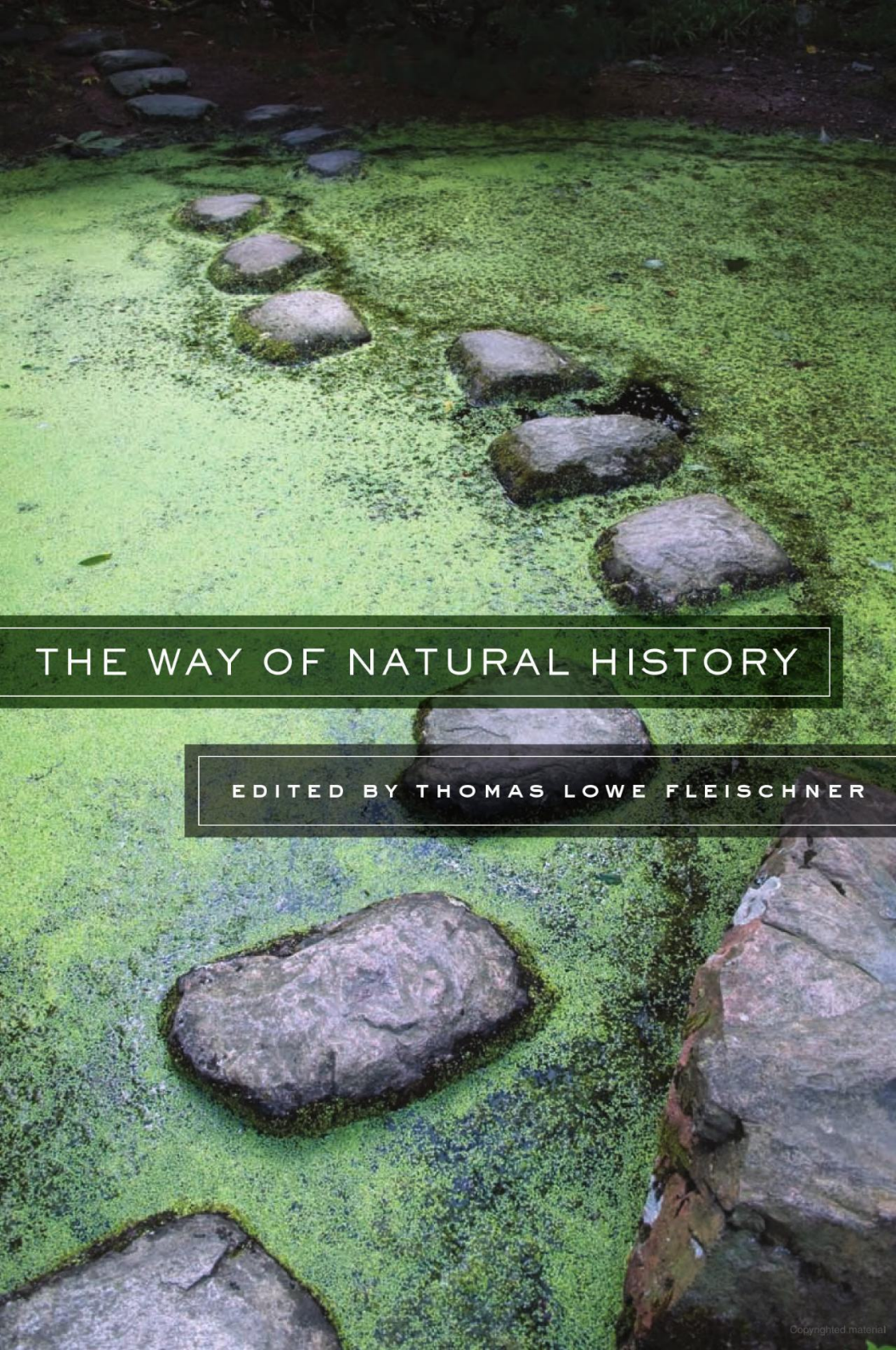

THE WAY OF NATURAL HISTORY

EDITED BY THOMAS LOWE FLEISCHNER

Trinity University Press
San Antonio

Published by Trinity University Press
San Antonio, Texas 78212

Cover design by Nicole Hayward
Book design by BookMatters, Berkeley

Trinity University Press strives to produce its books using methods and materials in an environmentally sensitive manner. We favor working with manufacturers that practice sustainable management of all natural resources, produce paper using recycled stock, and manage forests with the best possible practices for people, biodiversity, and sustainability. The press is a member of the Green Press Initiative, a nonprofit program dedicated to supporting publishers in their efforts to reduce their impacts on endangered forests, climate change, and forest dependent communities.

The paper used in this publication meets the minimum requirements of the American National Standard for Information Sciences—Permanence of Paper for Printed Library Materials, ANSI Z39.48-1992.

Library of Congress Cataloging-in-Publication Data

The way of natural history / [edited by] Thomas Lowe Fleischner.
p. cm.
Summary: "Scientists, nature writers, poets, and Zen practitioners highlight their individual ways of paying attention to nature and discuss how their experiences have enlivened and enhanced their worlds. The essays provide models for interacting with the natural world and create a call for the importance of natural history as a discipline"—Provided by publisher.
ISBN 978-1-59534-073-3 (hardback) — ISBN 978-1-59534-074-0 (paperback)
1. Natural history. 2. Naturalists. 3. Nature study. 4. Natural history—Philosophy. I. Fleischner, Thomas Lowe, 1954–
QH81.W387 2011
509.2'2—dc22 2011001294

15 14 13 12 11 | 5 4 3 2 1

Contents

The Supple Deer

The quiet opening
between fence strands
perhaps eighteen inches.

Antlers to hind hooves,
four feet off the ground,
the deer poured through it.

No tuft of the coarse white belly hair left behind.

I don't know how a stag turns
into a stream of water.
I have never felt such accurate envy.

Not of the deer.

To be that porous, to have such largeness pass through me.

THOMAS LOWE FLEISCHNER

The Mindfulness of Natural History

From here, the tropical forest stretches more than two thousand miles toward the Atlantic coast. In the sticky heat I walk beside the Rio Puyo, along the uppermost edge of the Ecuadorian Amazon, having just descended from the Andean highlands. There's a tingling sense that something new, something beautiful, might manifest at any moment, around any corner. The flick of a leaf, the chip-note of an unseen bird—these are potential portals into new worlds. This sense of total alertness enlivens me; the air throbs, ready to explode, it seems, into new life forms. Across the muddy river, a rustle among the treetops seizes my attention, then there it is: a finch-sized bird with a luminescent turquoise head, sharply contrasting with a black body, splashed with a straw-yellow patch on its wing. A bird so gaudy and brilliant, I laugh aloud. In the next moment, a second bird, about the same size, flies onto the next branch, so close it's visible in the same binocular view. This bird shimmers lime-green, with a lemon-yellow belly. They both jounce the branches a bit as they grab insects, then fly off, deeper into the forest. I grab my field guide—the monumental *Birds of Ecuador,* which, given the

tremendous diversity of this biologically blessed nation, fills my shoulder bag. Because of their size, behavior, and fanciful coloration, I'm pretty sure these are both tanagers—members of a large tropical family of fruit-eating birds. Soon I've narrowed it down: a blue-necked tanager (I must concur with the field guide authors' enthusiasm: "arguably one of the more stunning members in a wonderful genus") and a female swallow tanager. My actual observation of these two lasted only half a minute, but weeks later I still tingle with the memory, and with the knowledge that creatures such as these are out there, going about their business, each and every moment of each and every day.

Another morning, far to the south. Low-angle sun of the austral summer glints off the surface of the violet-blue bay, whitecaps kicking up spray into the steady twenty-knot wind. But here on shore, more than two hundred thousand birds stand erect, each as tall as my waist, squawking up a collective cacophony that can be heard well out to sea—almost as far as the fertile scent of their guano can be smelled. Most of these king penguins are in full adult plumage: gleaming white breasts, with charcoal-gray heads, necklaced with sun-bright yellow, the same color that forms a teardrop patch on each side of their heads, like golden exclamation points on each bird. Scattered throughout the colony are the juveniles, which have a completely different appearance—shaggy and uniformly brown. These adolescents cluster together in small pockets, readying themselves to overwinter on this sub-Antarctic island. All in all, these are stunning creatures. Even a single bird would be astonishing, but so many thousands, packed within a body length of one another, together filling an entire valley, is almost incomprehensible, beyond my senses' ability to process. This enormous colony—the center of the world for this species—is severed into halves by the gracious curves of a river, pulsing

with fresh glacial meltwater, its source visible in the daunting, jagged peaks that jut almost three thousand meters above this remote beach in the Southern Ocean. As an early explorer exclaimed on encountering this island: "It's like coming upon the Alps in the middle of the ocean."

As I move away from the fringe of the penguin colony, Antarctic fur seals glare at me, corkscrewing their necks in broad circles and snapping their formidable teeth in warning. Occasionally I have to waggle a slender stick in their direction to discourage those jaws from chomping onto my leg. Amid all this swarming life, three hours pass by in a blur, and soon it's time to load back into our rubber landing boats and bounce across the roughening sea to our ship.

And the most important moment: this one. Right now, right here. Early spring sun casting broad shadows, glinting bright copper in large patches on the pine needle forest floor. The wind from the end of the huge cyclonic storm system spinning east is almost past us now. Yet the wind's whipping tail tosses the tops of ponderosa pines as if they were cornstalks on the prairie, their long needles twirling against azure sky. The sound of the powerful wind burrows through the trees, shouldering away the spring sounds of finches. My eyes flick from golden grama grass waving in the sunlit openings to glossy-green Emory oak leaves mirroring the sun. My ears trace the crescendo and decrescendo of wind. My imagination feels the snowmelt moisture slowly percolating into volcanic soil beneath my crossed legs. I'm no longer alone in the world. Rather, I've connected with my true neighbors, and with the force that flows along the ribs of the continent.

Natural history is a practice of intentional, focused attentiveness and receptivity to the more-than-human world, guided by hon-

esty and accuracy. Simply put, it is paying attention to the bigger world outside our own heads. As Zen Rōshi (and contributor to this volume) Robert Aitken noted, attention is prerequisite to intimacy. Natural history, then, is a means of becoming intimate with the big, wild world. For some, this involves watching birds visit a feeder outside a city apartment. For others, it's an annual pilgrimage to witness the spring bloom of desert flowers. Flyfishers pay close attention to aquatic insect larvae, snorkelers gain joy watching the synchronized movements of reef fishes, and geologists trace the evolution of the Earth by following bends and folds in sedimentary rocks. The mind of a hunter is nothing if not attentive to nuances of animal movement and color. With some 30 million species living on this remarkable planet, across an endless variety of landscapes, and interacting in an infinite number of ways, there is literally no limit to the "nature" we can pay attention to.

Mindfulness, a crucial element of many spiritual lineages, is particularly closely allied with Buddhist traditions, which include it as one of the elements of the Noble Eightfold Path. Right Mindfulness involves cultivating a state of increasing clarity and intensity of consciousness, one that filters out illusions and projections. Recognition of the importance of focused attentiveness is common to most spiritual traditions. Christian monks spend long hours in contemplative silence, Hindu yogis focus their minds through breathing and body movements, Sufi dancers invoke unity with the divine, Tibetans chant sutras. By whatever name—mindfulness, meditation, prayer, zazen, contemplation—a process of quieting the mind and attending to the unadorned particularities of the world has been deemed an essential component of human spiritual endeavor across cultures, languages, continents, and time.

Buddhist scholar Nyanaponika Thera, in *The Heart of Bud-*

dhist Meditation, notes that mindfulness begins with a "taking notice," a "turning toward" an object (or, one could extrapolate—a bird, a flower, a dragonfly . . .). Thich Nhat Hanh declared that "mindfulness is the foundation of a happy life" and that practicing it helps us "become a real person." Poet (and contributor to this volume) Jane Hirshfield has noted that "in a state of open mindfulness, a broad subliminal attention is going out in many directions at once." In short, mindfulness represents the mind on full alert, open to sensation and stimuli, eager to engage. Recently, psychologists have developed a keen interest in mindfulness due to its role in helping people maintain psychic balance and health. Shinzen Young, a Buddhist teacher, asserts that mindfulness training leads to greater clarity and equanimity, which he suggests are analogous to strength and flexibility in physical fitness training. In the last few years a professional literature on mindfulness has sprouted. The gist of these articles, largely buried in technical psychology journals, is that mindfulness revolves around openness to present-moment experiences. Such openness, say the psychologists, leads to acceptance and nonjudgment. As Buddhist teachers have long taught, enlightenment derives from full awareness of each present moment.

Natural history and mindfulness are two surfaces of the same leaf, a seamless merging of attentiveness outward and inward, toward the interwoven realms of nature and psyche. For some people, the window is clearer looking outward; for others, it's easier to look within. But regardless of what is being attended, the practice of mindful attention is very much the same, and the two practices are fully complementary. That Gautama, the historical Buddha, had his original moment of awakening while seated under a tree is probably not coincidental.

Mindfulness practices of all traditions share three char-

acteristics: a commitment to developing the capacity to pay attention; an object or ally to pay attention to (typically, one's breath); and a focus on in-the-body rather than out-of-body experience. The first notion—developing skill at paying attention—is fully concordant with any definition of natural history. But some advocates of mindfulness have concentrated on the importance of interior reality, while neglecting that which occurs outside. When considering mindfulness, we should erase the false boundary between inwardly and outwardly directed attention. Jungian psychologist James Hillman has pointed out that "the cut" between "the me" and "the other" is completely arbitrary. (In fact, he asserts that psychology's core issue should be examining the uncertainty of this boundary.) Recognition of the essential permeability of the "self" and larger "ecological self" leads to a sense of unity between mindful practices directed toward the inner and outer landscapes. Hillman concluded that "the most profoundly collective and unconscious self is the natural material world."

As I sit in the forest, legs crossed, attention to my breathing encourages awareness of rhythms inside the boundary of my skin. Noticing grosbeaks sing from the upper branches of pines catalyzes a sense of "a psyche the size of earth" (to use Hillman's phrase). And attentiveness to the melodious song emphasizes the fuzziness of the boundary between inner and outer: Does the sound emanate from the bird's syrinx or as vibrations upon my eardrum? Or is this sensation really about the merging of the two?

Fully developed attentiveness toward the natural world is nothing new. Human ecologist Paul Shepard asserted that the very nature of human consciousness—the way our brains developed capacities for paying attention—is a result of our

keen attentiveness toward predators and prey while evolving from other primates. "Animals," he wrote, "are among the first inhabitants of the mind's eye. They are basic to the development of speech and thought . . . indispensable to our becoming human in the fullest sense." Millennia before "mindfulness" or "natural history" emerged as concepts, our human ancestors paid close heed to interior and exterior worlds and the ways they interpenetrated.

Why does attentiveness to nature matter? In a very fundamental sense, we *are* what we pay attention to. Paying heed to beauty, grace, and everyday miracles promotes a sense of possibility and coherence that runs deeper and truer than the often illusory commercial, social "realities" advanced by mainstream contemporary culture. Even awareness of the grimmer sides of nature (predation, death, decay), when witnessed in ecological context, illuminates the essence and poignancy of human potential.

Our attention is precious, and what we choose to focus it on has enormous consequences. What we choose to look at, to listen to—these choices change the world. As Thich Nhat Hanh has pointed out, we *become* the bad television programs that we watch. A society that expends its energies tracking the latest doings of the current celebrity couple is fundamentally distinct from one that watches for the first arriving spring migrant birds, or takes a weekend to check out insects in a mountain stream, or looks inside flowers to admire the marvelous ingenuities involved in pollination. The former tends to drag culture down to its lowest commonalities; the latter can lift us up in a sense of unity with all life.

John Tarrant, a Zen Buddhist teacher and psychologist, noted that "attention is the most basic form of love"—a form

of blessing. Nicolas Malebranche, a French philosopher in the seventeenth and eighteenth centuries, said that "attentiveness is the natural prayer of the soul." And, indeed, my own observation over three decades of teaching natural history is that it routinely has a centering, uplifting effect on people. Among the attributes I've noticed in those who are attentive to nature are a greater sense of humility, affirmation, hope, and gratitude. At the end of a natural history outing, jaws often ache from smiling—there's so much joy, so much laughter. Who among us can't stand some of this tonic? Paying careful attention to life is, unsurprisingly, life-affirming. Natural history tends to lead to an expanded sense of a naturalist's own humanity.

Natural history is the oldest continuous human tradition. Throughout history attentiveness to nature was so completely entwined with daily life and survival that it was never considered as a practice separate from life itself. In modern life, though, most people have become distanced from the kind of direct interaction with other patterns and processes of life and other living beings—other presences—that was formerly taken for granted. Simply put, there has never been a moment in the story of human existence when natural history was practiced so little.

Our current lack of consideration of what poet W. S. Merwin refers to as "the unrepeatable world"—the massive, unique creation we know as nature—reveals a fundamental hubris in modern life. This lack of attentiveness to nature correlates with a plethora of social, cultural, and environmental maladies: widespread depression, violence, and pollution. Why is there a correlation? Because attentiveness to the more expansive consciousness of "nature" inherently promotes humility and questioning; the lack of it can promote smugness.

Yet alienation from nature is becoming more widespread.

Attention to nature has been marginalized in many institutions. A great many universities have replaced teachers of field natural history with molecular biology researchers. In the realm of K–12 education these days, it takes real commitment to devote a single week out of thirteen years of schooling to field-based environmental education. Many school systems are cutting out even simple field trips, in part due to concerns about safety and litigation. In his *Last Child in the Woods*, Richard Louv notes that modern society teaches young people to avoid direct experience in nature. He coined the phrase "nature deficit disorder" to describe the resulting syndrome of dysfunction. Recent behavioral research makes clear that decreases in direct interactions with nature correlate closely with more indoor sedentary recreation involving electronic media (an increase in "videophilia"). Other recent research verifies that the sense of psychological well-being among urban dwellers reflects the degree of biological diversity they encounter—people simply feel better when surrounded by a diversity of plants and animals.

Even indoor sedentary connection to the natural world is being systematically eliminated. Recently the editors of the *Oxford Junior Encyclopedia* announced that they were removing a great many nature words (buttercup, acorn, fern, wren, and the like) and replacing them with currently fashionable words from technology (broadband, voice mail, database, and so on). So in the lexicon of young people, BlackBerry the electronic gadget replaces blackberry the luscious fruit. With what language will these people discover and express their innate affinity for the rest of creation—that fundamental human tendency that E. O. Wilson termed "biophilia"?

But the simple, elegant practice of natural history—which every person is wired to do, and which costs almost nothing—helps us fall in love outwardly with the world. Natural history

attentiveness was the source of the earliest human literature—stories of the day's hunt vigorously acted out around campfires—and our first art, whether the cave paintings at Lascaux or petroglyphs chiseled into the desert-varnished sandstone canyons of the Colorado Plateau. As Joseph Campbell, among others, pointed out, we owe the very forms of our bodies and the structures of our minds to the natural history–infused lifeways of our Paleolithic forebears. Prioritizing a reconnection with such fundamental elements of our original mind—paying attention to the larger forces we are a part of—will be crucial to finding a pathway toward environmental sustainability and interpersonal sanity.

If the predilection toward natural history is so fundamentally innate to *Homo sapiens*, why have we strayed so far from it? Have modern humans simply outgrown the need for outwardly directed attentiveness? And what of those people in crowded cities or in poorer, less developed parts of the world? Is natural history simply a luxury, an artifact of a privileged colonial mindset?

Is it more challenging to find "nature" to attend in big cities? Often, yes—but far from impossible. For one thing, "vacant lot" is one of the greatest of urban misnomers—for even small open spaces in cities harbor patches of wildness well worth examining. Tiny flowers emerge from cracked pavement; butterflies come sip their nectar. Curbside trees green up in spring; insects hatch from tiny eggs hidden in crevices along the branches; birds soon descend to forage in this reborn biological exuberance. Moreover, many great cities have parks and other green spaces that can concentrate wildlife. New York's Central Park and Boston's Mount Auburn Cemetery, to cite just two exam-

ples, are famously spectacular sites to witness the spring songbird migration.

There is no reason to believe that poverty-stricken regions of the globe are less inclined to engage in natural history, for there is no direct relationship between economic hardship and lack of interest in the natural world. In fact, often the opposite is true: Campesinos living close to the bone often live close to the land. Indeed, many peasants, fisher folk, and forest dwellers still actively utilize their natural history field skills to supplement their kitchens and their medicine shelves with wild plants and animals. Some of the best naturalists I've ever met have been people living off the bottom end of any economic development concept of poverty, whether indigenous hunter-gatherers along desert seacoasts of Mexico, sheepherders high in the Andes, or homesteaders in Pacific Northwest river valleys.

Paying attention to the more-than-human world can be irrelevant only to the extent that clarity of mind and connection with and understanding of greater forces are no longer relevant, to the extent that humility and joy no longer serve the human spirit. Marginalized peoples, whether in sprawling cities or desolate backcountry, need the psychological gifts provided by mindful natural history as much as, if not more than, any academic, museum-going sophisticate.

Natural history is not a privilege, but a right—a fundamental capacity and need of all people. And because its practice requires no fancy tools or technology, it is easily available. Indeed, one of the causes of its demise in many institutional settings—not least academia—is that little money need be exchanged for natural history to be fostered. We don't need gas chromatographs, mass spectrometers, fancy laboratories. We can do this work with our bare hands.

Natural history mindfulness offers many gifts—glimpses of wholeness, connection, and beauty that continue to teach, inspire, and heal for many years.

Along the Escalante River, scarlet flowers bloom on copper-sand terraces under cottonwoods and box elders, while black-headed grosbeaks sing their long, up-and-down song from hidden branches. Pausing to peer through a hand lens into the tubular cathedral of a *Penstemon* flower, I'm startled by the remarkable array of golden hairs, and the precise seam in each anther, about to burst with pollen.

In the Cascades, five-hundred-year-old Douglas-firs reach into the clouds, which dump silent, steady rain. Higher up, the smell of soil just emerging from a nine-month winter, yellow glacier lilies blooming right at the snowmelt edge, anxious for the fleeting summer to begin. The sharp whistle of a marmot piercing the stillness, then the wind bringing chill.

In the Sea of Cortez, I'm roused each time I step inside an open boat, for I know that one-third of the world's whale and dolphin species lunge through these food-rich waters, and the richest concentration of seabirds south of Alaska clusters on sea cliffs. The pulse of possibilities: gatherings of fin whales heaving their immense bodies through dense schools of plankton; Craveri's murrelet, one of the least-known birds in North America, silently slicing glassy waters; tropicbirds swirling above their northernmost breeding colony. And—just once—the utterly humbling, transfixing experience of being escorted for several hours by a pod of orcas. Gazing eye to eye as they plunged sideways beneath us, their mouths large enough to swallow our stern, the males' dorsal fins projecting above our heads. A sense of menace that transmuted, through shared moments at the surface of the sea, into communion.

Or watching, say, a flock of five hundred Western sandpipers on a Mexican mudflat, knowing they are about to lift into flight—as if a single organism, flashing white, dark, then light again, as they abruptly shift directions—and then wing their bodies, smaller than my fist, to tundra flats north of the Bering Straits.

And these hummingbirds in front of my eyes, signaling with the full force of their fierce, dense energies, that life is not to be lived partway. That every single moment must be a blur of feathers, a deep suck of nectar.

Natural history renews us as it scrubs clean our vision of the world. We need it to counter despair—there *is* durable beauty in this world. And we need it as an essential guidepost as we retrack our collective behavior toward more harmonious ways.

In the pages you hold, twenty-two voices—women and men, poets and scientists, musicians and teachers—declare how paying attention has changed their lives, and how it can change the world. You'll hear how attentiveness to inner/outer nature has made their lives less boring and more fun. How it has made them better thinkers, better neighbors, more fully alive. How it has encouraged humility and insight, protected their sanity and even their lives.

Enjoy their stories. Celebrate this bountiful beauty. Then step outside. What will you witness, this next moment?

JOHN TALLMADGE

Crazy about Nature

Like Thoreau, I wish to speak a word for nature, for natural history and the amateur tradition in particular. An amateur is led by the nose, or by the spirit, toward and into something that he or she comes to love. It is not a matter of schooling, or professional advancement or the usual rewards of the world. It is not about discipline or method—indeed, there may be a bit of madness in it, something that violates common sense and the admonitions of the rational mind. Why spend all that time, why clutter your brain with so much useless knowledge, why digress so emphatically from the proven and necessary pathways that lead to success with honor? The amateur turns from such questions with a smile. There is no point arguing. One's taste in life, as in food, cannot be disputed. The amateur loves whatever feeds the spirit.

Before there was biology, ecology, the National Science Foundation, there was natural history. Its culture heroes were all amateurs, self-taught mavericks and explorers. Think of Gilbert White, inventor of "parochial history," or his disciple Thoreau, who discovered forest succession while reporting to "a journal

of no very wide circulation." Think of Darwin idling through the university, drinking, hunting, and gambling, flunking first medicine and then law before eventually graduating in divinity while taking elective after elective in botany and geology. When Captain Fitzroy came looking for a naturalist to take on board the *Beagle*, Professor Henslow realized that all his other students had secured positions in their chosen careers; none were available but the feckless Darwin, who eagerly signed on. Think of John Muir, who excelled at mechanical engineering and was offered a partnership after automating the carriage factory where he worked. Had it not been for the accident that left him temporarily blind, we would not have his thousand-mile walk to the gulf, his love affair with Yosemite, or the Sierra Club, not to mention volumes of first-rate nature writing. All of these people were largely self-taught, contrarian in their sensibilities, and more at home in the field than in the library. Their example prompts me to ask how natural history comes to feed the spirit, lighten the heart, and enhance the overall quality of life.

The journey began, for me, on the asphalt pavements and concrete sidewalks of urban New Jersey, where nature was dismally circumscribed by commerce and industry. I grew up there, yearning for the clean water, green woods, and blue skies of rural Connecticut, where we had a family cottage. Each summer I would hear stories about my grandfather, the minister, who had built the cottage and collected butterflies. It was fun to pore over the big old guidebooks with marginal notes in his slender, clerical hand; they reflected a time when the cottage sat in the middle of a meadow, surrounded by wildflowers, before the forest had begun to grow up after World War II. Nearby were other guidebooks to insects, ponds, and minerals; I used to spend hours copying down mysterious, esoteric names—*ana-*

baena, xanthosiderite, basidiomycetes–loving the sound and secrecy of the words, as if they rendered all nature somehow knowable and familiar. It was one way to escape the depressing prospect of winter in the city, with its school and church and blighted landscapes. The lake seemed such a rich and powerful place, so remote and exotic to an urban kid. Each trip felt like passing through the looking glass into a dream world where anything could happen.

But it was high school biology that turned me toward natural history in a serious way. This was in 1961, before the molecular wars and genetic engineering, and bio still meant dissections, microscopes, drawings on the blackboard, and forced marches through the phyla. Mr. Robertshaw, not long out of college, wore the requisite Cold War suit of navy blue and wing-tip shoes that belied his intense feeling for the organism. His course deepened and illuminated my experiences of nature at the lake. It provided a vocabulary and a framework that would organize and relate them to one another. It also provided tools for observing, collecting, and classifying: insect nets, spreading boards, illustrated keys, forceps, and collecting bottles, plus microscopes, with all their attendant apparatus of slides, stains, eyedroppers, and cover glasses. Thus armed, I began an earnest inventory of all the rocks, minerals, insects, fish, and plants around the lake. Now I knew how to look and what to look for.

Like the early explorers, I felt surrounded by unaccountable wonders and riches. Cigar box after cigar box soon filled with mounted insects cataloged by order (Hymenoptera, Odonata). A big glass jar of pig's feet from the deli held a lump of swamp muck that burst into life when I added water; it was marvelous to observe this miniature in vitro community morph through ecological succession. I loved drawing the transparent organisms that cruised and tumbled across the bright circular field of

the microscope (*Euglena, Cyclops, Vorticella*). It felt like looking deep into nature through the eyes of God.

The physical world came next, through intro geology in college, where a young volcanologist described exciting discoveries along the Mid-Atlantic Ridge. He had worked in Iceland, scrambling over the newest, hottest rocks on the planet and dodging lava bombs during eruptions. Once, trapped on Surtsey, he had barely escaped with his life. It sounded impossibly romantic, much more dramatic than sectioning varved clays or measuring the strike and dip of beds. We learned how continental drift and the emerging theory of plate tectonics could explain places like Surtsey. Results from the International Geophysical Year were just coming in. One day the professor rushed into class waving a journal. "Paleomagnetism!" he shouted. "The IGY data proves we were right about plate tectonics!" The class burst into applause. Here we were, just college students but already standing on tiptoe at the frontiers of knowledge. Education could hardly get any better. And yet this was my last course in anything that could be called natural history.

Ironically, it took the U.S. Army to confirm my naturalist's avocation. Assigned to the Defense Language Institute in Monterey, California, I wandered the Big Sur coast on weekends, spending the evenings reading the poetry of Gary Snyder and Robinson Jeffers. It was not long before I discovered John Muir's and Clarence King's writings on the Sierra, which quickly became the dream destination for every free weekend or seasonal leave. Both Muir and King had exulted in the grand narrative of the range, written in the sublime language of uplift and glaciation, but Muir had also noticed the small things: a fly or a grasshopper on a granite dome, a water ouzel dipping and darting about a rushing stream. For him, everything was connected to everything else. I wanted to be like him, enjoying a hardy

freedom in the open air, surrounded by exuberant wild things and magnificent landscapes, feeling at home everywhere. He was an adventurer, a writer, and a naturalist, self-taught, self-reliant, and living by his wits in the greatest place on earth. What could be better?

I began carrying a copy of Storer and Usinger's *Sierra Nevada Natural History*, which provided a comprehensive and ecologically organized guide to what I was seeing on the ground. It was an education between covers, a pocket manual to being John Muir. Here was the beginning of a lifelong practice of becoming native: learning to weave the stories in the land together with your own story—human, natural, and personal history all bound up together.

I came back from California and resumed grad school in literature convinced that nature writing ought to be studied and taught. No one was aware of what we now call "creative nonfiction" and "ecocriticism," and very few lit profs had ever thought of taking their students into the field, let alone into the wilderness, so that they could experience for themselves the power of place that had inspired writers like Jeffers and Muir. My literary friends were suspicious of science in any form and treated their own ignorance as a privilege, while my scientist friends thought nature writing had too much mushy subjectivity. Neither side seemed to recall that natural history had emerged as both field-based observational science and a literary genre—not a hybrid, but an original synthesis.

In an age enamored of exact science and poststructural semiotics, this primeval linkage was bound to arouse suspicion. To the scientists it removed the comforting, hygienic allure of numbers and formulas, which promise a kind of security. Observation, so crucial for naturalists and explorers, seems less reliable than controlled experiment. In science, as in the courts

of law, eyewitness testimony can so easily be cast into doubt. And narrative, with its inherent bias of speaker and point of view, can be accused of distortion or subjectivity. On the other side, natural history's emphasis on direct observation, telling details, and objective reality resists the tendency to see everything as some sort of "text" that has been socially constructed and therefore has no essential meaning, or even being, apart from the "play of difference" among arbitrary signs.

Despite all the sound and fury of these debates, story remains both the oldest and the most pervasive technology that humans have devised for constructing, preserving and transmitting knowledge. And natural history is as much story as nature. That's why it connects so readily to the humanities, with their critical inquiry into values, images, or beliefs; to the arts, with their expressive powers; and to mythology and religion, with their sacred places, magical realism, and impulse to link moral and cosmological truth. The literature of nature and exploration fascinated me because it drew deep truths from real experience. Charles Darwin's narrative of the *Beagle* voyage depicted a man coming into his vocation. John Muir's first summer in the Sierra was a story of conversion. Aldo Leopold's shack sketches revealed how he and his family had found, in restoring a worn-out farm, their meat from God. These teachers had all found in the practice of natural history both a calling and a mission. It centered them emotionally, intellectually, spiritually, and professionally. They exemplified, for me, the ideal of a whole and balanced life.

But realizing one's vocation and finding a position may only be mileposts along the way. Some are born wanderers, some choose to wander, and some have wandering thrust upon them, especially in academe. I was thrust first into Utah and the Great Basin, then to the prairies of Minnesota, and eventually into the

Ohio Valley. It was easy at first, leaping upon the mountains or exploring the desert mazes where Anasazi had dwelt, glorying in the epic story of geologic time just as I had in the Sierra. But moving to Minnesota proved a much greater challenge. There was not much poetry or nature writing to guide me, and for a lover of mountains, the prairie held little scenic appeal. Look toward the horizon, and all you might see would be a solitary bur oak, a silo, or a feed mixer that looked like some kind of lunar module.

It took several cycles of seasonal change to reveal the landscape's hidden dimensions: innumerable spring wildflowers blooming from winter-bleached grass, or immense rivers of migrating birds that filled every shallow depression in April fields with hungry song. You had to stay put to notice things like that. You had to enlarge your sense of place to include both time and distance, as well as biota that moved across continents. Where was home to a migrating goose? I might have a wintry image of Minnesota, all ice crystal and northern lights, but the goose would see it only as sweet, soft mud, waste corn, and a million tiny ponds scattered like rose petals along its flight path to Manitoba. These ancient, recurring cycles defined the character of the landscape as indelibly as its low-relief hummocky terrain. The prairie was truly a fusion of geological and biological time. I began to wonder if migration might offer a paradigm for coping with the rootlessness of professional life.

Meanwhile, up north the Boundary Waters offered another kind of natural history lesson. Canoeing through the mazes of lakes proved more intimate, intricate, and challenging than hiking in the mountains. There, if you got lost or disoriented, you could always navigate by streams, landforms, and elevation, eventually making your way out to a road. But the Boundary Waters had no commanding summits, drainages, or other obvi-

ous landmarks, and you could not walk out across country. Without a map, you'd be utterly lost. Travel by canoe meant being immersed in the land, nose to nose with its plants and creatures; you were embedded, absorbed, with no aesthetic distance. The landscape was as much felt, heard, or smelled as seen. It was difficult to capture on film. The scenery was not self-composing, as in the mountains, and you had to resort to visual circumlocution to evoke some of the most characteristic features, such as the whine of mosquitoes or the taste of blueberries.

In the Boundary Waters I learned natural history mainly from rangers and scientists who worked directly in the field. They had learned how much of the place's character depended on what could not be seen with the naked eye, either because it was a matter of ecological relationships, food webs and the like, or because it involved processes that transpired across a time frame that exceeded a person's memory.

Ecologists had realized the crucial role of fire in the Boundary Waters, where "dry lightning" will ignite a given area once every hundred years under average conditions. Since that period is longer than a human life, you can't "see" the fire cycle, but every species that lives in these northern forests must adapt to its curve. Hence, white cedars grow along lakeshores; white and red pines grow tall and lay on thick insulating bark; aspens send up clones from underground roots; and jack pines, which need bare soil to sprout, keep their cones sealed up until a fire comes through and burns them open, releasing tiny winged seeds. Each of these adaptations can easily be observed, but to link them together with the fire cycle requires an act of imagination, a facility of "seeing the unseen." To study the Boundary Waters from the bow of a canoe was not only to cultivate the virtues of intimacy, patience, and attentiveness, but also to learn

the importance of intangible and invisible things. So much of the quality of our lives depends on relationships, which can't be weighed, measured, quantified, or even directly observed. We use stories to make them visible.

By now, my own story was becoming clearer and clearer, at least with respect to natural history. The next move took the family to Cincinnati, where, amazingly, I found more wildness and profusion of life than ever before. Admittedly, Cincinnati, and the Rust Belt in general, were never high on my list. What did they have to offer a wilderness guy? Plus, the move was professionally traumatic: I had lost my bid for tenure and gone over to the dark side by accepting a deanship at a university for adult learners. What's more, I had just gotten married and we had a baby on the way. Life comes at you fast. But, as I learned, it also comes *to* you. Moving to the city, which had always seemed incompatible with nature and wilderness, actually opened a whole new realm of natural history.

The Zen master Shunryu Suzuki wrote, "In the beginner's mind there are many possibilities; in the expert's mind there are few." Becoming a parent gives you intense, invaluable training in beginner's mind. I'm not talking just about labor, diapers, and sleepless nights, although these do factor in. I'm talking about waking up to the world. For young kids, everything is new and vivid, glowing with mystery. To step out the front door is to land on an unknown continent. If you want to keep up with them, you have to slow down. Being smaller, they are closer to the earth, and they notice *everything*: the dove feather caught in a sidewalk crack, the gumball pecked by warblers, the bird's-nest fungi, small as peas, growing in the mulch at the foot of a Norway spruce. Once attuned to the near-at-hand, I noticed more colorful distractions: the twenty-four species of birds that showed up within two blocks of our house, the fireflies rising

into the treetops on hot July nights, the deer and possums sauntering through, nibbling jewelweed and hostas. For a wilderness expert, these encounters with urban nature were both exhilarating and troubling. I had never imagined that there was so much going on, nor how much it would force me to rethink cherished environmental ideas.

When you stay in one place, you begin to notice patterns and processes, such as ecological succession; you start thinking of wilderness in terms of time instead of space. You begin to sense how the place where you are is connected to larger dimensions and arrays, such as the bioregion, the continent, or even the biosphere itself. All this leads to a more complex and expansive sense of ecological identity and a practice of natural history that is at once more personal and more nuanced. For example, the Cincinnati biota manifests a diverse array of alien and native species, which have begun to co-adapt in interesting ways. Take the Amur honeysuckle, a notorious invasive imported to stabilize road cuts and reclaimed strip mines. It loves our degraded, calcareous soils and unstable hillsides but also woody edges, where it chokes out native shrubs, wildflowers, and saplings. Much sound and fury, along with buckets of sweat, are spent trying to extirpate it from our parks, to little avail. Yet now I hear from a biologist friend that at his university, where the playing fields are all edged with honeysuckle, the woodcock have been nesting in the thickets and coming out at dawn to do their sky dance before the players stagger out of bed. This arrangement of native and alien species seems to be working, at least for the woodcock, who benefit from the humans who disturbed the land to create both the grassy clearing and the edge that favors the honeysuckle that creates thickets perfect for sheltering their nests.

Now, after twenty years, I still live in Cincinnati and practice

natural history as both a sojourner and a traveler, exploring the neighborhood and visiting more remote and exotic places, some new, and some familiar from past trips. Everything knits together and converges. There are even times when I feel the exhilaration of a Humboldt or a Darwin, realizing how distant places are connected by similar processes or stories. Tennyson's Ulysses declared, "I am a part of all that I have met," but the reverse seems equally true: Every place I have lived has become a part of me. Practicing natural history, even as an amateur, has deepened all those connections. It helps one become native to a place, so that wherever you are set down, there you can orient yourself and begin to live. It is comforting, too, to discover familiar organisms in distant places, like John Muir finding a water ouzel in the icy fastnesses of Glacier Bay, when he was cold and hungry and down on his luck. Maybe this is why I always wander around the edges of motels or rest areas, checking the weeds and flowers. It helps to take your bearings. And in time, you realize that every place you have lived and worked is one of your homes and that you can always go back, circling like a migratory bird. In this way, home begins to feel less like the Ohio Valley, the Great Basin, or the Boundary Waters, and more like the continent itself, North America, Turtle Island.

Time washes over, under, around, and through a place like this, not just at personal or ecological scales, but also with geological grandeur. Walk down any Cincinnati ravine and you will find slabs of upturned Ordovician limestone knobby with fossil brachiopods (*Rafinesquina*, *Herbertella*); this land was their land a mere 450 million years ago. Or take the Ohio River, a very young stream whose present course more or less follows the front of the Pleistocene ice sheets that pushed down from Canada, damming the streams flowing north from the Kentucky

mountains. Notice, too, how the river's arc also follows the contoured edge of the climate zone, which in turn follows the average path of the jet stream. Twelve thousand years ago, there were no alien species in Cincinnati, and no native species either, because the land was covered by six hundred feet of ice. If you live in one place and pay attention, a sense of deep time begins to form.

Both continental citizenship and a deep sense of the past are necessary, I believe, for a sustainable civilization. Imagining a deep past makes it possible to imagine a deep future, which is the ground of hope. Even in the damaged and degraded landscapes where most of us live, in old Rust Belt cities like mine, we can see healing processes at work, the woods undergoing succession, the animals starting to return. Paying attention to these processes is indeed precious, for it lightens our hearts and opens our minds. Knowledge is value; the more we understand the living world around us, the more curiosity and delight we experience, and the more alive we feel. "Nature deficit disorder" is not just for kids; it can afflict us at any age. Two million years of evolution have exquisitely tuned us to respond to the living world, upon which our ancestors had to depend for everything. Biophilia may be no more than a survival adaptation, but how forcefully it compels us. Just watch how your kids react whenever they spy an animal.

I love natural history because it helps me live in the present. It's good for society because it fosters sustainability, it's good for kids because it connects them to place and opens their eyes; it's good for me because it helps me become native in a nomadic professional life. The sense of wonder is as liberating as it was for Coleridge's Ancient Mariner, who forgot his misery when he looked at beautiful sea creatures and was suddenly able to pray.

The albatross fell from his neck. In the end natural history is good for the soul. It gives me delight and makes me feel at home. And it makes me want to share the gifts, sometimes even to the point of tedium. I can't forget my daughter taking aside a friend who had come over to play. "Be careful," she warned. "My dad is crazy about nature!"

Noctambulism

Late last March, snow settled unexpectedly across England, taking the country by surprise. Spring had arrived a week previously: Black buds had popped green on the ash trees. But then the winds swung round to northerly, the temperature sank, and winter made its comeback. Trucks moved patiently over the roads, whirring out fans of salt and stone. Children created an ice-slide on a quiet road near my house, and queued up in jostling lines, polishing the ice to the consistency of milk-bottle glass. A friend wrote from his home in Hope Valley in the Peak District to say he had spent two days out tracking Arctic hares there. He spoke of big beluga drifts of snow, and of the hares, still in their white fur, moving unhurriedly between them.

The story of the hares set me thinking, and the falling snow set me dreaming, as it always does. I decided that I would travel up to the Lake District, and go for a long night-walk in the Cumbrian mountains. Winter is the best time to night-walk, you see, because snow perpetuates the effect of moonlight, which means that on a clear night, in winter hills, you can see for a distance of up to thirty miles or so. I know this because I have seen that

far several times before. Several, but not many, because in order to go night-walking in winter mountains, you require the following rare combination of circumstances: a full moon, a hard frost, a clear sky, and a willingness to get frozen to your core.

Night-walking—a.k.a. noctambulism. Noctambulism is usually taken to mean sleepwalking. But this is inaccurate: It smudges the word into somnambulism. Noctambulism means walking at night, and you are therefore etymologically permitted to do it asleep or awake. Generally, people noctambulize because they are in search of melancholy, or rather a particular type of imaginative melancholy. Franz Kafka wrote of feeling like a ghost among men—"weightless, boneless, bodiless"—when he walked at night.

I have found another reason for being out at night, however, and that is the wildness which the dark confers on even a mundane landscape. Sailors speak of the uncanny beauty of seeing a well-known country from the sea, the way that such a perspective can make the homeliest coastline seem strange. Something similar happens to a landscape in darkness. Coleridge once compared walking at night in his part of the Lake District to a newly blind man feeling the face of a child: the same loving attention, the same deduction by form and shape, the same familiar unfamiliarity. At night, new orders of connection assert themselves: sonic, olfactory, tactile. The sensorium is transformed. Associations swarm out of the darkness. You become even more aware of landscape as a medley of effects, a mingling of geology, memory, movement, life. New kinds of attention are demanded of you, as walker, as human. The landforms remain, but they exist as presences: inferred, less substantial, more powerful. You inhabit a new topology. Out at night, you understand that wildness is not only a permanent property of land—that it is also a quality that can settle on a place with a snowfall, or with the close of day.

Over the past two centuries in particular, however, we have learned how to deplete darkness. *Homo sapiens* evolved as a diurnal species, adapted to excel in sunlit conditions, and ill-equipped to maneuver at night. For this reason, among others, we have developed elaborate ways of lighting our lives, of neutralizing the claims of darkness upon us, and of thwarting the circadian rhythm. The extent of artificial lighting in the modernized regions of the Earth is now so great that it produces a super-flux of illumination easily visible from space. This light, inefficiently directed, escapes upward before being scattered by small particles in the air—such as water droplets and dust—into a generalized photonic haze known as sky glow. If you look at a satellite image of Europe taken on a cloudless night, you will see a lustrous continent. Italy is a sequined boot. Spain is trimmed with coastal light, and its interior sparkles like a rink. Britain burns brightest of all. The only significant areas of unlit land are at the desert margins of the continent: the northern stretches of the Sahara, and the ruined terrain around the Aral Sea, where water has surrendered to sand.

The stars cannot compete with this terrestrial glare and are often invisible, even on cloudless nights. Cities exist in a permanent sodium twilight. Towns stain their skies orange. The release of this light also disrupts long-established natural rhythms. Migrating birds collide with illuminated buildings, thinking them to be daytime sky. The leaf-fall and flowering patterns of trees—reflexes that are controlled by perceptions of day length—are disrupted. Glowworm numbers are declining because their pilot lights, the means by which they attract mates, are no longer bright enough to be visible at night.

By the time I reached the mountains, it was late afternoon. The snow line was regular at a thousand feet, dividing the world into

gray and white, lower and upper. It was clear from the mood of the sky that another big fall was coming. Dark clouds had started to hood the Earth from the east, and the brown burnt light of imminent snow was tinting the air. Scatters of thin sleet were falling. My cheeks and nose fizzed with the cold.

The path to the upper ground switchbacked from the lakeshore through tall oak woods. Old coarse snow lay in rows between the trees, and in rings around their bases. Where I brushed against branches and leaves, snow spilled onto me like sugar. I met three other people, all of whom were descending. On each occasion we spoke briefly, acknowledged the extraordinariness of the land in this weather, and went our ways.

After half an hour, I reached the wide corrie that holds Bleaberry Tarn, and behind which rises the line of peaks that includes Red Pike, High Stile, and High Crag. Looking to my east and north, all I could see were white mountains. Distant snowfields, on mountains whose names I did not know, gave off bright concussions of late light. The wind was cold, and blowing into me. It was already so strong that I had to lean into it at a five-degree vaudeville tilt.

By the time I got to the ridge, at over two thousand feet, the snow had thickened to a blizzard. Visibility was no more than a few meters. The white land had folded into the white sky, and it was becoming hard even to stand up in the wind. I would need to find somewhere to sleep out the worst of the storm, so I cast about for sheltered flat ground, but could see none.

Then I came across a tiny tarn, roughly circular in shape, perhaps ten yards in diameter, pooled between two small crags, and seemingly frozen solid. The tarn ice was the milky gray-white color of cataracts, and rough and dented in texture. I padded out to its center, and jumped gently a couple of times. It did not creak. I wondered where the fish were. The tarn was, if not

a good place to wait out the storm, at least the best place on offer. It was flat, and the two crags gave some shelter from the wind. My sleeping bag and bivouac bag would keep me warm enough. And I liked the thought of sleeping there on the ice: It would be like falling asleep on a silver shield, or a lens. I hoped that when I woke, the weather would have cleared enough for some night-walking.

The blizzard blew for two hours. I lay low, got cold, watched the red reeds that poked up from the ice flicker in the wind. Hail fell in different shapes, first like pills, then in a long shower of rugged spheres, the size of peppercorns. Over half an hour, the hail turned to snow, which had the texture of salt and fell hissing onto the ice. I had begun to feel cold, deep down, as though ice were forming inside me, floes of it cruising my core, pressure ridges riding up through my arms and legs, white sheaths forming around my bones.

I must have slept, though, for some hours later I woke to find that the snow had stopped and the cloud cover had thinned away, and a late-winter moon was visible above the mountains: just a little off full, with a hangnail missing on the right side, and stars swarming round it. I got up, and did a little dance on the tarn, partly to get warm, and partly because if I looked backward over my shoulder while I danced, I could see my moon-shadow jigging with me on the snow.

I had woken into a metal world. The smooth unflawed slopes of snow on the mountains across the valley were iron. The deeper moon-shadows had a tinge of steel blue. Otherwise, there was no true color. Everything was grays, black, sharp silver-white. Tilted sheets of ice on the ridge gleamed like tin in the moonlight. The hailstones lay about like shot or ball bearings, millions of them, grouped up against each rock and nested in snow-hollows. The air smelled of minerals and frost. Where

I had been lying on the tarn, the ice had melted, so that there was a shallow indent, shaped like a sarcophagus, shadowed out by the moonlight.

To the south, the mountain ridge curved gently round for two miles. It was as narrow as a pavement at times, at others as wide as a road, with three craggy butte summits in its course. To the east and west, the steep-sided valleys, unreachable by the moonlight, were in such deep black shadow that the mountains seemed footless in the world.

I began walking the ridge. The windless cold burned the edges of my face. These were the only sounds I could hear: the swish of my breathing, the crunch my foot made when it broke through a crust of hard snow, and the woodlike groans of ice sinking as I stepped down on it. I passed an ice dune that was as smooth and glassy as the sill of a weir. My shadow fell for yards behind me. Once, stopping on a crag-top, I watched two stars fall in near-parallel down the long black slope of the sky.

When I came to a big frozen pool of water, I took a sharp stone and cut a cone-shaped hole in the white ice where it seemed thinnest. Dark water glugged up into the hole, and I knelt and dipped my mouth to the ice, and drank. I caught up a handful of snow, and patted and shaped it in my hands as I walked, so that it shrank and hardened into a little white stone of ice.

Where the ground steepened, I moved from rock to rock to gain purchase. On the thinner sections I walked out to the east so I could look along the cornice line, which was fine and delicate and proceeded in a supple curve along the ridge-edge and over the moon trench, as if it had been engineered.

Several small clouds drifted through the sky. When one of them passed before the moon, the world's filter changed. First my hands were silver and the ground was black. Then my hands

were black and the ground silver. So we switched, as I walked, from negative to positive to negative, as the clouds passed before the moon.

To be out by night in a forest, by a river, on a moor, in a field, or even in a city garden is to know it differently. Color seems absent, and you are obliged to judge distance and appearance by shade and tone: Night sight requires an attentiveness and a care of address undemanded by sunlight.

And attention—care of address—is a moral refocusing as well as a physical one. The novelist Iris Murdoch knew this. She wrote repeatedly and brilliantly about the idea of "attention," a concept on which she based her moral philosophy. "Attention," Murdoch proposed, is an especially vigilant kind of "looking." When we exercise a care of attention toward a person, we note their gestures, their tones of voice, their facial expressions, their turns of phrase and thought. In this way, by interpreting these signs, we proceed an important distance toward understanding the hopes, wishes, and needs of that person. This "attention," Murdoch noted, is the most basic and indispensable form of moral work. It is "effortful," but its rewards are immense; for this attention, she memorably wrote, "teaches us how real things can be looked at and loved without being seized and used, without being appropriated into the greedy organism of the self."

This ideal of "attention," of a compelling particularity of vision, obtains to landscapes as well as to people. It is harder to dispose of anything, or to act selfishly toward it, once one has paid attention to its details. This is an environmentalist's truth, as well as a humanist's. It's for this reason that the most inspiring travelers through wild landscapes—from Samuel Taylor Coleridge to Barry Lopez—have been attentive, in the sense that Iris Murdoch and Simone Weil meant that word, to the terrains through which they have moved. Their imaginations have

responded with gripping exactitude to certain forms of matter (ice, rock, light, sand, moorland, water, air), and to certain arrangements of space (altitude, edges, valleys, ridges, plains, horizons, slopes). Comically, earnestly, lyrically, ecstatically, anecdotally, or beautifully, these travelers have approached their chosen landscapes with an eye to their uniqueness. In so doing, they have primed a space within which those landscapes can be respected—can come to seem less seizable and usable by the greedy human self.

Out walking at night, you become of necessity super-attentive: keenly aware of yourself and your passage through place. But you also find yourself abolished, pummeled exhilaratingly into insignificance by the spaces that surround you. The astonishment of the night-walker has to do with the unconverted and limitless nature of the night sky, which in clear weather is given a depth by the stars that far exceeds the depth given to the diurnal sky by clouds. On a cloudless night, looking upward, you can experience a sudden flipped vertigo, the sensation that your feet might latch off from the Earth and that you might plummet upward into space. Stargazing gives us access to orders of events, and scales of time and space, that are beyond our capacity to imagine: It is unsurprising that dreams of humility and reverence have been directed toward the moon and the stars for as long as human culture has recorded itself.

Our disenchantment of the night through artificial lighting may appear, if it is noticed at all, as a regrettable but eventually trivial side effect of contemporary life. That winter hour, though, up on the summit ridge with the stars falling plainly far above, it seemed to me that our estrangement from the dark might constitute a profound event for our self-perception. We are, as a species, finding it increasingly hard to imagine that we are part of something that is larger than our own capac-

ity. We have come to accept a heresy of aloofness, a humanist belief in human difference, and we suppress wherever possible the checks and balances on us—the reminders that the world is greater than us or that we are contained within it. On almost every front, we have begun a turning away from a felt relationship with the natural world.

The blinding of the stars is only one aspect of this retreat from the real. On many fronts, there has been a prizing away of life from place, an abstraction of experience into different kinds of touchlessness. We experience, as no historical period has before, disembodiment and dematerialization. The almost infinite connectivity of the technological world, for all the benefits that it has brought, has exacted a toll in the coin of contact. We have in many ways forgotten what the world feels like. And as we have done so, many new maladies of the soul have emerged, unhappinesses that are complicated products of the distance we have set between ourselves and the world. We have come increasingly to forget that our minds are shaped by the bodily experience of being in the world—its spaces, textures, sounds, smells, and habits—as well as by genetic traits we inherit and ideologies we absorb. A constant and formidably defining exchange occurs between the physical forms of the world around us and the cast of our inner world of imagination. The feel of a hot dry wind on the face, the smell of distant rain carried as a scent-stream in the air, the touch of a bird's sharp foot on one's outstretched palm: Such encounters shape our beings and our imaginations in ways that are beyond analysis, but also beyond doubt. There is something uncomplicatedly true in the sensation of laying hands on sun-warmed rock, or watching a dense mutating flock of birds, or seeing snow fall irrefutably upon one's upturned palm.

The mountaineer Gaston Rebuffat identified a retreat from

the real as under way fifty years ago, in his memoir *Starlight and Storm*. And Rebuffat knew the real. He had spent his life in mountains by night and by day. He had bivouacked on north faces, in rock niches, in snow holes, and walked and climbed in all weathers and all hours. Starlight and storm, for Rebuffat, were indispensable energies, for they returned to those who moved through them a sense of the world's own forces and processes. "In this modern age, very little remains that is real," he wrote in 1956. "Night has been banished, so have the cold, the wind, and the stars. They have all been neutralized: the rhythm of life itself is obscured. Everything goes so fast, and makes so much noise, and men hurry by without heeding the grass by the roadside, its colour, its smell. . . . But what a strange encounter then is that between man and the high places of his planet! Up there he is surrounded by silence. If there is a slope of snow steep as a glass window, he climbs it, leaving behind him a strange trail."

After an hour's slow walking, I reached the flat-topped final summit of the ridge. Leading off it to the southeast was a steep little ice couloir, only twenty or thirty feet long, curved up at either edge, and sheeny with clear ice. It led down to a saddle and a small lower top. I sat down and heeled my way to the rim of the couloir, then luged down it, using my feet as brakes, striking ice chips with them, and feeling the cold black air crack against my face as I slid, so that it seemed as though I were passing through shattering plates of ice, until I slowed to a halt. Then I cleared some space among the rocks of the outcrop, pitched my tiny tent, and tried to sleep.

Sleep was almost impossible; the cold was so great, and the ground so uncomfortable. Before sunrise I got up, stretched, stamped my feet, and blew into my cupped hands. Then I

walked over to the hard drifts of snow on the eastern side of the outcrop and cut a snow-seat, in which I sat and watched as dawn, polar and silent, broke over the white mountains.

The first sign was a pale blue band, like a strip of fine steel, tight across the eastern horizon. The band began to glow a dull orange. As the light came, a new country shaped itself out of the darkness. The hills stood clear. Webs of long, wisped cirrus clouds, in a loose cross-hatched network, became visible in the sky. Then the sun rose, elliptical at first, and red. I sat and watched that dawn, looking out over a country that was and was not England, with the cold creeping into me, and the white mountains receding into the white sky.

About half an hour later, the sky was a steady tall blue. I stood up, feeling the stiffness of the cold deep inside the joints of my legs, but also the early sunlight warm on my cheeks and fingers, and started to descend the mountain. As I got lower, the land began to free itself from the cold. Wafers of ice snapped underfoot. I could hear meltwater chuckling beneath the hard snow billows. Here and there, yellow tussocks of grass showed through the white. I was walking down out of winter.

Spilling from a black rock wall, I found a waterfall that was only partially frozen: a hard portcullis of ice, beautifully mottled by dark figures of thaw, and water falling behind it and from it. The water's turbulence was surprising and swift after the night-world. I stood for a while watching it, then drank from the stone cistern it had carved out beneath it, and snapped off an icicle to eat as I walked. Near my ledge, I found a gourd-shaped hole in a rock, in which water had gathered and frozen. I pried at the edges of the ice, and found I could lift out the top two inches of ice, revealing clear water beneath. The ice was as thick as the glass of a submarine's window, and I held it to my eyes, and briefly watched the blurred world through it. Then

I drank the sweet cold water beneath it and set off down the mountain, picking my path through the steep uneven ground, toward the fog.

The shoreline forest, as I came back through it, was busy with birdsong. I felt tired, but did not want to sleep. Near the head of the lake, just downstream of a small stone-and-timber bridge, where the river widened, there was a deep pool, glassy and clear, banked by grass.

I sat on the grass for a while and watched light crimp on the water's surface and flex on the stones that cobbled the streambed. I lay flat on the bank, rolled up my sleeve, and reached down to the bottom of the stream, where the water was weaving and unweaving the light, and picked a white stone, hooped once round with blue. I sat on the bank, holding the stone, and tried to list to myself the motions that were at that moment acting upon it: the Earth's 700-miles-per-hour spin around its axis, its 67,000-miles-per-hour orbit about the sun, its slow precessional straightening tilt within inertial space, and, containing all of that, the galaxy's own inestimable movement outward in the deep night of space. I tried to imagine into the stone, as well, the continuous barrage of photons—star photons and moon photons and sun photons—those spinning massless particles that were arriving upon the stone in their trillions, hitting it at 186,000 miles per second, as they were hitting me, and even with the stone still solid in my hand, I felt briefly passed through, made more of gaps than of joins.

I took off my clothes and waded into the water. It felt like cold iron rings were being slid up my legs. Dipping down, I sat in the water up to my neck, huffing to myself with the cold. The current pushed gently at my back. I listened to the whistles and calls of a farmer and saw sheep streaming like snow across the tilted green fields on the lake's far shore. In an eddy pool a few

yards downstream, between two dark boulders, the curved rims of sunken plates of ice showed themselves above the surface. The sun was now full in the eastern sky, and in the west was the ghost of the moon, so that they lay opposed to each other above the white mountains: the sun burning orange, the moon its cold copy.

Perceiving a World of Relations

Stand at the edge of the marsh and listen to the choral uproar of the frogs . . . surrender to their shouting and allow yourself, too, like those pine needles and that deer hair, to be refashioned into the shape and the pattern and the rhythm of the land.

—RICK BASS

I started picking up trash on the coast of Maine in the spring of 1993. It was the year my mother died, leaving a beach house to the care of my sisters and me. Picking up garbage in a place she loved was good for my grief.

On a warm afternoon in early May, I paddled into the Sprague River marsh to collect garbage that had floated in over the winter. There wasn't much. The stern hatch was far from full that first spring.

Picking garbage out of the marsh became an annual spring ritual. I recorded my collection over the first four or five years, noting the increase and wondering where it came from. It didn't take long to see that it was coming from beachgoers and fishermen alike. Empty quarts of engine oil showed up in equal measure to beach balls and plastic shovels.

Sixteen years later, I gather garbage during the fall and win-

ter, and just about every time I wander into the marsh I find endless pieces of plastic. Oil cans and oil jugs are less common, but plastic bottles and bags are ubiquitous. It is too much to catalog.

I now know where all that tidal trash comes from. My mind shifts to the streams and rivers I have come to know, the patterns of land use in this watershed, the flows of stormwater through the estuary and the impact on all life downstream. At the end of the line, I see plastic strewn in the wrack line, wrapped up with seaweed and salt marsh hay.

The fact of my mind wandering through the watershed is no coincidence. I've schooled myself on the imagery of water and relatedness for years. My attention has been focused on patterns, tides, lunar cycles, and what happens to water bodies when it rains.

I'm a visual scientist by training. My focus on relatedness began with the accumulating data indicating that attention has the power to alter the way we process visual information—and hence how and what we habitually see. With attention activated, so went the argument, connections between simultaneously firing neurons are strengthened. Those that become well connected are like well-worn paths—easily accessed and easily traveled. The neural paths themselves depend on where we have been looking and whether we were truly attending.

After teaching ecopsychology for a decade, I wanted to see more of the relatedness of the world. I was weary of our common focus on objects, and the relentless pressure to buy more things. I had come to the conclusion that our environmental crisis, the fact of living in a world of loss, is ultimately a crisis of perception. I am now as certain as ever: Unless we commonly perceive the interdependent reality within which we are all embedded, we will never get ourselves out of the ecological mess we are in.

I began my practice by attending to contrast. I looked for edges and counted series of things like fence posts and windows. Soon these edges led my eye into patterns like ripples and leaves. Branching patterns began to bounce into view, so I looked for metaphors and evidence, like flocks of birds pointing to schools of fish, or forest composition revealing land use history. I studied phenomena like the "edge effect" and the movement of constellations across desert skies. I watched for the precise moment when the high tide began to ebb, signaling an otherwise invisible relationship between sun and moon.

Contrary to our Western notion that seeing is the obvious outcome of opening our eyes, this way of seeing is intentional and relational. In this case, the relationship is between the viewer and the viewed, but so too, the "thing seen" informs us of relatedness—of how things are similar, endlessly connected, and interdependent. In such a field of dense relations, receptivity—requiring our sincere engagement, as if opening long-clenched hands—is critical. For Goethe, seeing well required even more than being especially receptive. He began by "plunging into seeing." His practice included actively searching for patterns, qualities, and "exalted perceptual experiences." It was rigorous and curious. According to historian Theodore Roszak, "his eye for form and color was almost voluptuous; it caressed what it studied and felt its way in deep."

With the senses engaged like this, our attention is committed and cast outward. Colors become especially vibrant, and new forms jump into view, capturing still more of our attention. We forget ourselves, and habitual thoughts dissipate as if left behind in a fog. With my attention cast out over the salt marsh, I became spellbound by the daily high tide and fascinated by moving edges, by changing blues, greens, and light

on water, and by the saturation of a wetland. As I watched the tides change over many monthly cycles, I began to sense great gravitational bodies tugging at one another. I, too, was tugged and began to feel slow pulses with the turning of the tides.

Having taught vision improvement in the 1980s, and having observed a significant number of people change their visual acuity by doing simple eye exercises, I was eager to try out this more qualitative form of practice with others. In the fall of 2001, a dozen students signed up for a course titled Ecological Perception and then followed me into the Arizona backcountry. Our intention was to immerse ourselves in natural landscapes for several weeks and to become skillful perceivers of patterns, metaphors, and the quality of our sensory relationships with the nonhuman world. Our first camp was in a ponderosa pine forest along Black Creek in the northeastern part of the state. The trees were one hundred and even two hundred feet tall, healthy and widely spaced, as in "presettlement" days. We did exercises designed to make ourselves especially good sensory receivers, to sharpen our acuity, improve our visual memory, and refine our depth perception. We studied animal tracks and stars, played visual games, and told stories about wandering among ponderosas. From my perspective, it was an experiment in perceptual practice. By the end of eight or nine days, I think it fair to say that all of us had altered our visual habits. No doubt, however, we all felt many more sensations in our reawakened bodies.

On the day of our departure from Black Creek, I became agitated for no apparent reason. I found myself hunched and crying by the creek, tears streaming. When asked why, I could not say. I became oddly irritated by the banter around camp as we took down tents and stuffed packs. Before hiking up the trail, I gathered everybody together, requesting that we walk in silence. I then started to cry again, saying something about