NINE

SKILL

WHEN THE EXALTATION OF WILDNESS or family or fidelity wears off, I tumble into my body once more, down the slope of gravity and time. Where else could I dwell except in this familiar flesh, with its smooth habits and rough aches? For more than a year I've been carrying around my list of reasons for hope, and I feel the added weight of those days in my joints. I wake up rehearsing the list one Saturday morning in late summer while rain pounds the roof. My feet slide into sandals, my legs carry me to the kitchen, my hands gather makings for breakfast, all of their own accord but with abundant complaints from every last bone.

On rainy days my mother often stops by to ask about the pains in my feet, my fingers, my knees. She brings me small tins of an ointment called tiger balm, purchased in China, to rub on the sore spots. She advises me to wrap whatever hurts in heating pads, no matter how muggy the weather. She shows me how to relieve the pressure on my joints by stretching. She circles around me and frets.

Although my mother's bones began their service twenty-nine years before I was born, she's never broken any of hers, while I've snapped, dislocated, or otherwise abused quite a few of mine. As a boy I fell off bicycles and ponies, tumbled from trees, slammed into the walls of gymnasiums during basketball games, dropped toolboxes and logs on my innocent feet; as a man, I've lifted too

much lumber and stone, climbed too many ladders, dug too many holes, twisted my spine too often cleaning gutters or fixing cars. My bones remember every insult. Rain sharpens their memory. I limp for an hour or so after getting out of bed each morning, and for an hour or so before going to bed each night. Following a bout of carpentry or landscaping, my stiff arms may complain about carrying a tray of dishes to the table, my hands may refuse to button a shirt.

My durable mother, meanwhile, has been waltzing and square-dancing, teaching an aerobics class at the senior center, and gardening in her backyard. Still without any broken bones, she only began to slow down a few years ago when arthritis flamed in her left knee. The summer before Jesse and I went tramping in the Rockies, the pain in her knee grew so bad that she ground nearly to a halt. For months she debated whether to have the joint replaced. At her age (well past seventy) would she ever heal? In the end she had to choose between risking the operation or camping forever in an easy chair with her feet propped up, and she chose the operation. She spent three days in a clinic, six weeks in a convalescent home, and six months in physical therapy, wondering all the while if she would ever be able to dance or garden or teach aerobics again.

A hard year passed. Performing exercises to limber up the scarred knee, riding a stationary bicycle to strengthen the withered leg, she winced, she wept, but she persevered. I ached in sympathy, wishing I could do some of the agonizing work for her. I offered her tiger balm. Eventually she regained her old ease of motion, thanks to her determined efforts, and thanks also to the therapists who nursed her along, the surgeon who performed the operation, the people who fashioned the artificial joint, those who manufactured the materials from which the joint was made, and the countless souls through the ages who've discovered and perfected the many ways of medicine. By the time Jesse and I hiked up into the Wild Basin, she was back in full swing.

Now, two years after the operation, she walks without a hitch,

leads exercise classes, spins around ballrooms to the music of big bands, raises gladioli and raspberries and rhubarb to give away. I'm happy for my mother, and also happy for my species, that we have figured out how to achieve such healing. Her knee bends sweetly again because of human skill wedded to the body's wild powers of recovery. In this alliance of wildness and craft I find another item for my medicine bundle, another source of hope. I wish to speak here about our capacity for making and mending things; I wish to celebrate not only the good that we accomplish but the gifts of meaning and delight that we receive from doing skillful work.

Before the celebration, though, a caution: if we practice our skills without foresight or compassion, we're headed for trouble—as individuals and as a species. No sooner do we learn how to smelt iron than we begin forging swords. We capture the explosion of gasoline in cylinders to drive horseless buggies and before long we're smothering the earth with pavement and filling the air with smog. We split the atom and build a bomb. Every time we unriddle another disease, we burden the planet with more hungry mouths to feed and more itchy minds to satisfy. Now we're monkeying with genes, and who knows what troublesome creatures we may loose upon the scene? Many of the nightmares about the future that ruin the sleep of my students and my children could be traced back to our blundering cleverness in manipulating the world.

Once young people begin to notice how often we misuse our ingenuity—to increase the levels of nicotine in cigarettes, to make handguns more lethal, to poison wolves, to fill our airwaves with trash—they may grow discouraged by our potential for mischief. I certainly felt discouraged when I was Jesse's age, or Eva's. After a childhood infatuation with science, when I believed that whatever we figured out how to do we should blithely do, I came to feel that the earth would be far better off if we forgot every trick

we knew. It seemed to me, in my late teens and early twenties, during my years of dawning political and ecological awareness provoked by the Vietnam War, that our whole civilization, the sum of all those skills laboriously acquired and passed on through the ages, had culminated in napalm, B-52s, electronic bingo, flip-top beer cans, water skis, alligator-skin shoes, and soap operas. Other species would heave a sigh of relief, I figured, if we all retreated to our rooms and sat very still and did nothing for a long while.

I've never been any good at doing nothing, however. So I finished college, married Ruth, went off to graduate school in England, where I read mind-changing books, agitated against the war, marched in support of sundry causes, scoured a good many spiritual traditions for guidance, then came back to start a job in America, where I began teaching young people who were as eager and baffled as I had ever been, and by and by I helped give birth to a child. More than anything else, Eva's arrival hauled me out of my funk. How could I gaze into those brand-new eyes in the delivery room of a hospital, surrounded by deft people and cunning machines, and think that all our ingenuity is for naught? How could I dismiss as evil all those inventions that would ease my daughter's way through life?

Of course, our power to manipulate the world is neither wholly benign, as I thought in my childhood, nor wholly destructive, as I thought for a spell in early adulthood, but rather, like most human powers, a mixed blessing. The same day I wrote in praise of the surgeon who repaired my mother's knee, I read in the newspaper about a plastic surgeon who specializes in disguising the faces of criminals. The two doctors may be equally adroit with a scalpel, but one cures the lame while the other hides crooks. Everything depends on how we use our skills. Thieves and assassins may be good at what they do, yet what they do is nonetheless evil. Masons and carpenters may build houses or gas chambers with the same tools; pilots may deliver mail or missiles; engineers

may design space telescopes or styrofoam burger boxes; chemists may purify aspirin or heroin; writers may compose sober histories or tabloid sleaze.

It's easy to praise the surgeon who repaired my mother's knee, or the astronomers who track comets, or the ecologists who restore damaged habitats; it's easy to honor the desert apple grower who watered and pruned his orchards in the Superstition Mountains, or the South African trumpeter who filled street urchins with the juice of jazz. But what about artists who design the billboards that blight our highways? What about loggers who cut down the last of the old-growth forests? What about assembly line workers who build gas-guzzling cars? What about computer hackers who meddle in other people's lives? What about lawyers who chase ambulances or hunters who chase elephants? What about generals, gamblers, developers, lobbyists, fashion designers, talk-show hosts, or exotic dancers? They may be wizards at their work, dazzling to watch. Yet on balance do they add to or subtract from the good of the world? That's a hard question to answer, but it's the crucial one to ask. In order to judge any exercise of skill, we should ask not only what it does for the person, what rewards of money or pleasure it brings; we should also ask what it does for other people, how well it serves their needs and how genuine those needs are; and we should ask what effect it has on other creatures and on the earth.

I have a friend who plays the violin exquisitely, with a grace that makes audiences weep, and I have another friend who plays the stock market shrewdly, buying and selling hundreds of shares every hour. The violinist brings fresh beauty into the world, at very little cost to anyone except herself, for those thousands of hours of practice. The stock speculator adds nothing to the world's wealth, but merely transfers money from the hands of more patient investors into his own. I rejoice at how the violinist uses her skill and regret how the speculator uses his.

Similarly, one can admire the talent on display in a television

ad and still lament that so much expertise is devoted to peddling casinos or colas. One can respect the skill required to negotiate a hostile takeover of one corporation by another, while concluding that the effects of the takeover may be harmful to everyone except the shareholders. One can acknowledge the skill required to knock a small white ball across a carpet of grass into a hole, or to hit a somewhat larger ball over a fence, or to dunk an even larger ball backwards through a steel hoop, while still recognizing that we as a nation waste fantastic amounts of money and time worshiping those who are expert at basketball or baseball or golf.

Just as one sign of maturity is the willingness to accept limits, and thereby to live in fidelity, so another is the willingness to make judgments of value. The word *skill* rises from a root meaning to cut apart or separate, signifying the power of discernment. The seasoned carpenter knows not only how to use tools well, but which hammer or saw to choose for a given task, which board, which nails or screws, and knows also how to assess the results. One day while I carried two-by-fours to a builder who was framing a new house, he told me he wouldn't let his worst dog sleep in a house put up by a rival contractor, a man known for cheap and shoddy work. "He ought to go apologize to the trees," the builder said, "for the way he mistreats wood." If we cared less about how much money or fame people earn by practicing their skills and cared more about how much good or harm they do, we would all be better off. The ability to judge with clear eyes how skills are used—whether to enrich or diminish life, whether to improve our days or squander them—is itself a prime example of skill.

Blessed with a new knee, Mother only winces and staggers for balance nowadays when going up or down stairs. Her own house, one story high and built on a slab, poses no challenge; but our two-story house, with a threshold some eight or ten feet above the level of the street, confronts her with steps inside and out.

The stairways inside have banisters, but until recently those between house and street had none. If anybody was home when Mother arrived, one of us would go outside to offer her an arm as she climbed up from the sidewalk. But when nobody was home, she had to labor up and down on her own.

The danger of her falling convinced Ruth and me that we must have some railings, one for the steps near the street, one for the steps at the front door. I thought of making them from wood, but worried about splinters. The one-size-fits-all railing kits for sale at the lumber yard were too flimsy. The only option left was to have them custom-made from steel. So I asked around for a good welder and was given the name of Earl Ketchum, on Mt. Gilead Road. When I showed up with my sketch, Earl was kneeling on the floor of his shop, surrounded by hoses, gauges, tanks filled with explosive gases, and by enough rods and tubes and steel plates to build a ship. A rangy man of about forty, with hands as broad as platters, he was laying out the pieces for a trailer hitch, following a design marked in pencil on the concrete. The ghostly patterns of earlier jobs, partly erased, covered the floor like faded tattoos. What I could see of Earl's own skin was pockmarked by dozens of burns, especially at the base of his throat, where the welding mask would not reach, and along his forearms, where drops of molten metal would sometimes cut through even the heaviest leather gloves.

I handed Earl my sketch and asked if he'd give me an estimate for a pair of railings.

He pinched my careful drawing between scorched thumb and index finger, eyed it skeptically, muttered, "I might," then handed me the paper and resumed work on the trailer hitch.

I stood there waiting for some further word. None came, so I asked, "Would you like my name and address and phone number?"

"It wouldn't hurt."

I tore a page from my notebook, scribbled the information, offered it to Earl.

"Just lay it on the bench," he said, waving at a battered steel table. I could have parked my car on its top, the bench was so big, except that every square foot of the surface was already heaped with blueprints and tools and parts. I cleared a corner and left my note there, pinned under a tape measure.

"So you'll come by sometime and give me an estimate?" I suggested.

Earl grunted but never looked up from his trailer hitch.

As I backed out of the shop, figuring I wouldn't lay eyes on Earl again, I thought to add, "My mother's been having trouble getting up and down those steps ever since she had a knee joint replaced, and I worry she might fall without anything to hang on to."

Now Earl peered up at me, with eyes squinted from staring through smoked glass at bright flames. "She live with you?"

"No, but she lives in town, and she visits us."

He loosed a huff of breath. "Well, then. Guess I'd better make her some railings. Where'd you leave your name?"

I pointed at the note and this time he looked, saying, "All right, then. I'll come by when I get a chance."

Earl did come by a few weeks later, a towering man now that I saw him upright, half a foot higher than my own six feet, wide enough to fill a doorway, the whole expanse wrapped in coveralls the shade of butterscotch. Faded blue denim showed through holes at the knees and elbows like pale patches of sky. As he sized up the job he told me about his youngest boy's weekend feats in football. "He just flattens everybody on his way to the end zone," Earl said. A heavy cold made his big voice sound as though it was booming from inside a closet.

"Is he taking after you?" I asked.

"Like a bear after honey," said Earl.

Using level and tape, he measured the steps, then recorded the figures on a scrap of cardboard with a pencil retrieved from behind his ear. After a minute's calculation, he gave me an estimate for the cost of two railings. The figure seemed fair to me, so we

shook hands, and his great paw swallowed mine. "No telling when I'll get to it," he said, "I'm so buried in work."

"I sure would like to have those railings in place before the first snow."

"Oh, I'll aim to beat the snow. We don't want your mom slipping and sliding."

Earl paused to study the sidewalk, which a crew from the city had replaced a few weeks earlier. He laid his level on the new concrete to make sure water would drain away from the base of the steps. Then he paced the length of the walk, checking the joints and the textured finish. At the end of his inspection, he announced, "The boys did a good job."

"I thought so," I said.

"You thought right." He climbed in his truck and hooked an arm through the window. "You want anything fancy on those railings? Any curlicues or doodads?"

"Just make them simple and strong," I answered.

"Black or white?"

"Black."

"You got it," said Earl, and away he drove.

Of all the exhibits I studied in the British Museum, the one I found the most moving, even more so than the Assyrian lions or the figurines of women holding out their breasts, was a case filled with stoneworking tools from Egypt. Among the items, all dating from the second millennium B.C.E., there were dividers for measuring, a stylus for marking, chisels pitted with rust, a try square, and a wooden mallet, its angled face gouged from delivering hundreds of thousands of blows. I thought of the long-dead hands that once wielded those tools and the eyes that guided them, thought of how those hands and eyes had carved statues, raised monuments, inscribed hieroglyphics, fit block to block in pyramids and palaces. I was moved by a feeling of kinship with those vanished craftsmen, for I have my own banged-

up mallets and chisels, and by a realization that virtually everything they knew about their craft had been passed down from master to apprentice, from their time to ours, over three thousand years.

There are men and women in my part of Indiana today who carve limestone using techniques that would have been familiar to those ancient Egyptians. I've spent hours in the quarries and mills watching them work. They use air-powered hammers these days instead of wooden mallets, and their chisels are made of harder metals, but the square and stylus and dividers haven't changed shape, and the carving of stone is still the same old collaboration of hand and eye. These skills have been preserved for the best of reasons—because they're useful, because they're satisfying, and because elders have taken pains to teach them to the young.

The knack of shaping stone can be traced back far earlier than the second millennium B.C.E., of course, back through petroglyphs and megaliths, flint scrapers and hand axes, back to the very emergence of our kind from the company of apes. When I was a boy in Ohio I walked the freshly plowed fields each spring, on the lookout for arrowheads. Most years I found one, sometimes two or three, and every time I marveled at how anything so lethal could be so beautiful. I scrubbed the points clean with spit and rubbed them dry on my jeans and immediately the scalloped wedges of stone gleamed as though lit from within. I wrapped them in cotton and kept them in the drawer with my socks. Now and again I would take one out, run my fingers gingerly over the sharp edges, and try to imagine how it had been made, how it had been lost, and whether it had ever been used to kill anything.

By the time I moved from those Ohio fields, I'd given away most of my arrowheads to bosom buddies or curious visitors, but I kept a few prize ones. I keep them still, in a wooden cigar box on a shelf beside my writing desk. Between sentences I often pick

one up, turn it over and over, still marveling. I now realize these arrowheads were shaped only a few centuries ago, by the Shawnee or Miami or other woodland tribes. Yet to me as a boy they seemed to have been handed down from the dawn of time. And in a sense they were, for these stone points embody skills that were already developing in the valleys of Africa more than two million years ago.

I mean *embody* as more than a metaphor. The design of tools and the knowledge of how to use them flow from body to body, mind to mind, through the millennia, each generation adding its own discoveries. If the elders are diligent in training the young and if the young are eager to learn, skills accumulate over time, so that today's engineers or gymnasts or surgeons may outdo even the greatest of their predecessors. We're no smarter than our ancestors, no more talented, yet we benefit from all their efforts, just as those who come after us will benefit from ours.

If the flow of knowledge is interrupted, however, skills may be lost. I know perhaps half as much as my father did about woodworking, because in my adult years, living far from him, I could only go for lessons once or twice a year, and he died before I could complete my schooling. Antonio Stradivari carried the secrets of his violin-making with him to the grave. While we can learn a great deal by studying the violins themselves, we cannot learn everything, for certain critical steps were known to Stradivari alone. On several occasions in the past, brilliant mathematicians, in writing down proofs of some new insight, have truncated their argument—saying, in effect, the rest is obvious—and no subsequent mathematician has been able to fill in the gaps. Every time the last native speaker of a language falls silent, as bullets and disease and global culture wipe out indigenous peoples around the world, we lose one more distinctive way of seeing, one more set of insights about living in a place.

Even when knowledge is more widely held, it still depends for survival on faithful teachers and willing pupils. There are farmers scattered across the United States who know how to plow with horses rather than tractors, how to raise livestock and crops without depleting the soil, how to increase the land's fertility and the abundance of wildlife. But their numbers are dwindling, while a new generation of farmers learns only the quick-and-dirty industrial scheme that relies on pesticides, herbicides, artificial fertilizers, and an endless supply of petroleum and topsoil. A time may come when the last of those who know the wise old ways die out. If that happens, and we discover we need those lost skills, we'll have to relearn them from scratch, aided by hints from books, films, or photographs, but relying mainly on the slow stumble of trial and error, the tedium of practice and more practice.

We'd be far better off conserving the old skills instead of having to resurrect them; yet the fact remains that we can, to a remarkable degree, resurrect them. From studying the debris at tool-making sites around the world, for example, anthropologists have recovered many of the techniques for shaping stone points. They can't be sure their methods are exactly the same as the ancient ones, of course, but the results are of comparable quality. I have watched a latter-day expert cleave a lump of flint with the sharp blow of a stone hammer on a bone punch, then cleave it again to produce a flake of suitable size, and then fashion a deadly and beautiful arrowhead by chipping the edges with the tip of an antler, all with amazing precision and speed, as though he'd apprenticed himself to the ancients themselves and not merely to their artifacts.

There's not much call for arrowheads these days, except as objects of study or admiration. Pottery, on the other hand, is still as useful today as it was in the time of King Ashurbanipal, whose craftsmen carved those bas-reliefs of leaping lions twenty-six hundred years ago, or in the time of our ancestors who figured out how to fire clay into ceramics some ten thousand years ago. The people of Acoma, a Hopi pueblo in New Mexico, have been

making pottery for many centuries, going on foot to the same quarry for clay, using the same minerals from the desert for coloring glazes. Yet certain traditional designs were lost when European invasions disrupted the passing on of knowledge to the young. Left with nothing but shards of the antique pots, including sacred vessels used in burials, the Hopi lost track of the old designs for a time, and have been able to recover them only in recent decades.

A potter from Acoma laughed when she told me how the recovery had come about: "My mother went to the museum and looked at pots the scientists had glued back together. She drew pictures, right there in front of the glass cases, and she brought the pictures home." As the woman spoke she was grinding minerals in a mortar. Now she paused to rub a pinch of the dust between index finger and thumb, judging the texture. When she resumed grinding, she resumed talking. "We looked everywhere on our own land, but only found what we needed in the museum. Think of the poor scientists digging in the hot sun and picking up tiny pieces! So much work!" Again the potter laughed. "First, the white grandfathers tried to break us apart and now their grandsons try to put us back together."

Grandsons and granddaughters alike, light-skinned or dark, can in fact repair much of the damage wrought by previous generations. It may be more difficult to mend broken communities and habitats than to mend pots, but it is still possible. We have that power; we have that opportunity. To use it, we'll need to preserve the legacy of skills that enhance life—everything from articulate speech to antiseptic surgery, from pottery to carpentry, from breeding plants and baking bread to measuring gravity and mapping the stars. We'll need to relearn some vital skills that enabled our ancestors to live well at less cost to the earth, such as those required for raising and cooking more of our own food, for building modest shelters out of local materials, for stitching our clothes and fixing our machines, for entertaining ourselves and

our neighbors. And we'll need to develop new skills for new conditions, as restoration ecologists and computer modelers and international peacekeepers are now doing. If we learn a useful craft and practice it well, if we serve the real needs of other people and other creatures, then we'll not only tap the springs of satisfaction for ourselves, we'll also help in the labor of healing.

A month after taking his measurements and well before the first snow, Earl Ketchum showed up at our place with a handsome pair of railings, free of doodads or curlicues, each with banisters and posts fashioned from square tubing, balusters spaced every four inches, all the joints neatly welded without so much as a ripple in the beads of steel, the whole affair painted matte black and sturdy enough to stop a truck. Out of his own dented pickup, Earl unloaded a toolbox, a framing square, a level half as long as he was, a dustpan and broom, a drill the size of a jackhammer, and a slurry of mortar in a bucket.

He propped one of the railings on the steps leading down to the sidewalk and squinted at me. "Look okay?"

"It looks just fine," I answered.

"I'd say so."

He marked where the holes should go, then tapped a steel punch into each mark to make sure the point of the drill bit stayed where it should. "You plug me in?" he asked.

I dragged a thick power cord up the sidewalk and plugged it into an outlet on the front porch, then gave Earl a thumbs-up. He steadied the bit against the instep of his boot, gripped the drill by its pair of jutting handles, and squeezed the switch. Soon a gray spiral of powdered concrete rose up the winding shaft of the bit. Every now and again Earl would blow the hole clean of dust and check it for depth; he did this more and more often as he neared his goal, until finally he was satisfied. Once the holes were drilled, he lowered the railing into place, measured and leveled and squared it from every direction, then poured the slurry of

mortar around each post, tamping the soupy mixture with a dowel to squeeze out any pockets of air. Finally he braced the railing with scraps of angle iron, so that it would stay square and true while the concrete hardened.

"You figure that'll keep your mom on her pins?" he asked.

"It ought to," I answered.

Earl backed off and circled around to give the railing the stern test of his experienced eye. Noticing a flaw in the paint, he fetched a spray can from the truck and covered the blemish with a fresh black coat. "You touch it up every spring and it'll never rust," he said. "Why, my dad put in that railing for the Alamedas, down there on the corner"—he pointed toward the end of our block—"back around 1955 or '57, and they keep it painted, and you can see it's as good as new."

"Your father was a welder?"

He was, Earl told me, and so was his grandfather. Earl had tagged along after them from the time he could walk, and he never wanted to be anything else but a welder. He helped his father put up railings all over the place, fix tractors, patch up derricks and saws in the limestone mills, fabricate just about anything you could make out of steel. His dad was retired now, crippled with arthritis, but sometimes on a Sunday he and Earl would drive around town to see how their work was holding up. Earl had welded everything from bicycle frames to coolant pipes for nuclear reactors. Now he was teaching the trade to his son, the one who flattens everybody on his way to the end zone.

"My only worry about that boy," said Earl, "is that he'll be so good at football he won't want to mess with welding."

"You really think he might?"

By now Earl had installed the second railing and had put away his tools, and he was sweeping powdered concrete into the dustpan. He paused to consider my question, leaning on the handle of his broom. "Naw," he said finally, "he'll be a welder. It's in him too deep."

I thanked Earl, paid him, and shook his giant hand. Before pulling away in the dented truck, he said, "Remember, keep it painted."

By the time the rain stops this sultry morning, my bones have quit aching. I hear a car door slam, and look out from my second floor window to see Mother climbing the lower steps from the street, her nimbus of white hair bobbing, one hand braced on the railing, the other wrapped around a bouquet of lavender gladioli. I go down to meet her, but she beats me to the front door, where she holds onto the porch railing while offering me the flowers. They're gorgeous. I promise to put them in a vase right away and ask if she can stay for lemonade. No, she has too many errands to run—clothes to sort at Hospitality House, a bright-eyed girl to tutor at the middle school, more bouquets to deliver.

"But first," she says, "how's your knee? I worry about you whenever it rains."

"It's fine," I tell her. "How's yours?"

"Oh, I hardly ever think about it. I don't pick up heavy weights and I'm careful about my turns when I'm dancing." Holding the railing, she gives a playful curtsy, knees bent outward, like a ballerina at the bar. "Well, have to run!" And once down the porch stairs she nearly does run, hurrying off without a limp. She slows up at the steps near the street, grabs the railing carefully, eases her way down, then bustles to her car. Before zooming away, she waves at me and calls back cheerfully, "That welder certainly did a good job. I'm thankful every time I come by."

I put the gladioli in a vase and drop an aspirin in the water to make them last. Each of the long curving stems tapers from tight green buds at the top to fully opened blooms at the bottom. I stare into one of the lavender blossoms, past the gathering of petals like crushed silk, past the curving stamens, down into the pale throat dusted with pollen, and for a moment I envy the bees.

. . .

Earl the welder is teaching his son a craft that has been handed on, with an expanding repertoire of techniques, since the Bronze Age. Every skill we depend on today can be traced back through such a human lineage, sometimes shorter, sometimes longer. A legacy of skills acquired over a few thousand or even a few hundred thousand years may seem modest compared to that inherited by most other species. The screech owl roosting in the hemlock tree beside my house employs hunting methods that have been evolving for perhaps sixty million years. The hemlock itself, bearing seeds in cones, performs a trick that is nearly a quarter of a billion years old.

By comparison with these veterans, we humans are raw beginners. But we learn fast, and part of what we've learned is how to store and pass on our knowledge outside of our genes, in language and pictures, in rituals and lessons, in gesture and voice. Do you wish to weave the seat of a chair out of split oak? Solve a differential equation? Make a dovetail joint? Conjugate a verb? Bake a cherry pie? Clean up a watershed or mend an arthritic knee? Anybody alive today can find out how to do almost anything that humans have ever done, if not from the experts themselves then from the records they have left.

This rapid, cumulative learning can be a danger as well as a blessing, as I've said. Without ignoring the danger, I find hope in the accumulation of skill. I'm not encouraged by the mere piling up of wealth, the proliferation of gadgets and machines, or the tightening of our grip on nature, all those trends that form the usual notion of progress; but I am deeply encouraged by the steady refinement of our abilities, as individuals and as a species, to work intelligently with the materials of earth, to collaborate with wildness. We carry in our minds, we hold in our hands, the power to bring about a more elegant, peaceful, and becoming existence for all creatures.

TEN

MOUNTAIN MUSIC III

CARRYING ONLY WAIST PACKS and water bottles and snowshoes, Jesse and I set out from our campsite along North St. Vrain Creek and headed for Thunder Lake, a thousand feet higher and four miles farther on. We soon climbed beyond the last patches of bare ground, then paused to strap on our snowshoes. This was the moment Jesse had been waiting for since reaching the Rockies, the moment that would separate him from the casual day-trippers and prove that he was really in the wilds. With a whoop he dashed on up the trail, powder flying.

I followed slowly, knowing my limitations, and also wishing to savor the land, to notice details, to saunter instead of rushing through. In spite of my deliberate pace, I didn't resent Jesse's hurrying. When I was his age, without the means of traveling far from my Ohio home, I used to run barefoot in our woods until my feet bled; I shinnied up the tallest trees while limbs bent under me; I rode ornery ponies until they bucked me off, then scrambled back into the saddle; I worked in sweltering weather detasseling corn or baling hay, and in cold weather gathering maple sap, less for the money than for the satisfaction of knowing I could hold up through all that labor. Even though I no longer had the stamina to keep pace with him, I understood Jesse's craving to measure himself against river, rockface, mountain slope.

Most young men yearn for a test of their strength. Feeling their

own juices flowing, they wish to confront what is most wild and rugged in the land. In durable cultures, grown men teach the young ones how to carry out these trials of endurance, how to flex their muscular will without hurting themselves or tearing up the community. This task is easier where there is an abundance of open land and a call for hard physical work. A man who spends his days hunting or farming, building houses or clearing roads, learns what his strength can do and where his limits are. In the wilds, sooner or later, even the brashest man comes up against a power greater than himself. In our society, as wild lands dwindle and jobs demanding strength and courage disappear, many young men end up testing themselves on the street. The proliferation of gangs and drugs, the shootings and car wrecks, the swelling prison population, the waywardness of so many soldiers and athletes, all suggest that we often fail in teaching our sons how to harness their fearful energy.

Jesse waited for me at a bend in the trail that gave a view to the west, where Ogalalla Peak, Isolation Peak, and Mount Alice marked the Continental Divide. Billowy clouds were gathering above the ridge, casting shadows on the steep white flanks.

"I don't like the looks of that sky," Jesse said.

"Maybe it'll blow on past," I suggested.

"Maybe." He gave me an assessing look, from snowshoes to floppy hat. "You doing okay?"

"Just fine," I answered. And it was true, even though the going was tough, not merely uphill, zigzagging along switchbacks, but also up and down over windcarved drifts and over the slippery backs of boulders. The morning's unexpected freshness and clarity had stayed with me. The longer our truce held, the lighter I felt.

As we continued on, Jesse still made lunging dashes on ahead, but he circled back more often, maybe to check on me, maybe to see what I thought of the darkening sky. I thought less and less well of it as we climbed. The flat bottoms of the clouds blurred

with rain, and they were sliding our way. Rain at this altitude would chill us badly and make the footing treacherous. With such a depth of snow, avalanches were always a possibility. But the greatest danger was from lightning. Although still a thousand feet below tree line, the fir and spruce were thinning out, so we hiked more and more in the open, making handy targets for any loose electricity.

One of the times he circled back to join me, Jesse asked, "Did you hear thunder?"

"We're aiming for Thunder Lake, aren't we?"

"Seriously, Dad."

I stood still and listened, but could hear only wind through needled branches. "Nothing yet."

"Do you want to keep going?"

I looked at this boy who kept astonishing me by having grown into a man, now an inch taller than I, with a ginger beard on his jaw and thick arms crossed over his chest. Yet the child was not so far below the surface, for the skin of his face had only just begun to show the marks of sun and grief.

"Do you?"

He gazed up the trail. "We must be getting close."

"Under a mile, I'd guess."

"Let's try it," he said, shuffling on over the snow.

Halfway up another switchback, where the few scrubby trees reached only waist high, we both stopped abruptly, as if we had run into a great hand. Now the rumble was unmistakable. We looked at one another, then at the mountains looming dark ahead. Lightning cracked the gloom, once, twice, again, again, and each bolt sent a shudder through the air. A year earlier I would have played the father, announcing that it was high time for turning around. But now I wanted Jesse to make the decision. He stood with hands on hips, quite still, watching the storm. Between rolls of thunder I could hear him panting. I waited, my own fear rising.

At length he said, "Rain I could take, but I don't want to mess with lightning."

I nodded but still did not speak. The air shook.

After another minute, he said quietly, "I think we'd better go back."

"You're sure?"

"I'm sure."

"Then you lead." I stepped aside to let him pass.

We started downhill at a sober pace, resisting panic, but as the sky boomed behind us and our legs caught the knack of sliding on the snowshoes, we sped up. Soon we were leaping over drifts that we had struggled to climb, skidding through swales, now and again tumbling, dusting ourselves off, and charging on. Somewhere in our breakneck descent, as I watched Jesse romp on down through avenues of pines and heard his jubilant shouts, I realized that his fear had given way to exhilaration, and so had mine.

The storm rumbled on past without dropping any rain on our camp. The snow had soaked our boots, though, so we propped them on a log with their tongues hanging out, as though they were gulping air. Late afternoon sun slipped beneath the clouds and poured light down the hillside, picking out lichen-spangled granite, the ruddy trunks of lodgepole pines, and hummocks of snow. Here the drifts were only a couple of feet deep, their white surfaces littered with needles and twigs and cones, tapering away to nothing at the edge. Water trickled from those edges, glistened on the ground, and ran toward the booming creek.

Still warm from our downhill dash, I filled cooking pots in the creek, then lugged the water back uphill and chose a boulder in full sunlight as the spot for a bath. The water was only a few degrees above freezing, so I clenched my teeth before pouring the first scoop over my head. For a few seconds my body could not decide whether to shout pain or pleasure, and then, as the salt and

dirt washed away and the sun hit my skin, it settled on pleasure. While I lathered, a hummingbird cruised up, hovered a few seconds with needle beak pointing at my belly, as though deciding whether I was a rival for his territory, then zipped off. He returned for another inspection while I rinsed, hovering long enough to show me the red throat and green crown that marked him as a male broad-tailed hummer. "Relax, I'm only passing through," I said, and away he zoomed. My laugh was loud enough for Jesse to hear me up by the tent.

"What's so funny?" he called.

"A hummingbird," I called back.

"Sounds hilarious."

"You had to be there."

"I guess so."

It was sheer delight to stand there tingling from the scrubbing and the cold, and to feel the muted sun on my skin. My body was bearing up well so far, even the long-suffering joints of knee and foot and the cranky muscles of my back. I would turn fifty in a few months, yet I was far from old. Wasn't I far from old? My legs bending to slide into dry jeans, arms flexing to pull a clean shirt over my head, chest filling with sweet air, every part of me seemed brand-new. At this rate I'd be able to go tramping with Jesse for years and years.

When I got back to my notebook, I would add "Body Bright" to my list of reasons for hope.

Feeling cocky, I lifted a foot to put on a sock, and there, under the pale skin between ankle and heel, were the blue veins of my father's foot. I remembered wondering as a boy why my father had those rivery lines where my own skin was clear. Noticing them again in his last years, when the tiny vessels had begun to fray, I had realized that his body was breaking down. Now, after a day of hiking with my own grown son, gazing at my battered foot, I became at once child and adult, full of youth and full of days.

I found Jesse reading on his bench while a red squirrel chattered down at him from a nearby limb.

"Well, that makes one of us who's clean," I said.

Without lowering his book, he answered, "My mom taught me never to bathe in ice water."

"Your mom may be right," I said, chilled now that I was out of the sun. Thinking of Ruth, and of the way her face would shine when she saw us coming in the door, I realized how eager I was to tell her about our trip. It was an eagerness I felt whenever I traveled, a longing that embraced not only Ruth but also the house we shared, our children and parents, our neighbors and friends, and the Indiana countryside.

Searching for a word that would remind me of the joy and courage I drew from thoughts of home, I settled on "Fidelity."

The gray jays fluttered up, settled on a branch almost within reach, and resumed their jabbering. The red squirrel, as though relieved at shift change, moved on.

"Sounds like the bosses are back," said Jesse, closing his book. "Must be supper time. I'll cook if you wash."

"It's a deal."

As the water boiled for our fettuccine, I walked to a clearing where I could check the sky. It was a startling blue, mottled with a few cumulus clouds that were drifting slowly eastward, their backsides lit by the setting sun. Mountain chickadees crisscrossed in the air. Far above them a jet liner cruised from east to west, so high that the wings were barely visible and the fuselage gleamed like a silver needle. I had ridden up there often; Jesse and I had flown to Colorado, and would be flying home at the end of the week. Even while I regretted the burning of oil and fouling of air, and felt guilty every time I boarded a plane, I was forced to admire the audacity and ingenuity that made such travel possible. A species that can figure out how to launch a village's worth of people high in the air and hurtle them along at hundreds of miles per hour and bring them safely down again should be able

to figure out how to survive without devouring the earth. Our cleverness had brought on most of our troubles, from overpopulation to nuclear waste. There was surely no way out of those troubles, without harnessing and redirecting that very cleverness. To my list of reasons for hope, I added "Skill."

I returned to the aromatic neighborhood of the stove, where Jesse was stirring the noodles.

"What did you see?" he asked.

"An airplane."

"Amazing. First a hummingbird, then an airplane. Was that your first one?"

"No, I was at Kitty Hawk when the Wright Brothers launched theirs."

"Back around the time you invented the wheel?"

"Right around then."

Jesse laughed, then filled our plates with food.

I could have put no price on that laughter, nor on the day of peace leading up to it. Freed from calendars and clocks, away from cars and money and television, here in the mountains where Jesse needed no permission from me and I required no obedience from him, we could simply be companions. Here, neither of us was in charge. There was nothing here to remind me of the world's sickness, nothing to provoke in me the anger and grief that had cast a shadow over Jesse's vision. That might well change, I realized, as soon as we drove back to Denver, put up at a motel, returned the rental car, hurried to catch a plane. But for now the truce held. When it broke down, in the days or months ahead, we would still have this place, this time, as a measure of what is durable and desirable.

After supper I went to sit on a jutting granite ledge overlooking the creek. The water crashed and roiled through a jumble of boulders, churning up an icy mist and turning the current even whiter than the surrounding snow. I pulled up the hood of my

jacket, stuffed hands into pockets, and hunkered down to soak in the spray and roar.

Before long Jesse came to join me, bringing his sleepmat to sit on, and mine as well.

I thanked him, sliding the mat between me and the chilly granite.

"No problem," he said, and settled in to read.

Glacial air poured down the creek from snowfields higher up. The branches of spruce and fir, spreading outward from the banks, framed the white cascade in green lace. The day was catching up with me, and I could feel weariness gathering in my bones. I drew my knees up and wrapped my arms around them for warmth. Still I trembled. I couldn't tell whether my shivering was from the cold or from the spell of moving water.

As I hunched forward I noticed a brownish cord of some sort cupped in a hollow of the granite near my feet, among lichens and mosses and grit. Leaning closer, I could see that it was a necklace, quite slender, made of shell and stone. I first thought to leave it there, in case the person who lost it came looking, but then I realized that it must have been lying in the cavity for some time, because the moss had partly covered it. So I drew it out, brushed off the grit, and showed it to Jesse.

"Neat," he said, absently touching his own necklace of beads and braided string, one of several he had made.

"Do you want it?" I asked.

"No, that one came to you. Try it on."

I have never worn necklaces, or any other jewelry aside from my wedding ring. But I followed Jesse's advice and tried this one on, and it felt cool and smooth against my neck.

"It looks good," he said. "Dad the hippie."

He went back to reading, tilting his book to catch what little daylight there was, turning the pages with gloved hands. Eventually he gave up, closed the book, and flopped on his belly to watch the creek.

"Do you want to try Thunder Lake again tomorrow?" I asked.

"No. We've already seen most of that trail. I'd rather go up to Bluebird Lake. It's higher and the snow up there should be deeper."

"Sounds fine to me."

The water poured on. We breathed mist.

After a while, Jesse murmured, "This is a good place."

"It is."

"Thanks for bringing me here."

"I wouldn't have come without you."

In the waning light, the trees along the banks merged into a velvety blackness, and the froth of the creek shone like the Milky Way. Waves rose from the current, temporary shapes that would eventually dissolve, like my father's body or like mine, like the mountains, like the earth and stars. I blinked at my son, who rode the same current and who only asked to live out his days with a sense of hope. I would do everything in my power to help him accomplish that, beginning with an effort to climb out of the shadows and to see differently. I would never be able to look at a strip mine or a strip mall, at acres of blacktop or miles of trash, and see them as beautiful, see them as a fulfillment of earth's promise, but I could learn to see *through* them to the great renewing springs in body and land, in love and community, in human skill and stories and art.

I touched my throat as Jesse had touched his. "Mom will see this necklace and figure pretty soon I'll take up drumming."

"She'll think it's cool," he replied.

Again I imagined telling Ruth about the trip. She would hear about the furious yelling in Big Thompson Canyon, and the rafting in Poudre Canyon. She would hear about the elk chasing the coyote, the owls calling, Jupiter and Mars chasing the moon. She would hear how I stood naked in sunshine on a boulder surrounded by hummocks of snow, drenched in bliss. She would hear about the lightning that turned us back from Thunder Lake,

the hummingbird that looked me over, the necklace hidden in a mossy cup, the slant of light, the roar of the creek, the day of peace between Jesse and me. I would tell her of everything that moved me, every gift received, every lesson learned, for no journey is complete until we carry the stories home.

ELEVEN

SIMPLICITY

THE SPELL OF THE MOUNTAINS began to evaporate as soon as Jesse and I climbed into the rental car at the Wild Basin trail head. The ignition key, the steering wheel, the sun-fried upholstery chafed my skin; the thrum of pavement under the wheels and the press of traffic hustling into Denver chafed my brain. Everything moved too fast. The car felt like a cage on wheels, hurtling along against a gaudy backdrop of dry plains and snow-capped peaks. Never one to stare at scenery through windows, Jesse dived into his book, a thriller about corpses turning up in the alleys of Paris, and he said scarcely a word until we reached the motel. In the morning we would fly home to Indiana, streaking along even more swiftly at thirty thousand feet, sealed away in a more perfect cage, cut off from earth.

The truce between Jesse and me also began to evaporate as soon as we returned to the land of electricity, money, and clocks. His first act on entering our motel room was to switch on the television, and the sound of it was like a file scraping my nerves. I took refuge in the bathroom, figuring that hot water, at least, would be welcome. But the wall-to-wall mirror and the fierce lights quickly unsettled me. After a week of feeling vigorous and fit in the open air, I looked at my grizzled reflection and felt shabby and old.

A shower and shave did not make the television racket any

more bearable. Emerging from the growl of pipes and exhaust fan into the blare of a music video, I snapped at Jesse, "Does that have to be so loud?"

"If you want it off, why don't you say so?" he shot back.

"I only asked you to turn it down."

"You're the boss." He jabbed the remote control and the picture blinked out. "It's all trash anyhow."

I didn't argue, because I could feel the tension rising between us again, like the onset of a fever. Now that we had left the trail I was in charge once more of budget and schedule, and that alone would have irked him. Back in the city, where much of what I saw struck me as wasteful, ugly, or mad, I was also prone to the ranting and lamentation that had cast a shadow over Creation for Jesse. I would have to curb my tongue. I would have to find a way back through this confusion to the sanity and clarity I had felt in the mountains.

We unpacked, and soon our sweaty clothes and camping gear lay in heaps about the room, a room already overstuffed with two queen-size beds, a plywood bureau and desk, matching table and chairs, and half a dozen lamps. The lamps cast a wan light onto walls decorated with vaguely Impressionist views of the French countryside. By opening the heavy curtains at our window I could see, beyond the snarl of billboards and smokestacks and roads, the Rockies glowing serenely in the last light.

I stood there for so long that Jesse came to join me. He gazed quietly for a moment, then let out a deep breath.

"It's hard to believe we were up in those fields of snow only this morning."

"It does seem a long way," I agreed, touching the string of shells and stones at my throat.

I wanted to embrace him, the mountains, the light. But he soon backed away, and we both resumed sorting our gear.

To keep the clutter of the room at bay, and to still the panic I was feeling from the crush of the city outside, I summoned up an

image from the mountains: my green poncho, spread out like a tablecloth on the ground, with everything I needed to live comfortably in the woods—clothes, food, fuel, water, tent, sleeping bag, tools—covering no more than a quarter of the fabric. I carried that image with me into sleep.

The Latin word for hope, *sperare*, comes from an Indo-European root, *spei*, which means to expand. You can hear that old root in *prosper*, and you can hear its denial in *despair*. To be hopeful is not only to feel expansive, but to count on an ever-flowing bounty, while to despair is to feel constrained, to fear that the springs of life are drying up.

Try arguing before a chamber of commerce, a board of directors, or a legislature that we should honor limits—on consumption, population, territory, salary, size—and you will discover that the link between hope and growth is not merely etymological, it is visceral. We balk at barriers. Don't fence me in, we sing. We believe in our bones that to have more of anything good is always better than to have less. Get bigger or get out, a Secretary of Agriculture warns farmers. If you're not growing, you're dying, a business guru warns executives. So our cities and houses and budgets and waistlines keep swelling.

I woke at dawn, not to the sounds of creek and birds but to the whine of compressors and the roar of trucks. The air in our motel room was stale. I opened the curtains, but could not open the sealed window. To the northwest, the mountains loomed through a haze of smog, like an afterthought on the horizon. Between here and there lay gas stations, eateries, swarms of houses, an auto auction yard, radio towers, derricks, oil tanks, and one of the largest truck stops I had ever seen: Sapp Bros. Food & Fuel.

Feeling stifled in the room, I went outside for a walk, but there was nowhere to walk except on pavement, dodging traffic. Why all these errands, and the day barely begun? The motel parking

lot gave way to a poison-perfect lawn where sprinklers hissed, then the fringe of lawn gave way to concrete. Choosing the least-traveled path, a service road leading into a warehouse district, I shuffled along through beer cans, fast-food wrappers, cast-off mufflers, and skittering newspapers. I had brought along my notebook, hoping to find a bird or flower for sketching, but I saw nothing alive except drivers high in their cabs and a pair of guard dogs, Dobermans, that bared their teeth at me through a chain-link fence. Eventually the pressure of gray buildings and diesel fumes turned me back.

While I drank coffee in the motel lobby, two white-haired men sitting nearby on a plaid couch argued about whether their church could use another Bible class. One man thought the present class was way too big, while the other thought it could use a few more people. "There's so many talkers now," said the first man, "even God can't get a word in edgewise." "But the age we're getting to be," the second man replied, "we need every brain cell we can pack in the room."

As I pulled out my notebook to record their sayings, it fell open to the page I had marked with an aspen leaf, the one listing sources of hope: *Wildness, Beauty, Simplicity, Body Bright, Family, Fidelity, Skill*. Running my mind over the list, as if running my fingers over the necklace of beads, I felt reassured. Even here in the fluorescent glare of the lobby, amidst the buzz of phones and computer printers and hitting-the-road conversations, these words held their promise. The power lay not in the words themselves, but in the stubborn realities to which they pointed. They were tokens of healing energies that we could tap even here, in a hectic city, in the confusion of hasty journeys.

Because Jesse and I, too, needed to hit the road, I closed the notebook and trooped upstairs, to wake him, in a brighter mood than when I had set out.

The item on my list of talismans that seemed most out of keeping with the bustle of departure, and yet most vital as an antidote,

was simplicity. Whenever I return from a spell in the woods or waters or mountains, I am dismayed by the noise and jumble of the workaday world. One moment I could lay out everything I need on the corner of a poncho, could tally my responsibilities on the fingers of one hand, and the next moment it seems I couldn't fit all my furniture and tasks into a warehouse. Time in the wilds, like time in the silence of meditation, reminds me how much of what I ordinarily do is mere dithering and how much of what I own is mere encumbrance. The list of urgent jobs I leave on my desk before a journey always looks, on my return, like the jottings of a lunatic. Coming home, I can see there are too many appliances in my cupboards, too many clothes in my closet, too many books on my shelves and files in my drawers, too many dollars in my bank account, too many strings of duty and desire jerking me in too many directions. The opposite of simplicity, as I understand it, is not complexity, but scatter, clutter, weight.

Returning from a journey or surfacing from meditation, I yearn to pare my life down to essentials. I vow to live more simply, by purchasing nothing that I do not really need, by giving away everything that is excess, by refusing all chores that do not arise from my central concerns. I make room for silence. I avoid television, with its blaring novelties, and advertising, with its phony bait. Whenever possible I go about town on bicycle or foot. I resolve to slow down and savor each moment instead of always rushing on into the future.

The simplicity I seek is not the enforced austerity of the poor, which I have seen up close, and which I do not glamorize. I seek instead the richness of a gathered and deliberate life, the richness that comes from letting one's belongings and commitments be few in number and high in quality. I aim to preserve, in my ordinary days, the lightness and purpose that I have discovered on my clarifying journeys.

As our plane banked around after take-off, we caught one last glimpse of the Front Range shining to the west.

"So long, Rockies," Jesse muttered, then returned to his book.

"Have they found out who's killing all those unlucky folks in Paris?" I asked him.

"Not yet," he answered, in a tone that put me on notice he would rather read than talk.

I pressed my cheek against the window. Viewed from the air, Denver seemed to be blundering outward in every direction, without plan or reason, flinging subdivisions and strip malls and roads into the foothills and plains. No doubt many who lived there felt the city was already large enough. But even more people were eagerly joining the sprawl or making fortunes from it, and who was going to stop them? Like other American cities, Denver swells on a blind faith in abundance, a faith that there will always be enough water and land, enough metal and wood, and that oil will always be cheap. While I reflected on the folly of this addiction to growth, cheap oil carried Jesse and me home toward Indiana.

Except for the patchwork of irrigated fields and the green tendrils of waterways, the shortgrass steppes of Colorado were the color of buttermilk pancakes. The plowed fields not yet in crops more nearly matched the color of the airplane wing, a dusky gray like tarnished silver. In these arid lands the drainage patterns branching down from the hills were as clear as the seams on an outdoor face. In western Nebraska and Kansas we began seeing vast circular fields defined by pivoting irrigation equipment—a green that will fade away in thirty or forty years, hydrologists predict, when the Oglala aquifer has been pumped dry. Set within the grid of section lines, these circles look like solar arrays. In fact they *are* solar arrays, turning sunlight into beans or wheat, but clumsy by comparison to the grass that once flourished there without benefit of fertilizers or pesticides or pumps.

From the air, Missouri and Illinois and Indiana appeared to be more densely patterned, with the rectangles of farms and the somber patches of woodlots carved up by housing developments

and highways. Buildings clung to the roads, huddled into clumps to form towns, piled into great drifts to make cities. Roads and rails and power lines bound settlement to settlement, radiating into every hollow, slicing through every woods, a net flung over the land.

Gazing down on all of this from six miles in the air, I realized that nothing will halt the spread of human empire, nothing will prevent us from expanding our numbers and our sway over every last inch of earth—nothing except outward disaster or inward conversion. Since I could not root for disaster, I would have to work for a change of heart and mind. The word that came to me, as I flew home from the mountains with my worried son, was *restraint*. Here was a key to the work of healing, as it was also a key to the practice of fidelity. If we hope to survive on this planet, if we wish to leave breathing room for other creatures, we must learn restraint, learn not merely to will it, but to desire it, to say *enough* with relish and conviction.

But how are we to achieve restraint when we seem mindlessly devoted to growth? Increase and multiply, the Lord says, and we do so exuberantly. Like birds and bees and bacteria, we yearn to propagate our kind. Nothing could be more natural. We are unusual among species only in being able to escape, for the short run, the natural constraints on our population and appetites, and in being able to magnify our hungers through the lens of technology.

It seems that our evolutionary history has shaped us to equate well-being with increase, to yearn not merely for more offspring but more of everything, more shoes and meat and horsepower and loot. In a hunting and gathering society—the arena in which our ancestors spent all but the last few thousand years—the fruits of an individual's search for more food, better tools, and richer land were brought back and shared with the tribe. The more relentless the search, the more likely the tribe would be to

flourish. As a result of that history, observes anthropologist Lionel Tiger, "We are calculating organisms exquisitely equipped to desire more and truculent and grim about enduring less."

How much any group can accumulate or use is limited, of course, by their level of technology. Hunters on foot armed with stone-tipped weapons can wipe out large, slow-moving creatures, like woolly mammoths and giant beavers; they can open up grasslands by burning; they can alter the mix of plants in their home territory; but they cannot turn a mountain inside out in search of glittering metal or clear-cut a forest or heat up the atmosphere or poison the sea. The harnessing of mechanical power dramatically increased our ability to make the world over to suit ourselves; the rise of towns enabled us to pile up wealth, since we no longer had to haul it from campsite to campsite; and the withering of communal ties allowed more and more of that wealth to be sequestered in private hands. I suspect that we are no more greedy than our ancestors, no more eager for comfort, only far more potent in pursuing our desires.

The constant hankering for more, which served hunting and gathering peoples well, has become a menace in this age of clever machines and burgeoning populations. Our devotion to perpetual growth now endangers the planet, by exhausting resources and accelerating pollution and driving other species to extinction; it upsets community, by severing our links with the past, by outstripping our capacity for change, by swelling the scale of institutions and settlements beyond reach of our understanding; and it harms the individual, by encouraging gluttony, a scramble for possessions, and a nagging discontent even in the midst of plenty.

What are we poor ravenous creatures to do? We may keep riding the exponential curve higher and higher on every graph—widgets produced, oil burned, carbon dioxide released, hamburgers sold, acres paved, trees cut down, soils plowed up, babies born—until nature jerks us back toward the zero point. Or we

may choose to live more simply and conservingly, and therefore more sustainably. I doubt that there is anything in our biology to lead us onto the saner, milder path. Biology, I'm afraid, is all on the side of shopping, gluttony, and compulsive growth. If we are to achieve restraint, it will have to come from culture, that shared conversation by which we govern our appetites. Just as our technology and our short-term ability to ignore the constraints of nature distinguish us from other species, so we are also distinguished by the ability to impose limits on ourselves through reason and ritual and mindfulness. The acceptance of limits, in fact, is part of what distinguishes an adult human being from a child.

While I work on this chapter, National Public Radio carries a report about the culling of elephants in a South African game reserve. Animal rights activists protest the killing, but rangers insist that the elephants, having multiplied beyond the land's carrying capacity, are devastating the park by uprooting trees, gouging trails, trampling vegetation, exposing the soil to erosion. In the absence of predators, beaver in our own country can devastate a woods, and deer can graze fragile plants beyond the point of recovery. No matter how intelligent, these animals possess no inborn curb to prevent them from destroying their own habitat. The growth of their populations is checked only by the supply of water or food, by predators and rival species, or by disease.

Many anthropologists now believe that early humans behaved very much like elephants and beaver and deer, degrading one habitat after another, then moving on. As our ancestors spread over the globe, they left deserts and the bones of extinct species in their wake. Such evidence suggests that the ecological wisdom surviving today in remnants of traditional cultures had to be learned over long periods of time, through trial and error. The American landscape is dotted with sites of ancient social experiments that failed, including those of the industrious people who raised great earthworks along the Ohio and Mississippi river val-

leys in my part of the country. Only gradually did humans, here and there, develop cultural practices—stories and taboos, methods of birth control, rituals for hunting and planting and harvesting, rules about the use of common land—that curbed our instinct to follow the hunger for more wherever it leads.

The capacity for restraint based on knowledge and compassion is a genuine source of hope, though an embattled one. In an effort to clean up the atmosphere, the Environmental Protection Agency recently proposed higher standards for emissions from smokestacks and cars; before the ink was dry on the proposal, governors and industrialists attacked the standards as too expensive, claiming that the richest country in the world cannot afford to pay the real price of energy, nor to cut back on the use of electricity and gasoline, in exchange for breathable air. You can see this pattern repeated over and over in the daily news. One group of citizens calls for a halt to off-shore drilling, the cutting of old-growth timber, the draining of wetlands, the release of greenhouse gases, the building of new highways, or the dumping of toxins into streams, while others call for more drilling, more cutting, more paving, more manufacturing, more more more. For every voice that echoes Thoreau's famous plea, "Simplify, simplify," a dozen cry, "Amplify, amplify!"

As I listened on the car radio to the report about the havoc wrought by elephants, I passed a field where bulldozers grunted and shoved, uprooting a woods to make way for another burger joint. The present scale of human destructiveness is unprecedented, but the impulse to eat whatever is within reach, to manipulate our surroundings, to provide against future scarcity, is entirely natural. While it may be channeled, it cannot be eradicated. What is *un*natural, what comes only from culture, is behavior that arises from knowledge, reflection, and regard for other forms of life. We are the only species capable of exterminating other species wholesale, but we're also the only one capable of acting, through love and reason, to preserve our fellow crea-

tures. We are unique in our ability to affect the fate of the planet, but also unique in our ability to predict those effects and to change our ways in light of what we foresee.

Although I respect the power of biology in shaping our lives, I am not a determinist. If I were, I wouldn't be writing a book about hope. Since our identification of hope with perpetual growth is rooted in our evolutionary history, we can't just decide to feel good about living with less. We cannot force ourselves to welcome limits. We can, however, shift the focus of our expansive desires. We can change, deliberately and consciously, the standard by which we measure prosperity. We can choose to lead a materially simpler life not as a sacrifice but as a path toward fulfillment. In ancient terms, we can learn to seek spiritual rather than material growth.

Religious traditions the world over maintain that one who follows the Way should live simply. Do not lay up treasures on earth, we are told, if you desire treasures in heaven. So Prince Siddhartha and Francis of Assisi leave their fathers' mansions and strip off their fine clothes and walk the roads as beggars. Gandhi eats modestly of vegetables and fruits, sitting cross-legged on the floor in a peasant's hut, wearing a loincloth woven from homespun yarn. A Lakota shaman fasts. Monks dwell in bare cells, hermits in caves, seekers of visions in the open air. Suffering is not the point, although masochists may forget that; the point is to concentrate energy on spiritual work. When Jesus warned that it would be easier for a camel to pass through the eye of a needle than for a rich man to enter the kingdom of heaven, he did not mean, as I read the passage, that wealth is evil, but that the piling up and protection of wealth is all-consuming. The rich man is too preoccupied with being rich to be enlightened or saved.

Meditation, contemplation, pilgrimage, and other forms of religious inquiry are only part of what I mean by "spiritual." I also mean the nourishment that comes to us through art, music, liter-

ature, and science, through conversation, through skillful and useful work, through the sharing of bread and stories, through encounters with beauty and wildness. I mean a slowing down and focusing on the present moment, with its inexhaustible depths, rather than a dashing through life toward some ever-retreating goal.

"In the love of money," wrote the eighteenth-century Quaker John Woolman, "business is proposed, then the urgency of affairs push forward, and the mind cannot in this state discern the good and perfect will of God concerning us." One need not believe in God to sense how easily the love of money and the urgency of affairs may crush our inward life. So as to keep himself clear for the inward life and for service to his neighbors, Woolman chose to limit his business by closing a successful store that threatened to absorb all his care, relying instead on a small income from tailoring to support his family: "I saw that an humble man, with the blessing of the Lord, might live on a little, and that where the heart was set on greatness, success in business did not satisfy the craving; but that commonly with an increase of wealth the desire of wealth increased."

Indeed, if we imagine that the greatness we yearn for can be reckoned in dollars or pesos or yen, if we imagine it can be purchased in stores, then there will be no end to our craving, as the drug trade and corporate takeovers and political graft daily remind us. For an image of that insatiable frenzy, visit a casino, watch a game show, or look at brokers on the floor of any stock exchange as they race about and flail their arms and shout, their every gesture signifying *more*. Trucks for a company that refills vending machines in our town bear on their flanks the slogan SATISFACTION AT THE DROP OF A COIN, and billboards for the local mall proclaim SHOP LIKE YOU MEAN IT. But shopping will not give us meaning, and vending machines will not deliver satisfaction. Every time we jump in the car merely for the sake of motion, every time we browse the aisles of stores without needing a thing, or switch on television to banish silence, or surf the Net for distraction, or pump ourselves full of chemicals in search of a jolt, we are hunting for a freshness that we're far more likely to find in the place from which we set out, had we but eyes to see. In the scramble for money and things, we doom ourselves to frustration and we darken our souls.

Already two centuries ago, John Woolman realized that the earth, too, pays a price for our greed: "So great is the hurry in the spirit of this world, that in aiming to do business quickly and to gain wealth the creation at this day doth loudly groan." Thus our needs and the needs of the planet coincide. An outward modesty in dress and shelter and food not only leaves us more time and attention for pursuit of the Way, it also leaves more of the world's bounty for others to enjoy.

Each year the average American consumes roughly thirty times as much of the earth's nonrenewable resources as does the average citizen of India or Mexico. Who most needs to learn restraint? I won't presume to advise the poor how they should order their appetites. As for citizens in prosperous nations, most of us are living nowhere near the edge of survival. This very excess is reason for hope, because it means we could cut back dramatically on our consumption of food and fuel, our use of wood and metal, and on the size of our houses and wardrobes, without suffering any deprivation. We could not only free this surplus for others to use, now and in the future, but we could free ourselves from the burden of lugging it around. Just as we grow fat from eating and drinking too much, so we may grow fit from eating less. As we run ourselves ragged by chasing after too many thrills and tasks, so we may become centered and calm by remaining faithful to a few deep concerns. As we increase the likelihood of strife by scrambling for more wealth, so we may increase the likelihood of peace by living modestly and by sharing what we have.

Less burdened by possessions, less frenzied by activities, we might play more with our children, look after our elders, take

walks with our lovers, talk with friends, help neighbors, plant flowers, pick apples, read books, make music, learn to juggle or draw, pursue philosophy or photography, come to know the local trees and birds and rocks, watch clouds, study stars. We might take better care of the land. We might lie down at night and rise up in the morning without feeling the cramp of anxiety. Instead of leaping around like grasshoppers from notion to notion, we might sit still and think in a connected way about our families, our communities, and the meaning of life.

Scientists with a yen for large numbers have calculated that there are more possible paths among the neurons of the brain than there are elementary particles in the universe—hence our capacity for nearly infinite permutations of thought, no matter how bare our closets or calendars. Outward simplicity does not require us to be simple-minded, therefore, nor does it require grim renunciation, but offers instead the promise of elegance and renewal.

For days after reaching home from the Rockies, I felt oppressed by the glut of things, the din of messages, the seethe of machines, the bulk of buildings. My desk was mounded with mail. My floor was littered with unopened parcels. Lights blinked on the answering machine and dozens of requests lurked in the bowels of the computer. Family and friends, students and colleagues, neighbors and strangers marked my return by calling for help. Meanwhile, the basement faucet had sprung a leak, a gutter sagged, the car's engine was tapping ominously, our wildflower patch had all but disappeared under a surf of alien weeds, and grass too high for our tired mower waved in the June sunshine. Despite my yearning for simplicity, the life to which I had returned was over-full of duties and demands.

"You don't have to do everything your first day home," Ruth pointed out to me, as I set to work with my usual fury.

Even though I knew better, I kept imagining that if I could only

clear the decks, answer every request, fix every broken thing, *then* I would simplify my life. But trying to catch up once and for all is like digging a hole in sand: no matter how fast you shovel, new sand keeps pouring in. Unable to make any headway, missing the mountains, missing the company of my son, who had been caught up once more in his whirl of teenage friendships, I began to slide down the slope toward gloom.

Familiar with my moods from thirty years of marriage, Ruth kept an eye on me to make sure I didn't slide too far, and also to make sure I didn't throw out any crucial mail or junk the car or put up a FOR SALE sign in the front yard.

One evening that first week home, friends called to invite us out to their farm a few miles west of Bloomington for a look at the stars. Ruth covered the mouthpiece on the phone and told me she thought it would be a shame to squander this clear night.

"I've got too much work to do," I told her, pausing on my way upstairs with an armload of papers.

"You've been working since five o'clock this morning."

"Another few long days and I'll get caught up."

Ruth looked at me hard, then said into the phone, "We'll be there in half an hour."

I knew she was right to drag me away from my chores, so I went along without grumbling. Ruth has always been able to navigate through a maze of possessions without losing her way, and to carry in her mind a hundred tasks without sinking beneath the burden. On our drive into the country, whenever I began to speak about fixing the car or balancing the checkbook, she asked me about our time in the Rockies. So I told her in exuberant detail of quarreling with Jesse and making peace, of rafting through breakneck water on the Cache la Poudre, of snowshoeing up into avalanche country, told her of laying out all my gear on the corner of a green poncho, told her of meeting hummingbird and coyote and elk, told her of watching sunlight pour through the lodgepole pines and of listening all night to the creek.

By the time we rolled down the curving gravel drive to John and Beth's place, the mountain memories had steadied me. We could see our friends walking to meet us over a path of stepping-stones through grass allowed to grow waist-high for the sake of butterflies and birds, their silhouettes tall and thin against a background of stars.

I climbed out of the car with a greeting on my lips, but the sky hushed me. From the black bowl of space countless fiery lights shone down, each one a sun or a swirl of suns, the whole brilliant host of them enough to strike me dumb. The Milky Way arced overhead from Scorpius on the southern horizon to Cassiopeia in the north, reminding me of froth glimmering on the dark surface of North St. Vrain Creek. I knew the names of a dozen constellations and half a dozen of the brightest stars, but I was not thinking in words right then. The deep night drew my scattered pieces back to the center, stripped away all clutter and weight, and set me free.

TWELVE

BEAUTY

No star outshines my daughter. In the weeks and months since Eva's wedding, I have parceled out my joy into its elements, remembering the music, the flowers, the gowns and tuxedos, the friends whispering under the vaulted ceiling of the church. I can see the four grandmothers walking gingerly down the aisle clutching the arms of ushers, Ruth dabbing a handkerchief to her eyes as Jesse leads her to a seat, Jesse beaming and his blond hair newly shorn of dreadlocks gleaming. I see the groomsmen filing out with Matthew to stand expectantly near the altar, Matthew smiling through his beard as he gazes up the aisle for a glimpse of his bride, the bridesmaids in their dresses of midnight blue gathered around the shining face of my daughter.

In memory, I wait beside Eva in the vestibule to play my bit part as father of the bride. She is supposed to remain hidden from the congregation until her queenly entrance, but in her eagerness to see what's going on up front she leans forward to peek around the edge of the half-closed door. The satin roses appliqued to her gown catch the light as she moves, and the toes of her pale silk shoes peep out from beneath the hem. The flower girls watch her every motion. Twins a few days shy of their third birthday, they flounce their unaccustomed frilly skirts, twirl their bouquets, and stare with wide eyes down the great length of carpet leading

through the avenue of murmuring people. Eva hooks a hand on my elbow while the bridesmaids fuss over her, fixing the gauzy veil, spreading the long ivory train of her gown, tucking into her bun a loose strand of hair, which glows the color of honey filled with sunlight. Clumsy in my rented finery—patent leather shoes that are a size too small and starched shirt and stiff black tuxedo—I stand among these gorgeous women like a crow among doves. I realize they are gorgeous not because they carry bouquets or wear silk dresses, but because the festival of marriage has slowed time down until any fool can see their glory.

Concerned that we might walk too fast, as we did in rehearsal, Eva demonstrates once more a gliding ballet step to use as we process down the aisle—slide the sole of one shoe forward, bring the feet together, pause; slide, feet together, pause—all in rhythm with the organ.

"It's really simple, Daddy," she says, as I botch it again.

On an ordinary day, I would have learned the step quickly, but this is no ordinary day, and these few furtive seconds of instruction in the vestibule are not enough for my pinched feet. I fear that I will stagger like a wounded veteran beside my elegant daughter.

Eva, meanwhile, seems blissfully confident, not only of being able to walk gracefully, as she could do in her sleep, but of standing before this congregation and solemnly promising to share her life with the man who waits in thinly disguised turmoil at the far end of the aisle. Poised on the dais a step higher than Matthew, below the mystifying wooden cross, wearing a black ministerial robe and a white stole, is the good friend whom Eva and I know best as our guide on canoe trips through the Boundary Waters. He grins so broadly that his full cheeks push up against the round rims of his spectacles.

"There's one happy preacher," Eva says.

"He believes in marriage," I reply.

"So do I. Remember, Matt and I figured out that between you and Mom and his folks, our parents have been married fifty-eight years."

"So many?" I ask.

"Fifty-eight and counting." Eva lets go of my arm to lift a hand to her throat, touching the string of pearls she has borrowed from Ruth. The necklace was a sixteenth birthday gift to Ruth from her own parents, who have now been married over half a century all by themselves.

Love *can* be durable, I'm thinking, as Eva returns her free hand to my arm and tightens her grip. The arm she holds is my left one, close against my racing heart. On her own left arm she balances a great sheaf of flowers—daisies and lilies, marigolds, snapdragons, bee balm, feverfew—the sumptuous handiwork of a gardening friend, and in her left hand she holds a Belgian lace handkerchief, also borrowed from Ruth, in case she cries. But so far there's no welling of tears in those bold brown eyes.

The organ strikes up Bach's "Jesu, Joy of Man's Desiring" for the bridesmaids' entrance, and down the aisle they skim, those gorgeous women in midnight blue. The organist is another friend, the former choir director of our church, an old pro whose timing and touch are utterly sure, and likewise a generous man, who has postponed open heart surgery until next week in order to play for Eva's wedding. He tilts his head back to read the music through bifocals, then tilts it forward to study the progress of the bridesmaids, then tilts it back again as he raises the volume a notch for the entrance of the flower girls. Overawed by the crowd, the twins hang back until their mother nudges them along and they spy their father waving eagerly at them from the third row of seats, and then they dash and skip, carrying their fronds of flowers like spears.

Finally, only the bride and the father of the bride remain in the vestibule. Eva whispers, "Remember, now, don't walk too fast." But how can I walk slowly while my heart races? I have forgotten the ballet step she tried to show me. I want events to pause so that

I can practice the step, so that we can go canoeing once more in the wilderness, so that we can sit on a boulder by the sea and talk over life's mysteries, so that I can make up to my darling for anything she may have lacked in her girlhood.

But events do not pause. The organ sounds the first few bars of Purcell's "Trumpet Voluntary," our cue to show ourselves. We move into the open doorway, and two hundred faces turn their lit eyes on us. Eva tilts her face up at me, quirks the corners of her lips into a tight smile, and says, "Here we go, Daddy." And so, lifting our feet in unison, we go.

The wedding took place here in Bloomington, hometown for Matthew as well as Eva, on a sizzling Saturday in July. Now, as I write in early September, not quite two months later, I can summon up hundreds of details from that radiant day, but on the day itself I was aware only of a surpassing joy. The red glow of happiness had to cool before it would crystallize into memory.

Pardon my cosmic metaphor, but I can't help thinking of the physicists' claim that, if we trace the universe back to its origins in the Big Bang, we find the multiplicity of things fusing into greater and greater simplicity, until at the moment of creation itself there is only pure undifferentiated energy. Without being able to check their equations, I think the physicists are right. I believe the energy they speak of is holy, by which I mean it is the closest we can come with our instruments to measuring the strength of God. I also believe this primal energy continues to feed us, directly through the goods of Creation, and indirectly through the experience of beauty. The thrill of beauty is what entranced me as I stood with Eva's hand hooked over my arm while the wedding march played, as it entrances me on these September nights when I walk over dewy grass among the songs of crickets and stare at the Milky Way.

We are seeing the Milky Way, and every other denizen of the sky, far more clearly these days thanks to the sharp eyes of the

Hubble Space Telescope, as it orbits out beyond the blur of Earth's atmosphere. From data beamed down by the telescope, for example, I can summon onto my computer screen an image of Jupiter wrapped in its bands of cloud like a ball of heathery yarn. Then I view the planet after meteor fragments have burned a series of holes, like dark stepping-stones, in the frothy atmosphere. Next I call up the Cat's Eye Nebula, with its incandescent swirls of red looped around the gleam of a helium star, for all the world like the burning iris of a tiger's eye. This fierce glare began its journey toward earth three thousand years ago, about the time my Assyrian ancestors were in their prime and busy carving reliefs of a lion hunt to honor a bloodthirsty king. Pushing back deeper in time and farther in space, I summon onto my screen the Eagle Nebula, seven thousand light-years away, a trio of dust clouds upraised like rearing horses, their dark bodies scintillating with the sparks of newborn stars. I study images of quasars giving birth to galaxies, galaxies whirling in the shapes of pinwheels, supernovas ringed by strands of luminous debris, immense tornados of hot gas spiraling into black holes; and all the while I'm delving back and back toward that utter beginning when you and I and my daughter and her new husband and the bright heavenly host were joined in the original burst of light.

On these cool September mornings, I have been poring over two sets of photographs, those from deep space and those from Eva's wedding album, trying to figure out why such different images—of supernova and shining daughter, of spinning galaxies and trembling bouquets—set up in me the same hum of delight. The feeling is unusually intense for me just now, so soon after the nuptials, but it has never been rare. As far back as I can remember, things seen or heard or smelled, things tasted or touched, have provoked in me an answering vibration. The stimulus might be the sheen of moonlight on the needles of a white pine, or the iridescent glimmer on a dragonfly's tail, or the lean silhouette of

a ladder-back chair, or the glaze on a hand-thrown pot. It might be bird song or a Bach cantata or the purl of water over stone. It might be a line of poetry, the outline of a cheek, the arch of a ceiling, the savor of bread, the sway of a bough or a bow. The provocation might be as grand as a mountain sunrise or as humble as an icicle's jeweled tip, yet in each case a familiar surge of gratitude and wonder wells up in me.

Now and again some voice raised on the stairs leading to my study, some passage of music, some noise from the street, will stir a sympathetic thrum from the strings of the guitar that tilts against the wall behind my door. Just so, over and over again, impulses from the world stir a responsive chord in me—not just any chord, but a particular one, combining notes of elegance, exhilaration, simplicity, and awe. The feeling is as recognizable to me, as unmistakable, as the sound of Ruth's voice or the beating of my own heart. A screech owl calls, a comet streaks the night sky, a story moves unerringly to a close, a child lays an arrowhead in the palm of my hand, a welder installs a pair of railings on our front steps, my daughter smiles at me through her bridal veil, and I feel for a moment at peace, in place, content. I sense in those momentary encounters a harmony between myself and whatever I behold. The word that seems to fit most exactly this feeling of resonance, this sympathetic vibration between inside and outside, is *beauty*.

What am I to make of this resonant feeling? Do my sensory thrills tell me anything about the world? Does beauty reveal a kinship between my small self and the great cosmos, or does my desire for meaning only fool me into thinking so? Perhaps, as biologists maintain, in my response to patterns I am merely obeying the old habits of evolution. Perhaps, like my guitar, I am only a sounding box played on by random forces.

I must admit that two cautionary sayings keep echoing in my head, as they may well be echoing in yours. "Beauty is only skin deep," I've heard repeatedly, and "Beauty is in the eye of the beholder." Like most proverbs, these two convey partial truths that are commonly mistaken for the whole truth. Appealing surfaces may hide ugliness, true enough, as many a handsome villain or femme fatale should remind us. Some of the prettiest butterflies and mushrooms and frogs are also the most poisonous. It is equally true that our taste may be influenced by our upbringing, by training, by cultural fashion. One of my neighbors plants in his yard a pink flamingo made of translucent plastic and a concrete goose dressed in overalls, while I plant in my yard oxeye daisies and jack-in-the-pulpits and maidenhair ferns, and both of us, by our own lights, are chasing beauty. The women of one tribe scarify their cheeks, and the women of another tribe paint their cheeks with rouge, while the women of a third tribe hide their cheeks behind veils, each obeying local notions of loveliness.

Mustn't beauty be shallow if it can be painted on? Mustn't beauty be a delusion if it can blink off and on like a flickering bulb? A wedding gown will eventually grow musty in a mothproof box, flowers will fade, and the glow will seep out of the brightest day. I'll grant that we may be fooled by facades, we may be deceived by fashion, we may be led astray by our fickle eyes. But I have been married to Ruth for thirty years, remember. I've watched Eva grow for twenty-four years, Jesse for twenty, and these loved ones have taught me another possibility. Season after season I have knelt over fiddleheads breaking ground, have studied the wings of swallowtails nectaring on blooms, have spied skeins of geese high in the sky. There are books I have read, pieces of music I have listened to, ideas I have revisited time and again with fresh delight. I have lived among enough people whose beauty runs all the way through, I have been renewed by enough places and creatures, I have fed long enough from certain works of intellect and imagination, to feel absolutely certain that genuine beauty is more than skin deep, that real beauty dwells not in my own eye alone but out in the world.

While I can speak with confidence of what I feel in the pres-

ence of beauty, I must go out on a speculative limb if I am to speak about the qualities in the world that call it forth. Far out on that limb, therefore, let me suggest that a creature, an action, a landscape, a line of poetry or music, a scientific formula, or anything else that might seem beautiful, seems so because it gives us a glimpse of the underlying order of things. The swirl of a galaxy and the swirl of a gown resemble one another not merely by accident, but because they follow the grain of the universe. That grain runs through our own depths. What we find beautiful accords with our most profound sense of how things *ought* to be. Ordinarily, we live in a tension between our perceptions and our desires. When we encounter beauty, that tension vanishes, and outward and inward images agree.

Before I climb out any farther onto this limb, let me give biology its due. It may be that in pursuing beauty we are merely obeying our genes. It may be that the features we find beautiful in men or women, in landscape or weather, even in art and music and story, are ones that improved the chances of survival for our ancestors. Put the other way around, it's entirely plausible that the early humans who did *not* tingle at the sight of a deer, the smell of a thunderstorm, the sound of running water, or the stroke of a hand on a shapely haunch, all died out, carrying with them their oblivious genes.

Who can doubt that biology, along with culture, plays a crucial role in tuning our senses? The gravity that draws a man and woman together, leading each to find the other ravishing, carries with it a long history of sexual selection, one informed by a shrewd calculation of fertility and strength. I remember how astonished I was to realize, one rainy spring day in seventh grade, that the girl sitting in the desk beside me was suddenly, enormously *interesting*. My attention was riveted on Mary Kay's long blond hair, which fell in luxuriant waves over the back of her chair until it brushed against a rump that swelled, in a way I had

never noticed before, her green plaid skirt. As a twelve-year-old, I would not have called Mary Kay beautiful, although I realize now that is what she was. And I would have balked at the suggestion that my caveman ancestors had any say in my dawning desire, although now I can hear their voices grunting, Go for the lush hair, the swelling rump.

If we take a ride through the suburbs of my city or yours, and study the rolling acres of lawn dotted with clumps of trees and occasional ponds, what do we see but a faithful simulation of the African savannah where humans first lived? Where space and zoning laws permit, the expanse of green will often be decorated by grazing animals, docile and fat, future suppers on the hoof. The same combination of watering holes, sheltering trees, and open grassland shows up in paintings and parks the world over, from New Delhi to New York. It is as though we shape our surroundings to match an image, coiled in our DNA, of the bountiful land.

Perhaps in every case, as in our infatuation with lover or landscape, a sense of biological fitness infuses the resonant, eager, uplifting response to the world that I am calling beauty. Yet I persist in believing there is more to this tingle than an evolutionary reflex. Otherwise, how could a man who is programmed to lust after every nubile female nonetheless be steadily attracted, year after year, to the same woman? Why would I plant my yard with flowers that I cannot eat? Why would I labor to make these sentences fit my thoughts, and why would you labor to read them?

"Beauty is not a means," says Eudora Welty, "not a way of furthering a thing in the world. It is a result; it belongs to ordering, to form, to aftereffect." She is talking here about the writing of fiction, but I think her words apply to any human art. As far back as we can trace our ancestors, we find evidence of a passion for design—decorations on pots, beads on clothes, pigments on the ceilings of caves. Bone flutes have been found at human sites dating back more than thirty thousand years. So we answer the

magnificent breathing of the land with our own measured breath; we answer the beauty we find with the beauty we make. Our ears may be finely tuned for detecting the movements of predators or prey, but that does not go very far toward explaining why we should be so moved by listening to Gregorian chants or Delta blues. Our eyes may be those of a slightly reformed ape, trained for noticing whatever will keep skin and bones intact, but that scarcely explains why we should be so enthralled by the lines of a Shaker chair or a Durer engraving, or by photographs of meteor impacts on Jupiter.

As it happens, Jupiter is the brightest light in the sky on these September evenings, blazing in the southeast at dusk. Such a light must have dazzled our ancestors long before telescopes began to reveal the planet's husk of clouds or its halo of moons. We know that night watchers in many cultures kept track of the heavenly dance because the records of their observations have come down to us, etched in stone or inked on papyrus or stitched into stories. Did they watch so faithfully because they believed the stars and planets controlled their fate, or because they were mesmerized by the majesty of the night? I can't speak for them. But when I look at Jupiter, with naked eye or binoculars or in the magnified images broadcast down from the Hubble Telescope, I am not looking for a clue to the morning's weather or to the mood of a deity, any more than I am studying the future of my genes when I gaze at my daughter. I am looking for the sheer bliss of looking.

In the wedding scene that has cooled into memory, I keep glancing at Eva's face as we process down the aisle, trying to match my gawky stride to her graceful one. The light on her skin shimmers through the veil. A ripple of voices follows us toward the altar, like the sound of waves breaking on cobbles. The walk seems to go on forever, but it also seems to be over far too soon. Ready or not, we take our place at center stage, with the bridesmaids to

our left, Matthew and his groomsmen to our right. My heart thrashes like a bird in a sack.

The minister gives us both a steadying glance. Then he lifts his voice to inquire of the hushed congregation, "Who blesses this marriage?"

I swallow to make sure my own voice is still there, and say loudly, "The families give their blessing."

I step forward, lift Eva's hand from my arm and place it on Matthew's, a gesture that seemed small in rehearsal yesterday but that seems huge today. Then I climb onto the dais and walk to the lectern, look out over the sea of friends, and read a poem celebrating marriage. The words hover in the air a moment, then are gone.

Now my bit part is over. I leave the stage, carefully stepping around the long train of Eva's dress, and go to my seat beside Ruth, who still dabs a handkerchief to her eyes. I grasp her free hand, so deft and familiar. Thirty years after my own wedding, I want to marry her all over again. Despite my heart's mad thrashing, I have not felt like crying until this moment, as I sit here beside my own bride, while Eva recites her vows with a sob in her throat. When I hear that sob, tears rise in me, but joy rises more swiftly.

Judging from the scientists I know, including Eva and Ruth, and those whom I have read about, you cannot pursue the laws of nature very long without bumping into beauty. "I don't know if it's the same beauty you see in the sunset," a friend tells me, "but it *feels* the same." This friend is a theoretical physicist who has spent a long career deciphering, with pencil and paper and brain, what must be happening in the interior of stars. He recalls for me his thrill on grasping for the first time Dirac's equations describing quantum mechanics, or those of Einstein describing relativity. "They're so beautiful," he says, "you can see immediately they have to be true. Or at least on the way toward truth." I ask him

what makes a theory beautiful, and he replies, "Simplicity, symmetry, elegance, and power."

When Einstein was asked how he would have felt had the predictions arising from his equations not been confirmed, he answered that he would have pitied the Creator for having failed to make the universe as perfect as mathematics said it could be. Of course, his predictions were confirmed. Experiments revealed that light does indeed bend along the curvature of space, time slows down for objects traveling near the speed of light, and mass transmutes into energy.

Why nature should conform to theories we find beautiful is far from obvious. The most incomprehensible thing about the universe, as Einstein said, is that it *is* comprehensible. How unlikely, that a short-lived biped on a two-bit planet should be able to gauge the speed of light, lay bare the structure of an atom, or calculate the gravitational tug of a black hole. We are a long way from understanding everything, but we do understand a great deal about how nature behaves. Generation after generation, we puzzle out formulas, test them, and find, to an astonishing degree, that nature agrees. A welder opens the valve on his acetylene torch and strikes a spark, foreseeing the burst of flame. An architect draws designs on flimsy paper, and her buildings stand up through earthquakes. We launch a satellite into orbit and use it to bounce our messages from continent to continent. The machine on which I write these words embodies a thousand insights into the workings of the material world, insights that are confirmed by every tap of the keys, every burst of letters on the screen. My vision is fuzzy, but I view the screen clearly through plastic lenses, their curvature obeying the laws of optics first worked out in detail by Isaac Newton.

By discerning patterns in the universe, Newton believed, he was tracing the hand of God. Even in our secular age, scientists who ponder the origin of things still sometimes appeal to religious language, as when Stephen Hawking concludes *A Brief*

History of Time by proposing that a complete theory of the universe would enable us to "know the mind of God." Although you will find more than half a dozen references to God in Hawking's last chapter, you will not find that name in the index. It is as if the Creator were an embarrassing visitor to a cosmos supposedly ruled by logic and accident.

The dilemma for science is neatly summed up in remarks made by another physicist, Dennis Sciama, who said in an interview, "It's true that people have, internally, a religious feeling, which they use the word God to express, but how can a feeling inside of you tell you that a thing made the whole universe?" How indeed? Divinity won't register on meters. It leaves no track in the eye of the telescope. "The word God," Sciama adds, "just doesn't denote any structure." Little wonder, then, that scientists in our day have largely abandoned the notion of a Creator as an unnecessary hypothesis, or at least an untestable one. While they share Newton's faith that the universe is ruled everywhere by a coherent set of rules, they cannot say, as scientists, how these particular rules came to govern things. You can do science without believing in a divine Legislator, but not without believing in laws.

I spent my teenage years scrambling up the mountain of mathematics, aiming one day to read the classic papers of Einstein and Dirac with comprehension. During my college summers, as I sat on a forklift in a Louisiana factory between trips to the warehouse with loaded crates, I often worked problems in calculus on the backs of shipping pads. Men passing by would sometimes pause to study my scribbles. When they asked what I was doing, I said, Just messing around. I couldn't bring myself to admit that I was after the secrets of the universe. My visitors would frown or grin, baffled, and josh me about having my head stuck way up there in the clouds.

I never rose as high as the clouds. Midway up the slope of mathematics I staggered to a halt, gasping in the rarefied air, well

before I reached the heights where the equations of Einstein and Dirac would have made sense. Nowadays I add, subtract, multiply, and do long division when no calculator is handy, and I can do algebra and geometry, and even trigonometry in a pinch, but that is about all that I have kept from the language of numbers. Still, I remember glimpsing patterns in mathematics that seemed as bold and beautiful as a skyful of stars on a clear night.

I am never more aware of the limitations of language than when I try to describe beauty. Language can create its own loveliness, of course, but it cannot deliver to us the radiance we apprehend in the world, any more than a photograph can capture the stunning swiftness of a hawk or the withering power of a supernova. Eva's wedding album holds only a faint glimmer of the wedding itself. All that pictures or words can do is gesture beyond themselves toward the fleeting glory that stirs our hearts. So I keep gesturing.

"All nature is meant to make us think of paradise," Thomas Merton observed. Because Creation puts on a nonstop show, beauty is free and inexhaustible, but we need training in order to perceive more than the most obvious kinds. Even fifteen billion years or so after the Big Bang, echoes of that event still linger in the form of background radiation. Just so, I believe, the experience of beauty is an echo of the order and power that permeate the universe. To measure background radiation, we need subtle instruments; to measure beauty, we need alert intelligence and our five keen senses.

The word *aesthetic* derives from a Greek root meaning sensitive, which derives in turn from a verb meaning to perceive. The more sensitive we are, the more we may be nourished by what Robinson Jeffers called "the astonishing beauty of things." Anyone can take delight in a face or a flower. You need training, however, to perceive the beauty in mathematics or physics or chess, in the architecture of a tree, the design of a bird's wing, or the shiver of breath through a flute. For most of human history, that training has come from elders who taught the young how to pay attention. By paying attention we learn to savor all sorts of patterns, from quantum mechanics to patchwork quilts.

Again, this predilection brings with it a clear evolutionary advantage, for the ability to recognize patterns helped our ancestors to select mates, find food, avoid predators. But this applies to all species, and yet we alone compose symphonies and crossword puzzles, carve stone into statues, map time and space. Have we merely carried our animal need for shrewd perception to an absurd extreme? Or have we stumbled onto a deep congruence between the structure of our minds and the structure of the universe?

I am persuaded the latter is true. I am convinced there is more to beauty than biology, more than cultural convention. It flows around and through us in such abundance, and in such myriad forms, as to exceed by a wide margin any mere evolutionary need. Which is not to say that beauty has nothing to do with survival: I think it has everything to do with survival. Beauty feeds us from the same source that created us. It reminds us of the shaping power that reaches through the flower stem and through our own hands. It restores our faith in the generosity of nature. By giving us a taste of the kinship between our own small minds and the great Mind of the Cosmos, beauty reassures us that we are exactly and wonderfully made for life on this glorious planet, in this magnificent universe. I find in that affinity a profound source of meaning and hope. A universe so prodigal of beauty may actually *need* us to notice and respond, may need our sharp eyes and brimming hearts and teeming minds, in order to close the circuit of Creation.