

Also by Robin Wall Kimmerer

Gathering Moss

BRAIDING  SWEETGRASS

Robin Wall Kimmerer


milkweed
editions

the sound. One by one they joined in, singing in the long shadows and a drift of white petals settling on our shoulders. *That saved a wretch like me. I once was lost but now I'm found.*

I was humbled. Their singing said everything that my well-intentioned lectures did not. On and on they went, adding harmonies as they walked. They understood harmony in a way that I did not. I heard in their raised voices the same outpouring of love and gratitude for the Creation that Skywoman first sang on the back of Turtle Island. In their caress of that old hymn I came to know that it wasn't naming the source of wonder that mattered, it was wonder itself. Despite my manic efforts and my checklist of scientific names, I knew now that they hadn't missed it all. *Was blind, but now I see.* And they did. And so did I. If I forget every genus and species I ever knew, I'll never forget that moment. The worst teacher in the world or the best teacher in the world—neither can be heard over the voices of Silverbells and Hermit Thrushes. The rush of waterfalls and the silence of mosses have the last word.

As an enthusiastic young PhD, colonized by the arrogance of science, I had been fooling myself that I was the only teacher. The land is the real teacher. All we need as students is mindfulness. Paying attention is a form of reciprocity with the living world, receiving the gifts with open eyes and open heart. My job was just to lead them into the presence and ready them to hear. On that smoky afternoon, the mountains taught the students and the students taught the teacher.

As I drove home that night, the students slept or studied by dimming flashlight. That Sunday afternoon changed forever my way of teaching. A teacher comes, they say, when you are ready. And if you ignore its presence, it will speak to you more loudly. But you have to be quiet to hear.

SITTING IN A CIRCLE

Brad arrives at our wilderness field station for ethnobotany class in loafers and a polo shirt. I watch him wander the shoreline, looking in vain for a cell phone signal, looking like he really needs to talk to somebody. "Nature's great and all," he says as I show him around, but the remoteness makes him uneasy. "There's nothing here but trees."

Most of our students come to the Cranberry Lake Biological Station with effervescent enthusiasm, but there are always a few who arrive with only resignation to endure five weeks away from the wired world—a graduation requirement. Over the years, the demeanor of the students has become a pretty good mirror for the changing relationships to nature. They used to arrive motivated by childhoods filled with camping or fishing or messing about in the woods. Today, while their passion for wilderness has not diminished, they now report that their inspiration comes from Animal Planet or the National Geographic channel. More and more often, the reality of nature outside the living room takes them by surprise.

I try to reassure Brad that the woods are just about the safest place in the world. I confess that I experience the same unease when I go to the city, a slight panic of not knowing how to take care of myself, where there's nothing but people. But I know it is a tough transition: We are seven miles across the lake with no road access, not a scrap of pavement, and completely surrounded by wilderness for a day's walk in any direction. It's easily an hour to medical help and three to a Walmart. "I mean, what if you need something?" he says. I guess he's going to find out.

After just a few days of being here, the students start to metamorphose into field biologists. Their confidence with the equipment and the insider jargon gives them a new swagger. They constantly practice learning Latin names and count coup by using them. At the evening volleyball games it's perfectly excusable in biostation culture to miss the ball if your opponents call out "*Megaceryle alcyon!*" when a kingfisher rattles along the shore. These are good things to know, to begin to discriminate the living world into individuals, to discern the threads in the weave of the woods, to attune to the body of the land.

But I also see that when we put scientific instruments in their hands they trust their own senses less. And when they put more energy into memorizing Latin names, they spend less time looking at the beings themselves. The students come already knowing a lot about ecosystems and can identify an impressive list of plants. But when I ask how these plants take care of them, they cannot say.

So, at the start of my ethnobotany class, we brainstorm a list of human needs, with the goal of discovering which of them the Adirondack plants might be able to meet. It's a familiar list: food, shelter, heat, clothing. I'm glad that oxygen and water make it into the top ten. Some of the students have studied Maslow's hierarchy of human needs and take it beyond survival into the "higher" levels of art, companionship, and spirituality. This of course elicits some dubious comedy about people whose needs for interpersonal connection are met by carrots. Putting that observation aside, we begin with shelter—by building our classroom.

They've chosen the site, marked the geometry on the ground, harvested saplings and set them deep in the soil, so we have a twelve-foot circle of neatly spaced maple poles. It's hot and sweaty work, at first done mostly as individuals. But when the circle is complete and the first pair of saplings are joined in an arch, the need for a team becomes clear: the tallest to grab the treetops, the heaviest to hold them down, the smallest to scramble up and lash them in place. The creation of one arch calls for the next and they are led by the emerging shape of the wigwam. Its inherent symmetry makes any mistakes obvious and the students tie and untie until they get it right. The woods are full

of their bright voices. When the last pair of saplings is tied, quiet falls as they see what they have made. It looks like an upside-down bird's nest, a basket of thick saplings domed like a turtle's back. You want to be inside.

All fifteen of us can find a comfortable seat around the perimeter. Even without a covering, it feels cozy. Few of us live in round houses anymore, where there are no walls or corners. Indigenous architecture tends to the small and round, though, following the model of nests and dens and burrows and redds and eggs and wombs—as if there were some universal pattern for home. With our backs leaning against the saplings, we consider this convergence of design. A sphere has the highest ratio of volume to surface area, minimizing the materials needed for living space. Its form sheds water and distributes the weight of a snow load. It is efficient to heat and resistant to wind. Beyond material considerations, there is cultural meaning to living within the teachings of a circle. I tell them that the doorway always faces east and they quickly assess its utility, given the prevailing westerly winds. The utility of greeting the dawn is not yet part of their thinking, but the sun will show them.

This bare frame of a wigwam is not done teaching. It needs walls of cattail mats and a birch bark roof tied with spruce root. There's still work to be done.

I see Brad before class and he's still looking glum. I try to cheer him up and tell him, "We're going shopping across the lake today!" There *is* a tiny shop in the town across the lake, the Emporium Marine, the kind of general store you find off the beaten track that always seems to have the very thing you need, next to the shoelaces, cat food, coffee filters, a can of Hungry-Man stew, and a bottle of Pepto-Bismol. But that's not where we're going. The cattail marsh has *something* in common with the Emporium; but I suppose a comparison to Walmart is more appropriate, as they both sprawl over acres of land. Today we will shop at the marsh.

At one time marshes had a bad reputation for slimy beasts, disease, stink, and all manner of unpleasantness until people realized how valuable they are. Our students now sing the praises of wetland biodiversity and their ecosystem functions, but that still doesn't mean they want to walk in them, and they eye me skeptically when I explain that gathering cattails is most efficiently accomplished *in* the water. I reassure them that there are no poisonous water snakes this far north, no quicksand, and that the snapping turtles generally hunker down when they hear us coming. I do not say the word *leeches* aloud.

Eventually they all follow me and manage to exit their canoes without capsizing. We wade like herons through the marsh, minus the grace and poise, the students tentative among the floating islets of shrubs and grasses, feeling for solidity before committing their weight to the next step. If their young lives have not already shown them, they will learn today that solidity is an illusion. The lake bottom here lies under several feet of suspended muck, as solid as chocolate pudding.

Chris is the most fearless, and—bless him—he leads the way. Grinning like a five-year-old, he stands nonchalantly in the channel, waist deep, elbow resting against a sedge hummock as if it were an armchair. He's never done this before but encourages the others anyway, offering advice to those teetering on a log: "Just get it over with so you can relax and have fun." Natalie takes the plunge as she shouts, "Become one with your inner muskrat!" Claudia steps back to avoid the muddy splash. She's scared. Like an elegant doorman, Chris gallantly offers her a hand into the muck. Then a long trail of bubbles rises up behind him and breaks the surface in a loud burble. He blushes under his mud-streaked face and shifts his feet as everyone eyes him. Another long trill of foul-smelling bubbles erupts behind him. The class cracks up and soon everybody is smooshing through the water. Swamp walking releases a stream of fart jokes as inevitably as methane "swamp gas" is released by our footsteps. The water is about thigh deep in most places, but every now and then there is a shriek—and then laughter—when someone discovers the chest-deep holes. I hope it's not Brad.

To pull cattails, you reach under water to the base of the plant and

tug. If the sediments are loose enough or if you're strong enough, you can pull up the whole plant, rhizome and all. The problem is that you can't tell whether the shoot will snap or not until you tug with all your might and it suddenly breaks free, leaving you sitting in the water with muck dripping from your ears.

The rhizomes, essentially underground stems, are a real prize. Brown and fibrous on the outside, they are white and starchy on the inside, almost like a potato, and they taste pretty good roasted in the fire. Soak cut rhizomes in clean water and you'll soon have a bowl of pasty white starch that can become flour or porridge. Some of the hairy rhizomes have a stiff white shoot emerging from their end, a more than vaguely phallic organ of horizontal propagation. This is the growing point that will spread the cattails through the marsh. Invoking the hierarchy of human needs, some of the guys have a little fun with them when they think I'm not looking.

The cattail plant—*Typha latifolia*—is like a giant grass: no distinct stem, but rather a rolled bundle of leaves that sheathe around each other in concentric layers. No one leaf could withstand wind and wave action, but the collective is strong and the extensive underwater network of rhizomes anchors them in place. Harvested in June, they're three feet high. Wait until August and you have leaves eight feet long, each about an inch wide and strengthened by the parallel veins running from base to softly waving leaf tip. These circular veins are themselves encircled by sturdy fibers, all working to support the plant. In turn, the plant supports the people. Cattail leaves, split and twisted, are one of the easiest sources of plant cordage, our string and twine. Back at camp, we'll make twine for the wigwam and thread fine enough for weaving.

Before long, the canoes are brimming with bundles of leaves and look like a flotilla of rafts on a tropical river. We tow them to shore, where we begin to sort and clean them by taking each plant apart, leaf by leaf, from the outside in. As she strips off the leaves, Natalie drops hers quickly to the ground. "Ooh, it's all slimy," she says, and starts to wipe her hands on her muddy pants, as if that will help. When you

pull the leaf bases apart, gobs of cattail gel stretch like clear watery mucus between the leaves. At first it seems gross, but then you notice how good your hands feel. I've often heard herbalists say that "the cure grows near to the cause," and, accordingly, though gathering cattails is guaranteed to get you sunburned and itchy, the antidote to discomfort is in the plants themselves. Clear and cool and clean, the gel is refreshing and antimicrobial, the swamp's answer to aloe vera gel. The cattails make the gel as a defense against microbes and to keep the leaf bases moist when water levels drop. These same properties that protect the plant protect us too. It feels so soothing on sunburn that soon the students are smearing themselves with slime.

Cattails have evolved other features that are perfectly adapted for a life spent standing in the marsh. The bases of the leaves are under water, but they still need oxygen for respiration. So, like scuba divers with air tanks, they equip themselves with spongy, air-filled tissue, nature's Bubble Wrap. These white cells, called aerenchyma, are big enough to be seen with the naked eye and make a buoyant, cushiony layer at the base of each leaf. The leaves are also coated with a waxy layer, a waterproof barrier like a raincoat. But this raincoat works in reverse, keeping water-soluble nutrients inside, so that they don't leach away into the water.

This is all good for the plant, of course—and it's good for people. The cattails have made a superb material for shelter in leaves that are long, water repellent, and packed with closed-cell foam for insulation. In the old times, fine mats of cattail leaves were sewn or twined to sheathe a summer wigwam. In dry weather, the leaves shrink apart from one another and let the breeze waft between them for ventilation. When the rains come, they swell and close the gap, making the mat waterproof. Cattails also make fine sleeping mats. The wax keeps away moisture from the ground and the aerenchyma provide cushioning and insulation. A couple of cattail mats—soft, dry, and smelling like fresh hay—under your sleeping bag make for a cozy night.

Squeezing the soft leaves between her fingers, Natalie says, "It's almost as if the plants made these things for us." The parallels between the adaptations evolved by the plants and the needs of the people are

indeed striking. In some Native languages the term for plants translates to "those who take care of us." Through natural selection the cattails developed sophisticated adaptations that increase their survival in the marsh. The people were attentive students and borrowed solutions from the plants, which increased *their* likelihood of survival. The plants adapt, the people adopt.

As we keep peeling away leaves they get thinner and thinner, like the husks of corn as you get near the cob. At the center the leaves nearly merge with the stem, a soft column of white pith as thick as your pinkie and as crisp as a summer squash. I snap the pith into bite-size pieces and pass it around. Only after I eat mine do the students venture a nibble, looking at each other sideways. Moments later they're hungrily stripping stalks for themselves like pandas in a bamboo patch. Sometimes called Cossacks' asparagus, the raw pith tastes like a cucumber. It can be sautéed, boiled, or simply eaten fresh on the lakeshore by hungry college students after their bag lunches are just a memory.

Back across the marsh, you can easily see where we've been harvesting. It looks like big muskrats have been at work. The students wade into a heated conversation about their own impact.

Our shopping canoes are already filled with leaves for clothing, mats, twine, and shelter. We have buckets of rhizomes for carbohydrate energy, stalks of pith for vegetables—what more could people need? The students compare our haul to their list of human needs. They note that while the cattails are impressive in their versatility, there are some gaps: protein, fire, light, music. Natalie wants pancakes added to the list. "Toilet paper!" offers Claudia. Brad has an iPod on his list of essentials.

We wander the aisles of the supermarket of the swamp to search out additional products. The students start pretending they're at an actual Walmart, Lance offering to be the greeter at the door of Wal-marsh so he doesn't have to wade back in. "Pancakes, ma'am? Aisle five. Flashlights? Aisle three. Sorry—we don't carry iPods."

Cattail flowers hardly look like flowers at all. The stalk is about five feet tall and ends in a plump green cylinder, neatly tucked at the waist into two halves, males above and females below. Wind pollinated,

the froth of male flowers bursts open to release a cloud of sulfur-yellow pollen into the air. The pancake crew scans the marsh for these beacons. They gently slip a small paper bag over the stalk, crumple it tightly closed, and then shake. At the bottom of the bag there is about a tablespoon of bright yellow powder and perhaps an equivalent volume of bugs. Pollen (and bugs) are almost pure protein, a high-quality food to complement the starchy rhizomes back in the canoe. Once the bugs are picked out, it can be added to biscuits and pancakes, adding nutritional value and a beautiful golden color. Not all of the pollen ends up in the bag and the students emerge decorated with tie-dye splashes of yellow.

The female half of the stalk looks like a skinny green hot dog on a stick, a nubbly sponge of tightly packed ovaries waiting for pollen. We'll boil them in a little salt water and then drench them in butter. Holding both ends of the stalk like an ear of corn, you just nibble off the immature flowers as if the stalk were a skewer. The taste and texture are remarkably like an artichoke's. Cattail kebabs for dinner.

I hear shouting and see clouds of fluff drifting on the air, so I know that the students have reached Walmarsh aisle three. Each tiny flower matures to a seed attached to a plume of fluff, making up the familiar cattail, a handsome brown sausage at the end of the stalk. At this time of year, wind and winter have picked away at them until they are just wads like cotton batting. The students tear it from the stalk and stuff it into sacks, destined for pillows or bedding. Our foremothers must have been grateful for a thick marsh. One of the names for cattail in the Potawatomi language is *bewiieskwīnuk*, meaning "we wrap the baby in it." Soft, warm, absorbent—it was both insulation and diaper.

Elliot calls back to us: "I found the flashlights!" The stalks with matted fuzz traditionally were dipped in fat and lit to make a serviceable torch. The stalk itself is remarkably straight and smooth, almost like a lathed dowel. Our people gathered these for many uses, including arrow shafts and drills for creating handmade friction fire. A puff of cattail fluff was usually kept in a fire-making bundle as tinder. The students gather it all and bring their bargains back to the canoes.

Natalie still wades nearby; she calls out that she's going to "Marsh-alls" next. Chris is not back yet.

On wings of fluff, the seeds blow far and wide to establish new colonies. Cattails grow in nearly all types of wetlands, wherever there is adequate sun, plentiful nutrients, and soggy ground. Midway between land and water, freshwater marshes are among the most highly productive ecosystems on earth, rivaling the tropical rainforest. People valued the supermarket of the swamp for the cattails, but also as a rich source of fish and game. Fish spawn in the shallows; frogs and salamanders abound. Waterfowl nest here in the safety of the dense sward, and migratory birds seek out cattail marshes for sanctuary on their journeys.

Not surprisingly, hunger for this productive land precipitated a 90 percent loss of the wetlands—as well as the Native people who depended upon them. Cattails are also soil builders. All those leaves and rhizomes return to the sediments when the cattails die back. What hasn't been eaten lies beneath the water, only partially decomposing in the anaerobic waters, building up peat. It is rich in nutrients and has the water-holding capacity of a sponge, making it ideal for truck crops. Decried as "wastelands," marsh draining for agriculture was carried out on a huge scale. So-called "muck farms" plow under the black soil of drained marshes, and a landscape that once supported some of the world's highest biodiversity now supports a single crop. In some places the old wetlands are just paved over for parking. A true waste of land.

Just as we're tying down the load in our canoes, Chris comes walking along the shore with a secret smirk and something behind his back. "Here you go, Brad. I found your iPods." He has two dry milkweed pods, which he fits over his eyes and holds in place with a squint: eye pods.

By the end of the mucky, sunburned, laughing, and leech-free day, we have boats piled high with material for rope, bedding, insulation, light, food, heat, shelter, rain gear, shoes, tools, and medicine. As we're paddling home, I wonder if Brad is still worried that we might "need something."

A few days later, fingers roughened by harvesting and weaving mats, we gather in the wigwam with slits of sun coming through our

walls of cattail mats, sitting on cattail cushions. The top of the dome is still open to the sky. Surrounded by our woven classroom, it feels like being an apple in a basket, everyone nestled together. The roof is the last step, and rain is in the forecast. We already have a pile of birch bark sheets waiting to become our ceiling, so we head out to gather the last materials.

I used to teach just the way I was taught, but now I let someone else do all the work for me. If plants are our oldest teachers, why not let them teach?

After the long hike from camp, our shovels clanking against rocks and the relentless torment of deerflies on sweaty skin, the shade feels like a dip into cool water. Still swatting, we drop our packs by the trail to rest for a moment in the mossy hush. The air is redolent with DEET and impatience. Maybe the students already sense the line of welts that the blackflies will leave, where that gap of unprotected skin opens between shirt and pants when you're down on all fours, grubbing for roots. They'll lose some blood but still I envy them the experience to come, the beginner's mind.

The forest floor here is all spruce needles, rusty brown, deep and soft, with the occasional pale drift of maple or black cherry leaves. Ferns, mosses, and trailing partridgeberry glow in the few sun flecks that penetrate the dense canopy. We're here to harvest *watap*, the roots of white spruce, *Picea glauca*—a cultural keystone for Indigenous peoples throughout the Great Lakes, strong enough to stitch together birch bark canoes and wigwams, flexible enough for beautiful baskets. The roots of other spruces are serviceable, but it's worth hunting for the glaucous foliage and pungent feline odor of white spruce.

We thread our way among the spruces, snapping off dead branches that threaten to poke out an eye as we search for just the right spot. I want them to learn how to read the forest floor, to develop the X-ray vision that helps you see the roots beneath the surface, but it's hard to break down intuition into a formula. Choose a place between two

spruces to maximize your chances, as level as possible, and avoid a spot with rocks. A well-decayed log nearby is welcome and a mossy layer is a good sign.

In gathering roots, just plunging in will get you nothing but a hole. We have to unlearn hurrying. This is all about slowness. "First we give. Then we take." Whether it's cattails or birch or roots, the students have gotten used to this preharvest ritual, invoking the Honorable Harvest. Some close their eyes and join me and some realize it's a good time to fumble through their backpacks for a missing pencil. I murmur to the Spruces who I am and why I've come. Using bits of Potawatomi and bits of English, I ask their kind permission for digging. I ask if they'll share with these dear young people what only they can give, their physical bodies and their teachings. I'm asking for something more than roots and leave a little tobacco in return.

The students gather round, leaning on their shovels. I brush away the layer of old leaves, flaky and fragrant like aged pipe tobacco. I take out my knife and make the first incision through the duff—not deep enough to sever veins or muscle, just a superficial slice through the forest skin—slide my fingers beneath the cut edge, and pull back. The top layer peels away and I set it aside for safekeeping, to replace when we're done. A centipede runs blindly in the unaccustomed light. A beetle dives for cover. Laying open the soil is like a careful dissection and there is the same astonishment among the students at the orderly beauty of the organs, the harmony of how they rest against one another, form to function. These are the viscera of the forest.

Against the black humus, colors stand out like neon lights on a dark wet street. Juicy school bus orange, goldthread roots crisscross the ground. A web of creamy roots, each as thick as a pencil, connects all the sarsaparillas. Chris says right away, "It looks like a map." With roads of different colors and sizes, it really does. There are interstates of heavy red roots whose origins I do not know. We tug on one and few feet away a blueberry bush jounces in reply. White tubers of Canada mayflower are connected by translucent threads like county roads between villages. A mycelial fan of pale yellow spreads out from

a clump of dark organic matter, like the small dead-end streets of a cul-de-sac. A great dense metropolis of fibrous brown roots emanates from a young hemlock. They all have their hands in it now, tracing the lines, trying to match the root colors to the aboveground plants, reading the map of the world.

The students think they've seen soil before. They've dug in their gardens, planted a tree, held a handful of freshly turned earth—warm, crumbly, and ready for a seed. But that handful of tilled soil is a poor cousin to the soil of the forest, as a pound of hamburger is to the whole blooming pasture of cows and bees and clover, meadowlarks, woodchucks, and all that binds them together. Backyard soil is like ground meat: it may be nutritious but it has been homogenized beyond recognition of its origins. Humans make agricultural soils by tilling; forest soils simply make themselves through a web of reciprocal processes that few have the chance to witness.

Carefully lift away the sod of herb roots and the soil beneath is as black as morning java before the cream—humus, moist and dense, black flour as silky as the finest coffee grounds. There is nothing “dirty” about soil. This soft black humus is so sweet and clean you could eat it by the spoonful. We have to excavate a bit of this gorgeous soil to find the tree roots and sort out which is which. The maples, birches, and cherries are too brittle—we only want spruce. The spruce roots, you can tell by feel; they're taut and springy. You can pluck one like a guitar string and it twangs against the ground, resilient and strong. Those are the ones we're looking for.

Slip your fingers around it. Tug and it starts to pull up from the ground, leading you off to the north, so you clear a little channel in that direction to free it. But then its path is intersected by another coming in from the east, straight and sure, as if it knows where it's going. So you excavate there, too. Dig some more and then there are three. Before long, it looks like a bear has been clawing up the ground. I go back to the first, cut an end free, and then duck it under the others, over, under, over, under. I'm separating a single wire in the scaffold that holds up the forest, but I find that it can't be freed without unraveling the others.

A dozen roots are exposed, and somehow you need to choose one and follow it without breaking it, so that you have one great, long continuous strand. It's not easy.

I send the students off gathering, to read the land and see where it says *roots*. They go crashing off through the woods, their laughter flashing bright in the dim coolness. For a time they continue to call to each other, loudly cursing the flies biting under the edge of their untucked shirts.

They disperse so as not to concentrate the harvest in any one spot. The root mat is easily as big as the canopy above. Harvesting a few roots won't cause real harm, but we're careful to repair the damage we do. I remind them to fill in the furrows we've made, set the goldthread and the mosses back in place, and empty their water bottles over their wilting leaves when the harvest is done.

I stay at my patch, working my roots and listening to the chatter slowly subside. I hear an occasional grunt of frustration nearby. A splutter when soil flies up in someone's face. I know what their hands are doing and sense where their minds are as well. Digging spruce roots takes you someplace else. The map in the ground asks you over and over, Which root to take? Which is the scenic route, which is the dead end? The fine root you'd chosen and so carefully excavated suddenly dives deep under a rock where you can't follow. Do you abandon that path and choose another? The roots may spread out like a map, but a map only helps if you know where you want to go. Some roots branch. Some break. I look at the students' faces, poised midway between childhood and adulthood. I think the tangle of choices speaks clearly to them. Which route to take? Isn't that always the question?

Before long all the chatter ceases and a mossy hush befalls us. There is just the *ssshhhh* of wind in the spruce, and a calling winter wren. Time goes by. Way longer than the fifty-minute classes they're used to. Still, no one speaks. I'm waiting for it, hoping. There is a certain energy in the air, a hum. And then I hear it, someone singing, low and contented. I feel the smile spread across my face and breathe a sigh of relief. It happens every time.

In the Apache language, the root word for land is the same as

the word for mind. Gathering roots holds up a mirror between the map in the earth and the map of our minds. This is what happens, I think, in the silence and the singing and with hands in the earth. At a certain angle of that mirror, the routes converge and we find our way back home.

Recent research has shown that the smell of humus exerts a physiological effect on humans. Breathing in the scent of Mother Earth stimulates the release of the hormone oxytocin, the same chemical that promotes bonding between mother and child, between lovers. Held in loving arms, no wonder we sing in response.

I remember the first time I dug roots. I came looking for raw materials, for something I could transform into a basket, but it was me who was transformed. The crisscross patterns, the interweaving of colors—the basket was already in the ground, stronger and more beautiful than any I could make. Spruce and blueberries, deerflies and winter wren, the whole forest held in a wild native basket the size of a hill. Big enough to hold me too.

We rendezvous back at the trail and show off our coils of root, the guys bragging about whose is biggest. Elliot stretches his out on the ground and lies next to it—more than eight feet from toes to outstretched fingertips. “It went right through a rotten log,” he says, “so I went, too.” “Yeah, mine too,” adds Claudia. “I think it was following the nutrients.” Most of their coils are shortish pieces, but the stories are longer: a sleeping toad mistaken for a rock, a lens of buried charcoal from a long-ago fire, a root that suddenly broke and showered Natalie in soil. “I loved it. I didn’t want to stop,” she says. “It’s like the roots were just waiting there for us.”

My students are always different after root gathering. There is something tender in them, and open, as if they are emerging from the embrace of arms they did not know were there. Through them I get to remember what it is to open to the world as gift, to be flooded with the knowledge that the earth will take care of you, everything you need right there.

We also show off our root-gathering hands: black to the elbow, black

under every nail, black in every crevice like a ritual glove of henna, our nails like tea-stained china. “See?” says Claudia, pinkies raised for tea with the queen, “I got the special spruce root manicure.”

On the way back to camp, we stop at the stream to clean the roots. Sitting on rocks, we soak them awhile, along with our bare feet. I show them how to peel the roots with a little vise made of a split sapling. The rough bark and fleshy cortex strip away like a dirty sock from a slender white leg. Beneath, the root is clean and creamy. It spools around your hand like thread, but will dry as hard as wood. It smells clean and sprucy.

After unweaving the roots from the ground, we sit by the brook and weave our first baskets. With beginner’s hands they turn out lopsided but they hold us nonetheless. Imperfect they may be, but I believe they are a beginning of a reweaving of the bond between people and the land.

The wigwam roof goes on easily as the students sit on each other’s shoulders to reach the top and tie the bark in place with roots. Pulling cattails and bending saplings, they remember why we need each other. In the tedium of weaving mats and with the absence of iPods, storytellers emerge to relieve the boredom and songs arise to keep the fingers flying as if they remembered this, too.

In our time together, we’ve built our classroom, feasted on cattail kebabs, roasted rhizomes, and eaten pollen pancakes. Our bug bites were soothed by cattail gel. And there are cordage and baskets to finish, so in the roundness of the wigwam, we sit together, twining and talking.

I tell them how Darryl Thompson, a Mohawk elder and scholar, once sat with us as we made cattail baskets. “It makes me so happy,” he said, “to see young people getting to know this plant. She gives us all that we need to live.” Cattails are a sacred plant and appear in the Mohawk Creation stories. As it turns out, the Mohawk word for cattail has much in common with the Potawatomi word. Their word also refers to cattails in the cradleboard, but with a twist so lovely that tears spring to my eyes. In Potawatomi, the word means “we wrap the baby in it”; in Mohawk, it means that the cattail wraps humans in her gifts,

as if *we* were *her* babies. In that one word we are carried in the cradle-board of Mother Earth.

How can we ever reciprocate such a wealth of care? Knowing that she carries us, could we shoulder a burden for her? I'm mulling over how to ask this when Claudia edges in with a comment that mirrors my thoughts: "I don't mean this to sound disrespectful or anything. I think it's great to ask the plants if we can take them, and give them tobacco, but is that enough? We're taking an awful lot of stuff. We were pretending like we were shopping for cattails, right? But we just took all this stuff without paying for it. When you really think about it, we just shoplifted at the swamp." And she's right. If cattails are the Walmart of the marsh, then the security alarms at the exits would be blaring at our canoes full of stolen merchandise. In a sense, unless we find a way to enter into reciprocity, we are walking away with goods for which we have not paid.

I remind them that the gift of tobacco is not a material one, but a spiritual gift, a means of conveying our highest regard. I've asked some elders about this over the years and heard a range of answers. One man said that gratitude is our only responsibility. He cautioned against the arrogance of thinking we have the capacity to give back to Mother Earth anything approaching what she gives us. I honor the *edbesendowen*, the humility inherent in that perspective. And yet it seems to me we humans have gifts in addition to gratitude that we might offer in return. The philosophy of reciprocity is beautiful in the abstract, but the practical is harder.

Having your hands busy tends to free up your mind, and the students play with the idea as we twine cattail fiber between our fingers. I ask them what we can possibly offer cattail or birch or spruce. Lance snorts at the idea: "They're just plants. It's cool that we can use them, but it's not like we owe them anything. They're just there." The others groan and then look at me, waiting for a reaction. Chris is planning to go to law school, so he takes over the conversation like a natural. He says, "If cattails are 'free' then they're a gift and all we owe is gratitude. You don't pay for a gift, you just graciously accept." But Natalie objects:

"Just because it's a gift, does that make you any less beholden? You should always give something back." Whether it's a gift or a commodity, you still have incurred an unpaid debt. One moral, the other legal. So, were we to act ethically, don't we have to somehow compensate the plants for what we received?

I love listening to them consider such a question. I don't believe that average Walmart shoppers stop to consider their debt to the land that has produced their purchases. The students ramble and laugh as we work and weave, but come up with a long list of suggestions. Brad proposes a permit system in which we do pay for what we take, a fee to the state that goes to support wetland protection. A couple of kids take the route of generating appreciation for wetlands, proposing school workshops on the values of cattails. They also suggest defensive strategies: to reciprocate with protection against the things that threaten cattails, to organize pulls of invasive species like phragmites or purple loosestrife. To go to a town planning board meeting and speak up for wetland preservation. To vote. Natalie promises to get a rain barrel at her apartment, to reduce water pollution. Lance swears that he'll boycott fertilizing the lawn next time his parents give him that chore, to stop runoff. To join Ducks Unlimited or the Nature Conservancy. Claudia vows to weave coasters of cattail and give them to everyone for Christmas, so they'll remember to love wetlands whenever they use them. I thought they would have no answer, but I was humbled by their creativity. The gifts they might return to cattails are as diverse as those the cattails gave them. This is our work, to discover what we can give. Isn't this the purpose of education, to learn the nature of your own gifts and how to use them for good in the world?

As I listen to them, I hear another whisper from the swaying stand of cattails, from spruce boughs in the wind, a reminder that caring is not abstract. The circle of ecological compassion we feel is enlarged by direct experience of the living world, and shrunken by its lack. Had we not waded waist deep in the swamp, had we not followed muskrat trails and rubbed ourselves with soothing slime, had we never made a spruce root basket or eaten cattail pancakes, would they even be

debating what gifts they could offer in return? In learning reciprocity, the hands can lead the heart.

On the last night of the course, we decide to sleep in our wigwam, hauling our sleeping bags down the trail at dusk and laughing around the fire until late. Claudia says, "I'm sad to leave here tomorrow. I'm going to miss feeling so connected to the land when I'm not sleeping on cattails." It takes real effort to remember that it's not just in a wigwam that the earth gives us everything we need. The exchange of recognition, gratitude, and reciprocity for these gifts is just as important in a Brooklyn flat as under a birch bark roof.

When the students start to leave the fire circle with their flashlights in twos and threes to whisper, I sense a conspiracy. Before I know it they are lined up with makeshift song sheets like a choir in the firelight. "We have a little something for you," they say and start a marvelous anthem of their own creation, filled with crazy rhymes of spruce roots and hiking boots, human needs and marshy reeds, cattail torches on our porches. The song crescendos to a rousing chorus of "no matter where I roam, when I'm with plants I'll be at home." I couldn't imagine a more perfect gift.

With all of us packed into the wigwam like down caterpillars, the slow slide to sleep is punctuated by laughs and last scraps of conversation. Remembering the improbable rhyme of "ecotones and baked rhizomes," I start to giggle too, sending a ripple across the sleeping bags like a wave across a pond. As we eventually drift off, I feel us all held beneath the dome of our bark roof, an echo of the starry dome above. The quiet settles in until all I can hear is their breathing and the whisper of the cattail walls. I feel like a good mother.

When the sun pours in the eastern door, Natalie wakes first, tiptoes over the others, and steps outside. Through the slits in the cattails I watch as she raises her arms and speaks her thanks to the new day.

BURNING CASCADE HEAD

"The dance of renewal, the dance that made the world,
was always danced here at the edge of things, on the brink,
on the foggy coast."

—URSULA K. LE GUIN

Far out beyond the surf they felt it. Beyond the reach of any canoe, half a sea away, something stirred inside them, an ancient clock of bone and blood that said, "It's time." Silver-scaled body its own sort of compass needle spinning in the sea, the floating arrow turned toward home. From all directions they came, the sea a funnel of fish, narrowing their path as they gathered closer and closer, until their silver bodies lit up the water, redd-mates sent to sea, prodigal salmon coming home.

The coastline here is scalloped with countless coves, clothed in fog banks, and cut with rainforest rivers, an easy place to lose your way, where landmarks can vanish in the fog. The spruce are heavy on the shore, their black cloaks hiding signs of home. The elders speak of lost canoes that strayed in the wind and landed on a sand spit not their own. When the boats are too long gone, their families go down to the beach to light a blaze among the driftwood, a beacon to sing them home to safety. When the canoes finally approach, laden with food from the sea, the hunters are honored in dances and songs, their dangerous journey repaid by faces alight with gratitude.