. I will fuse in spirit skies. I will touch naked God." This letter was omitted when Muir's letters to Mrs. Carr were first published, by his daughter Wanda in 1915. In 1923, when William Bade brought out his authorized biography, the letter was quoted, but the reference to "naked God" was left out.

It's easy to see why. It's still a startling statement, both in its urgency and in its ambition. That's the nature of Muir: a determination to storm the heavens, the inexhaustible energy with which to do it, and an unshakeable faith in the truth of what will be found there, whether or not we can understand it. We read of his exploits, and think we know him, but in fact the "guided" Muir could startle those who knew him to the very end of his life, as when he insisted on taking a 40,000-mile journey around the world, alone, at age 71.

Though a cottage industry has grown up around Muir that puts out a half-dozen books a year—not to mention CDs, documentaries, dances, musicals, plays, and screenplays—most of these works concentrate on his

adventures and natural histories. As Williams points out, in contrast, “the urgent and excited prose of Muir’s not yet fully digested ideas in the field notebooks is reading Muir at his best.” This is the mysterious, almost Hericlitean Muir now slowly coming to light. “One’s feelings are always in advance of words,” Muir once mused, “so much is deeply felt is in its very nature undefinable, especially when we travel alone.” Ninety years after his death, he can still surprise us, just as—under the influence of the universe—he often surprised himself. ☾

Reviewed by Kit Stolz, a writer from Upper Ojai, California, who has written about John Muir for Sierra and also contributes to the Los Angeles Times.

The Birds of Northern Melanesia

Speciation, Ecology, and Biogeography

by Ernst Mayr and Jared Diamond

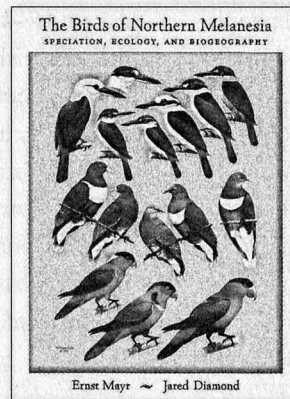
Oxford University Press, 2001

492 pages, \$55

CHARLES DARWIN’S famous title is somewhat misleading. *The Origin of Species by Means of Natural Selection* is a 600-page treatise on the fact that single species do, in fact, evolve into quite different beings over time, and that the mechanism for this process is natural selection. Speciation—the actual origination of new species, daughter species springing from existing ones in the manner of the classic branching evolutionary tree—is a matter that Darwin didn’t quite

get around to in *Origin*, though it continued to interest and perplex him. Evolution and speciation continue to be conflated in much of the modern natural history literature, but Ernst Mayr, born just 20 years after Darwin was in the grave, made the study of true speciation his life’s work. In 1928, at the age of 21, Mayr joined the famous Rothschild expedition to New Guinea, where he scoured remote mountain ranges for streaming birds of paradise. Now well into his nineties, still tottering into his office at Harvard several times a week, Mayr (with co-author Jared Diamond) has given us *The Birds of Northern Melanesia*, the fruit of a life spent tightly pressed to the lives of island birds.

Most of us learned Mayr’s biological species concept during intro ecology classes, and probably even memorized it: “a species is a group of actually or potentially interbreeding natural populations reproductively isolated from other such populations.” Speciation occurs when part of a population is geographically separated and, over time, differentiates enough both in form and behavior to prevent interbreeding with the parent species, even if their geographic ranges were to overlap. *The Birds of Northern Melanesia* is a layered and often surprising recapitulation of Mayr’s species concept, revealing the depth of its complexity, practicality, fluidity, and beauty. The approach is rigorous, but earthy—this is good old natural history, grounded in relentless observation of living beings over time, and a faith that such



patient watching has value, and will eventually bear light.

Northern Melanesia is comprised of the Bismarck Archipelago and the Solomon Archipelago, lying just east of New Guinea, and south of the equator.

Drawing from Australia

and New Guinea, the Northern Melanesian avifauna is fantastic, including everything from pert little white-eyes to cassowaries, colorful kingfishers, parrots, and owls. The gorgeously detailed color plates by H. Douglas Pratt imprint many of these birds on the reader’s imagination. Mayr and Diamond recognize 195 species in the region, 35 of which are endemics. That might sound like a rather smallish number of species for such a rich group of islands, and in fact most ornithologists recognize 251 regional bird species. This discrepancy, quite large for a process of identification that we consider to be reasonably straightforward these days, arises from the authors’ unit of consideration—what they call a “zoogeographic species.” This is a very stringent definition of a full species, requiring complete, proven reproductive isolation from related species. The other sixty or so species recognized by most other ornithologists are more vaguely termed “allospecies” by Mayr and Diamond. We may be able to infer reproductive isolation for such species, but the proof that they would persist in proximity to closely related allospecies is currently unattainable.

In *The Birds of Northern Melanesia*, Mayr and Diamond posit several stages in the move toward full

speciation, based on existing populations that appear to represent these stages in the current avifauna. Nothing is simplified. Species vagility, the vagaries of land and water barriers, shades of difference in habitat types, the role of non-avian animals, geology, the presence of humans, the fossil record, endemism, extinction—all of this is considered in the complex river that flows new species. The march toward speciation unfolds here as a process, intricate and frail, rather than inexorable.

Accusing Ernst Mayr of humility is a little tricky (he has claimed credit for both Niles Eldredge and Stephen Jay Gould's theory of punctuated equilibrium, and Robert MacArthur and E.O. Wilson's theory of island biogeography). But in a science that so often makes lexiconic certainty its goal, it seems that Mayr does tread the hollows with a kind of humility, refusing to name a species that is not ready to fall into a full-species category, and looking to the birds themselves for the sign that such categorization is appropriate, rather than imposing the needs of human scientists upon them. "We, not the birds, are the ignorant ones," writes Mayr. So many of our species-naming decisions, he constantly reiterates, are at least difficult, and often entirely arbitrary (and the authors' focus on zoogeographic species is an attempt to mediate this difficulty). This is a useful lesson, and not just for taxonomists, but also for us naturalists and birders who are ever ready to understand the animal that stands before us insofar as it matches the picture in our field guide. *The Birds of Northern Melanesia* is a marvelous guide to true watching, a watching that allows a bird to stand as each of

us stands—both as a distinct individual, and with our edges blurred, in flowing lineage. ©

Reviewed by writer and birdwatcher Lyanda Lynn Haupt, whose first book, Rare Encounters with Ordinary Birds (2001), won a Washington State Book Award.

Living Wild and Domestic

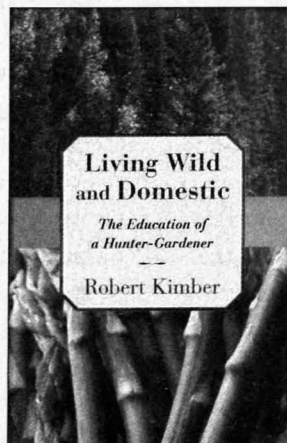
The Education of a Hunter-Gardener

by Robert Kimber
The Lyons Press, 2002
208 pages, \$22.95

GETTING YOUR OWN MEAT is a messy business, make no mistake. With a frankness that some may find disturbing, Robert Kimber describes vividly the bloody truth of eating animals and confronts squarely the ethical issues involved. He began as a boy with a spin-casting rod pulling out warm-water panfish with worms and Wonder Bread, then as a youthful plinker with an old .22 in the backyards and woods of suburban New Jersey. He progressed to refined fly fishing and mature deer hunting in Maine, and took up and later quit the raising of animals for food on his homestead. Through all this he has become well acquainted with the carnivorous half of the omnivory that our generalized human teeth and gut suggest.

Kimber has hunted in Labrador with the Naskapi, and he has led lambs to slaughter. He has gathered wild plant foods and with his wife he has nurtured garden vegetables. But although Kimber takes up and returns repeatedly to the subject of killing and eating animals (as well as whether there's any sense in just keeping them around for pleasure, in his chapter "Dish-Fed Retainers"), his larger concern is reconciling and accommodating the two ways of life that together defined humans' ecological relationship to Nature until the mid-1800s. Kimber, and many of us it seems, want to be in two places and to be two selves at once, to live, in his words, both wild and domestic. We want both the dark hidden forest and the sunlit familiar pasture, both the wild hunt and the orderly row of tomatoes. Kimber considers how we might bring together the hunter and the gardener, the ancient core self that is dependent on the gifts of wild Nature, freely given and gratefully received, and the 10,000-year-old pastoralist and farmer, the domesticator, at his best working with Nature but also profoundly manipulating it, altering it, twisting it to his own ends.

For help in this, Kimber turns to Aldo Leopold, and his ideal of "wild husbandry," the core of which is the "need to recognize the dependence of the cultivated on the wild for vitality, health, renewal." This, indeed, must be the starting point for any workable agriculture—and Kimber, despite the personal pleasure he



takes in hunting, the considerable time he has spent at it, and his belief in its continuing relevance, acknowledges that growing and raising food will forevermore be how just about everybody actually gets fed. Given this, Kimber advocates for the ideal of the "hunter-gardener-farmer-forester," who "tries to invite the wild back onto lands where it has been driven out, and in that endeavor finds meat from God."

But then do we, in fact, anymore *need* the even older self, *need* the hunter, the slayer of deer? Can the modern person anymore justify spending Saturday hauling fish from the rivers and lakes, where they would undoubtedly prefer to remain, to let them die in their own sort of aerial drowning or (worse?) to put them back to be caught again, assuming they survive their hooked visit with the fisherman? Can there be any sense in gathering wild blueberries or blackberries or fiddlehead ferns considering the 85° slope of growth in hungry human mouths? Do we have anything still to learn from practicing the ways of our hunter-gatherer ancestors? Or have they been irredeemably corrupted (the "slob hunter") or rendered irrelevant by a rising consciousness of animal suffering, by global food needs, and by the modern age of urban/suburban comfort in which everything necessary for physical survival can be easily purchased—no more important than the skills of the cooper, the wheelwright, or the currier?

Kimber argues strongly for the continuing cultural value of hunting, and although it is a pretty difficult argument to make, he carries it off well. He considers the usual problems of how the pursuit of wild prey is con-

ducted, and for what ends—sport (the pleasure of the chase, the demonstration of skill), connection to Nature, food, and so on. He notes that he is now himself solidly with the utilitarian (food) hunters, but cannot shake the enjoyment of "playing" a fish although he may have filled his limit or be required to throw it back on a catch-and-release river. But, as Kimber notes, "most of us who hunt do not *need* to hunt," and "because our hunt is not essential to survival, it lacks ultimate seriousness...we will not starve if we fail to bring home some wild meat." And so is hunting "a self-deluding atavistic pipe dream," in which "we know that we are at some level killing for 'fun,' no matter what ingenious gloss we may choose to put on our killing"? Not only does Kimber question the argument of the "food hunter," he also questions the "nature hunter," noting that "the paradox the hunter in the industrialized world has to deal with is that the hunt as sport—the very activity he engages in to reenter the wild world and become a complete insider—irrevocably marks him as an outsider." So why perpetuate hunting at all? Kimber's answer, the best that I've read anywhere, is that:

The hunt—and by "the hunt" I mean every form of foraging from moose hunting to clamming to berry-picking—is how we acquire food supplied by nature's beneficence, not through the intermediate step of agriculture. If raising a kitchen garden and keeping a few farm animals takes us one giant step back past the supermarket and into the realm of what we think of as primary resources—the corn on the stalk, the beef on the hoof—then hunting and foraging take us one step farther into

the truly primary resources, the food that existed before corn and beef were invented. By harvesting wild plants with our own hands, by taking wild meat and fish with our own hands, we are reminded—in case we have forgotten—that this primary world of soil, plant, and animal is what our secondary worlds of agriculture and industry derive from and remain dependent on.... The killing of a wild creature, freighted as it is with both celebration and regret, drives home on a personal level our debt to and responsibility toward the creature world.... Through the artificiality of hunting, we can find our way back through the labyrinth of artifice we live in to the reality of our first foods and to the practical knowledge and the religious understanding of the natural world that originated in dependence on those foods.

And what of domestic food animals? Kimber acknowledges that these animals are to a large extent human inventions, and are perhaps even "degraded," as Paul Shepard viewed them, lacking most of the beauty and grace of their ancestors, but he maintains that, at least in free-ranging domestic animals, there is yet "a touch of wildness," and that "what the small husbandman learns from his domestic animals reconnects him to the wild. They form a bridge back into the wild...." And yet they bring a problem, too, when they are threatened by the genuinely wild animals that surround them, and hunt them, emerging from the dark woods to enter the chicken house in silence.

Kimber's book is well-written, enjoyable, interesting, and thought-provoking. Yet with its descriptions of boyhood angling in New Jersey, of self-reliant living in rural and semi-wild Maine, and of intense wilderness

travel in the North—all pleasures and ways of life that I myself have had the chance to experience—I wondered about its greater relevance and application. This is, in truth, a privileged way of life, and although Kimber's book is, obviously, a collection of personal reflections, and not an attempt to solve larger problems of human ecology, we desperately need also to think well about how those people who are permanently embedded in cities might themselves connect with both the wild and the genuinely domestic. Essential to me, is it no less essential, if unrecognized, to them? If I consider it critical that my daughter grow up learning how to shoot a bow and taking pleasure in pulling from the soil carrots that she planted four months before, can I want anything less for the child growing up in a Baltimore slum? How to achieve this is the most difficult and vexing problem, but it cannot be ignored, both for the sake of each person's human spirit, wherever he or she lives, and also for the sake of the wild, which needs countless more advocates who have gotten at least a touch of what is out there. ☾

Reviewed by Jeff Bickart, who teaches at Sterling College and grows lots of food with his family in Craftsbury, Vermont.

Wandering God

A Study in Nomadic Spirituality

by Morris Berman

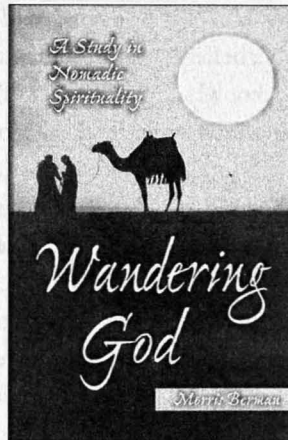
State University of New York Press, 2000
349 pages, \$74.50 hardcover, \$25.95 paper

CULTURAL HISTORIAN Morris Berman has long sought to understand the origins of what he terms “the basic

fault” in human life: an experiential dualism that has separated humans from the natural world and resulted in Nature's degradation and destruction. In two previous books he developed an analysis of this dualism and the many failed attempts to escape it. In *Wandering God* he continues with this analysis and also offers his view of the way out.

Berman argued in *Reenchantment of the World* that the Scientific Revolution's distinction between meaning and value on one hand, and facts on the other, consolidated a much deeper schism between body and Nature, and the mind and reason. This Cartesian view held only the conscious to be real. Psychoanalysis recovered the reality of the unconscious, but held it to be irrational—something to be brought under the control of consciousness. Berman, following others, argued that the unconscious became irrational only when a split between mind and body (emotion) existed; rationality of both emotion and thought depended on a permeable “boundary” between unconscious and conscious, i.e., wholeness.

In *Coming to Our Senses*, Berman reached into deep time and built on the work of Paul Shepard and object-relations theorists. He argued that this split is the psychic counterpart of the effort to control Nature that was part and parcel of the transition from hunting and gathering to agriculture and pastoralism. In the long history from the Neolithic to the present, Berman argued, that which had been lost and repressed but always carried



in the body—the repository of the unconscious—continually reemerged, only to be co-opted.

With *Wandering God* Berman blazes a path forward—a way to begin to change society and protect the natural world. He starts by returning to the Neolithic transforma-

tion and the rise of the first civilizations, arguing that it is not, strictly speaking, the transition from a hunting and gathering society that generates the experiential dualism that has been so catastrophic for humans and Nature. Rather it is the transition from societies in which the economy is immediate return (no surpluses, no extensive planning horizon) and societies having delayed-return economies (accumulation, investment, control).

The material circumstances of immediate return societies give rise, Berman argues, to child rearing that produces individuals able to “live in the question”—that is, able to live without ideology and formula, including religion. For them the sacred lies in the intense experience of everyday life. Pointing to the Mbuti pygmies who see the forest as benevolent, and magic and ritual as egotistical and anti-social, he argues that they cathect the world and do not need the transitional objects of the sedentary. They do not cling to things, and they do not fear death. Movement assuages the anxiety of self-awareness.

In contrast, delayed-return sedentary society is marked by clinging and fear, especially a fear of death. Just as accumulation breeds

social hierarchy it also breeds a “vertical consciousness,” in which heaven and earth are split and the sacred is separated from the mundane. The divine and heaven appear, rooted in the loss of being at home in the world. In place of the world and soma comes worldview: the need for paradigm and certainty. The split becomes more extreme as hierarchy and violence develop. The gods no longer mirror the mundane world as in early Mesopotamia, Egypt, and China; heaven becomes very different from the earth and salvation a main preoccupation. Obsession with orthodoxy and mysticism become central.

For Berman the way out lies in not universalizing religion or science. Religion *is* the fall from grace. The need for paradigm, not just particular paradigms, is an addiction. But the world won't allow us to turn our backs on the universal and immerse ourselves in the tribal particular. Rather, we must learn to live in the tension between the two, much as modern nomads do. We must abandon the notion that the universe is unfolding toward some particular outcome and stop clinging to a paradigm. We must also change our material conditions by reducing human numbers and living in smaller groups in which it is possible to control those who strive for power. And we must vastly improve the quality of child rearing.

Although Berman's proscriptions are good advice for the long term, little will come of it without a strategy for getting there. About that the author has little to say. ☺

Reviewed by political scientist David Johns, who serves on the Wildlands Project board of directors.

Ablution

Drought-whirtled Salmon Creek
rattles through new grass flats,
alto shards racheting from
Cascades to the Columbia—
but not too low to drown,

in this hushed collapse
of hours, seven asphalt days
lost in the carbon monoxide fog,
storming nowhere
through the urgent clatter.

Stack those mindless days
like cordwood, lichen-white
alder sapped dry, and feed
the tattered flames to fan
the shadows from this moment:

*chest-high Canada thistle
spindly
gone to seed*

*swaying to the pulse
of a noon-silver
meadow*

~ Laird Christensen

today. Racism among skinheads, Christian Identity thugs, and the militias is a curious thing. While racists claim that Aryans are physically and mentally superior, and that Aryans invented freedom and capitalism, blacks are feared for their physical and sexual superiority and Jews are hated because of their superior intelligence and success in capitalism. Aryan racists are the dumbest, least educated, poorest, and most insecure white folks.

OLD TESTAMENT CHRISTIANITY.

The Christianity that runs through dangerous extremists like the Christian Identity patriarchs and decent folks in the Christian Coalition alike is based more in the Old Testament than in the New. Their God is the vengeful Sky God telling Joshua to smite his enemies, not the hippie Jesus preaching that we should love our neighbors.

RURAL BRAIN DRAIN. Hoo boy.

I'm going to walk between a grizzly and her cubs here. I don't want to do it. However, this little tiptoe into danger is necessary to fully understand today's conservation opposition. In every generation since the European settlement of North America, more of the smart, ambitious, capable youngsters have left the farm for the city than have stayed home. Over the years, this has resulted in a gradual but significant dumbing down of rural America. While there are certainly plenty of smart folks in rural areas and plenty of dumb folks in the cities, in general there is a higher percentage of simpletons in the sticks. I say this reluctantly because I generally like rural folks more than I do urban folks, because I have lots of rural kinfolks (I was the first member of my family born off the farm), and because it's an

insulting thing to say. However, this rural brain drain is part of the reason that paranoid conspiracy theories find such fertile soil in rural America and why science is so roundly rejected.

Similarly, we have seen a dumbing down of blue-collar workers and hunters. Before college education was common, many intelligent, well-read people worked in factories, shops, and on pick-and-shovel crews. Their critical thinking leavened the overall sense of such working places. Now, as more and more people go to college and find technical, professional, and business jobs, those left working with their hands are generally the less-intelligent and less-educated folks.

When most men hunted, intelligent, thoughtful men encouraged good sportsmanship among all hunters. Now that fewer and fewer Americans hunt, particularly among the educated folks, hunters do not have as many good role models and the level of sportsmanship has gone downhill.

These are not nice things to say. And I feel a traitor to my kind to say them. Nevertheless, they are necessary for understanding where some of today's anticonservationists and militia members are coming from.

YAHOOOS OF COLOR. It's popular in liberal circles to see rural Hispanos in the Southwest and American Indians generally as people of the land with an intrinsically more harmonious relationship to Nature. Bunk. You find just as many poachers, don't-give-a-shit loggers, bad ranchers, and other landscapers among rural non-Anglos as you do among Anglos. You also find some Indians and Hispanos who have a close connection to the land and who are conservationists. However, good stewardship is not a racially

or ethnically inherited trait. I'm not even convinced that good stewardship is a *culturally* inherited trait, but that's a longer discussion.

SALT OF THE EARTH. Rural folks include, unfortunately, white trash, brown trash, red trash, black trash, but also some of the finest, most decent people on Earth—the true Salt of the Earth. And guess what? Not all of these good folks agree with me about wilderness or wolves. Some may even believe the United Nations is trying to take away their land through the Biodiversity Treaty or that black helicopters are flying around spying on them. They may still be fine, decent people in other respects.

OBVIOUSLY, I HAVE a love/hate relationship with this right-wing populist strain in American history. My grandparents, who believed that the Pope was the Antichrist, were in the Ku Klux Klan in the 1920s out on the high, windswept plains of eastern New Mexico.²¹ As a kid, I learned from Grandma and the Church of Christ about how the Catholics were storing guns in the basements of their churches awaiting orders from the Pope of Rome (pronounced "Poparome" in Texas). In college in the 1960s, I was New Mexico Chairman of Young Americans for Freedom and knew folks in the John Birch Society. They were nice people. I'm embarrassed today about how gullible I was in believing that Communists had infiltrated our government and that we were being delivered into a godless dictatorship. (I even bet my Aunt Barbara a hundred bucks that the commies would formally take over by 1972—thank goodness she let me slide on that one!)

The greatest shame in my life occurred then, when, wrapped up in conspiracy hysteria from the Birchers and John Stormer's *None Dare Call It Treason*,²² I wrote a column for the University of New Mexico newspaper, the *Lobo*, that Reverend Martin Luther King Jr. was part of the communist conspiracy. The Bible tells us that when we cast our bread upon the water, it shall be returned to us. My sin against reason and against Dr. King has been revisited upon me today with the fearful ones claiming that I am a leading conspirator working to deliver America into slavery through "The Wildlands Project: Subversive Tool of the United Nations." I appreciate the importance of populist paranoia in the anticonservation movement because of my long association with such folks.

There is indeed much to fear in America and the world today. Communists really did plan to conquer the world through subversion and oppression. But they weren't supermen. Communism collapsed in the Soviet Union and Eastern Europe because of its own heart rot.

Nonetheless, Communists were a clear and present danger for decades.

A popular bumper sticker is "I love my country, but fear my government." This is a wise and justified attitude. The FBI, ATF, and SWAT teams are frightening. They are un-American and sometimes stomp on the Bill of Rights in their jackboots. Believe me, I've seen it. The people fighting against gun control aren't all crazy.

The New World Order is a frightening prospect. However, this one-world setup tearing down national boundaries is being done by multinational corporations and financial institutions. It is a threat to American sovereignty, as well as to biological diversity worldwide. It's why the Sierra Club has opposed NAFTA, GATT, WTO, and "Fast Track" authorization for international trade agreements.

None of these, however, are conspiracies. "The key to understanding real conspiratorial activity is that it attempts to achieve an illegal goal," explains Tom Bethell in *National Review*. "Against whom are [the Council of Foreign Relations and the Trilateral Commission] supposed to be

conspiring? Why would they organize a putsch against themselves? What aspect of the law have they been unable to change?"²³

The militias and their ancestors through the centuries have been partly made up of good, God-fearing Americans who believed that a perfect, God-inspired society was set up here in the New World. It was a society where the common man reigned and where anyone could make it by the sweat of his or her brow. When they saw that society was not fair, when they saw elites getting more, when they saw their economic lot decline, they realized that something sinister was eating away at the perfection of the United States and taking away their freedoms and independence. In gullibility, in paranoia, in anger, in lack of critical thinking—but most of all, in *fear*—they imagine fiery flying serpents, monsters in the woods, devils in the leadership of America. Masons. Catholics. Jewish Bankers. Communists. The United Nations. Conservationists.

— Dave Foreman

Thelon River, Northwest Territories

NOTES

1. The others are the Puritans (East Anglia to Massachusetts), Cavaliers (South of England to Virginia), and Quakers (North Midlands to the Delaware).
2. David Hackett Fischer, 1989, *Albion's Seed: Four British Folkways in America* (New York and Oxford: Oxford University Press), 652–54.
3. Fischer, *Albion's Seed*, 612–13.
4. Fischer, *Albion's Seed*, 611.
5. Fischer, *Albion's Seed*, 615.
6. Fischer, *Albion's Seed*, 633.
7. When I was nine years old, I spent the summer in Kentucky visiting my father's family. Several of his aunts, uncles, and cousins still lived in log cabins in the mountains. I was delighted.
8. Fischer, *Albion's Seed*, 656–57.
9. Fischer, *Albion's Seed*, 660.
10. Fischer, *Albion's Seed*, 650–51.
11. Fischer, *Albion's Seed*, 617.
12. Fischer, *Albion's Seed*, 628–29.
13. Fischer, *Albion's Seed*, 630.
14. Fischer, *Albion's Seed*, 693–95.
15. One of my ancestors, John Crawford, was killed as a rebel in Bacon's Rebellion.
16. Catherine McNicol Stock, 1996, *Rural Radicals: Righteous Rage in the American Grain Belt* (Ithaca, NY: Cornell University Press).
17. Fischer, *Albion's Seed*, 642–50.
18. Fischer, *Albion's Seed*, 755–56.
19. Fischer, *Albion's Seed*, 662. Most of my family lives in semirural mobile homes.
20. Charles Krauthammer, 1996, The Return of the Primitive, *Time* (January 29): 82.
21. The Klan in the 1920s was a different organization than the KKK after the Civil War and since World War Two. Although it represented populist nativism and was an antidemocratic force, it was much more mainstream than the earlier and later versions. See Henry Bamford Parkes and Vincent P. Carosso, 1963, *Recent America: A History, Book One: 1900–1933* (New York: Thomas Y. Crowell), 412–413.
22. John A. Stormer, 1964, *None Dare Call It Treason* (Florissant, Missouri: Liberty Bell Press). Seven million copies of this 254-page paperback were printed in 1964. Most were given away by organizations that bought them cheaply in bulk.
23. Tom Bethell, 1995, Patterns of Conspiracy, *National Review* (August 28): 33–36.

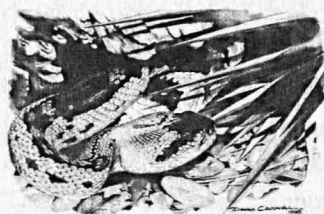


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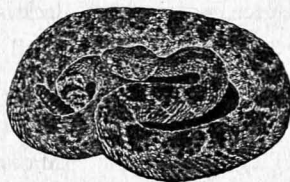


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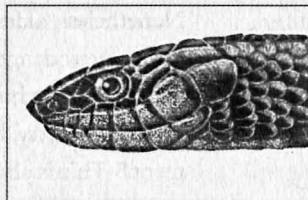


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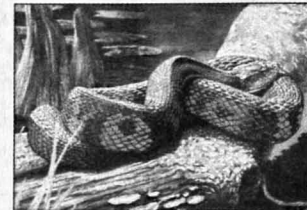


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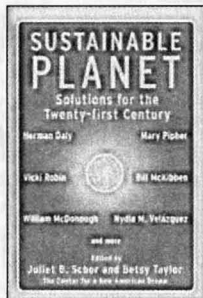
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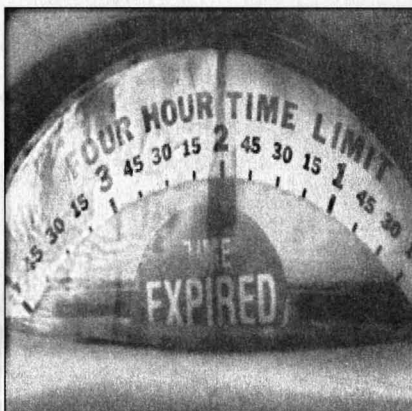


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GATHERINGS

Wildlife Society Conference The 2003 national meeting of the Wildlife Society will be held from September 6–10 in Burlington, Vermont. The technical program consists of workshops, symposia, and over 250 contributed papers presented in six concurrent sessions. An all-day special poster session will celebrate the centennial of the U.S. Fish and Wildlife Service's National Wildlife Refuge System. For information, visit www.wildlife.org.

Society of Environmental Journalists From September 10–14, 2003, the Society of Environmental Journalists will hold its 13th annual conference in New Orleans, Louisiana. The gathering will explore the Bush environmental record, relationships between climate change and emerging diseases like West Nile Virus, and regional issues including the loss of Louisiana wetlands during the plenary and concurrent sessions, tours, and events. The Wildlands Project will be exhibiting during the conference as well as hosting a "hospitality event" on the evening of Friday, September 12. Visit www.sej.org/confer/index1.htm.

Natural Areas Conference The 30th conference of the Natural Areas Association will be held in Madison, Wisconsin, from September 24–27, 2003. This year's theme, "Defining a Natural Areas Land Ethic," will challenge attendees to explore the role that natural areas play in developing an ecological conscience. Presentations will cover natural area identification, protection and management, restoring natural communities, rare species conservation, and developing a land ethic and sense of place; special forums will address landscape ecology, large river systems, fire ecology, private lands protection, and invasive plants. Visit www.naturalarea.org.

25th Annual Prairie Festival Hosted by The Land Institute in Salina, Kansas, this event features talks, music, tours, art, a supper with Kansas-grown food, and a barn dance. Speakers include Winona LaDuke, David Korten, Mas Masumoto, and Michael Pollan. Camping is free at The Land Institute for the festival weekend, Friday–Sunday, September 26–28, 2003. For more information or to register: 785-823-5376; theland@landinstitute.org; www.landinstitute.org.

Land Trust Alliance Rally The premier private land protection gathering, the LTA Rally brings together land trust professionals, volunteers, public agency staff, attorneys, appraisers, and other land conservation professionals from across the country and abroad. This year's rally will be held in Sacramento, California, from October 16–19, 2003. The Wildlands Project is sponsoring a panel on October 18 entitled "How Landscape-Scale Conservation Planning Can Guide Decision-Making." Visit www.lta.org/training/rally.htm.

PUBLICATIONS

America's Endangered National Forests Greenpeace and the National Forest Protection Alliance (NFPA) have released a new report, "Endangered Forests, Endangered Freedoms," which highlights 10 particularly endangered national forests at risk from Bush administration actions. Chosen were Apache-Sitgreaves (AZ), Bitterroot (MT), Black Hills (SD), Chequamegan-Nicolet (WI), George Washington-Jefferson (VA), Kootenai (MT), Mississippi's national forests (MS), Plumas (CA), Tongass (AK), and Umpqua National Forest (OR). The report, available at greenpeaceusa.org, found that commercial logging remains the biggest threat to the national forest system.

Public Attitudes Toward Wilderness The Campaign for America's Wilderness has released a research report, "A Mandate to Protect America's Wilderness: A Comprehensive Review of Recent Public Opinion Research." An excellent summary of recent polling of public attitudes toward wilderness, the report is available online at www.leaveitwild.org/reports/reports.html.

GO WHERE YOU MAY in the great wooded expanses of the north—the true boreal forest that circles the globe—and feather mosses will be underfoot. Of these, the mountain fern-moss (*Hylacomnium splendens*) figures prominently. The scientific name translates to "shining forest-inhabitant," an appropriate description of this beautiful species. It is also known as stair-step moss in reference to its unique growth form; each year a new frond emerges from the previous year's growth, with several layers being visible on any one stem. The effect is that of a small flight of stairs.

Feather mosses cover millions of acres of boreal forest—the land of white and black spruce, heath shrubs, and lichens. Like most of its kindred species, the mountain fern-moss is well



H. splendens detail

Species Spotlight

Plush Stairs for Lilliputian Steps

illustration by Betsy Brigham

Mountain Fern-Moss

KINGDOM Plantae
PHYLUM Bryophyta
CLASS Musci
ORDER Hypnales
FAMILY Hylocomiaceae
GENUS *Hylocomnium*
SPECIES *splendens*



adapted to the cool, moist conditions found there. Yet it also ranges northward into the treeless tundra closer to the north pole, and southward into the montane spruce-fir forests, cold ravines, and conifer swamps of the north-temperate zone, and further south along the Appalachian and Rocky Mountains. In the north-temperate forests, such as in New England, the moss grows in a duality of habitats—the mountain summits and the swamp bottoms. This is striking, but easily explained: the coniferous forests in both places produce similar environmental conditions.

Like all mosses, *H. splendens* has no roots; thus it is not anchored to its substrate. As aging vegetation decays, a dense mat is formed, with new layers growing up and out of this damp base. Individual stems can live for up to 80 years in this continuum of growth and decay. ◀

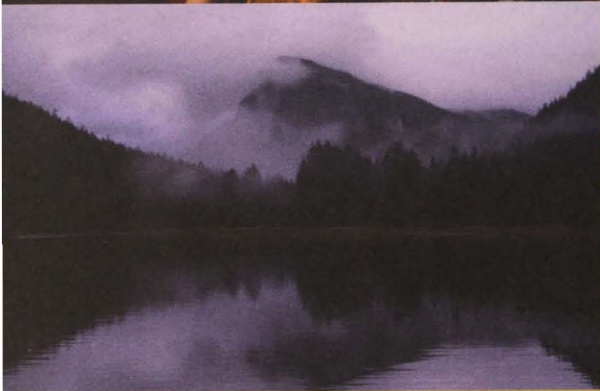
Text by Brett Engstrom and Betsy Brigham, who live in central Vermont. Brett works as a consulting naturalist throughout New England. Betsy is a freelance illustrator specializing in botanical and natural history subjects; she created this illustration in pen-and-ink.

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