Gathering Moss

A Natural and Cultural History of Mosses

by

Robin Wall Kimmerer

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For my family

Cover photograph by Larkin Kimmerer

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The Web of Reciprocity: Indigenous Uses of Moss

With the first scent of burning sage, the ripples on the surface of my mind become still and it is as if I am looking deep into clear sunlit water. Murmured prayer surrounds me with wisps of smoke and I can hear each word inside me. My uncle Big Bear smudges us in the old way, calling upon the sage to carry his thoughts to the Creator. The smoke of our sacred plants is thought made visible and his thoughts are a blessing breathed in.

Big Bear's voice is low; he's tired from a day driving into the city where he's been negotiating to obtain an old school building, abandoned in the remote foothills of the Sierra. I admire the way he walks in both worlds, that of government red tape and the traditional ways. His vision is to start a new kind of school for kids in the area. His school would teach the fundamentals. How to read a river in order to catch a fish, how to gather food plants, how to live in a way that is respectful of those gifts. He values a modern education and is proud of his grandsons' straight A's. But, in his work with troubled families he sees every day the costs of not learning about respectful relationship.

In indigenous ways of knowing, it is understood that each living being has a particular role to play. Every being is endowed with certain gifts, its own intelligence, its own spirit, its own story. Our stories tell us that the Creator gave these to us, as original instructions. The foundation of education is to discover that gift within us and learn to use it well.

These gifts are also responsibilities, a way of caring for each other. Wood Thrush received the gift of song; it's his responsibility to say the evening prayer. Maple received the gift of sweet sap and the coupled responsibility to share that gift in feeding the people at a hungry time

of year. This is the web of reciprocity that the elders speak of, that which connects us all. I find no discord between this story of creation and my scientific training. This reciprocity is what I see all the time, in studies of ecological communities. Sage has its duties, to draw up water to its leaves for the rabbits, to shelter the baby quail. Part of its responsibility is also to the people. Sage helps us clear our minds of ill thoughts, and carry our good thoughts upward. The roles of mosses are to clothe the rocks, purify the water, and soften the nests of birds. That much is clear. I'm wondering though, what is the gift they share with the people?

If each plant has a particular role and is interconnected with the lives of humans, how do we come to know what that role is? How do we use the plant in accordance with its gifts? The legacy of traditional ecological knowledge, the intellectual twin to science, has been handed down in the oral tradition for countless generations. It passes from grandmother to granddaughter gathering together in the meadow, from uncle to nephew fishing on the riverbank, and next year to the students in Big Bear's school. But, where did it first come from? How did they know which plant to use in childbirth, which plant to conceal the scent of a hunter? Like scientific information, traditional knowledge arises from careful systematic observation of nature, from the results of innumerable lived experiments. Traditional knowledge is rooted in intimacy with a local landscape where the land itself is the teacher. Plant knowledge comes from watching what the animals eat, how Bear harvests lilies and how Squirrel taps maple trees. Plant knowledge also comes from the plants themselves. To the attentive observer, plants reveal their gifts.

The sanitized suburban life has succeeded in separating us from the plants that sustain us. Their roles are camouflaged under layers of marketing and technology. You can't hear the rustle of corn leaves in a box of Froot Loops. Most people have lost the ability to read the role of a medicine plant from the landscape and read instead the "directions for use" on a tamper-proof bottle of Echinacea. Who would recognize those purple blossoms in this disguise? We don't even know their names anymore. The average person knows the name of less than a dozen

plants, and this includes such categories as "Christmas Tree." Losing their names is a step in losing respect. Knowing their names is the first step in regaining our connection.

I was so lucky. I grew up knowing plants, wandering the fields and staining my fingers red with tiny wild strawberries. My baskets were pretty crude, but I loved gathering the willow shoots and soaking them in the creek. My mother taught me the names of plants, and my father which trees made the best firewood. When I went away to college to study botany, the focus shifted. I learned all about plant physiology and anatomy, habitat distributions, and cell biology. We carefully studied plant interactions with insects, with fungi, and with wildlife. But I don't think a word was ever said about people. Especially not Native people, even though our college sits on the ancestral homelands of the Onondaga, the center of the great Iroquois Confederacy. Humans were carefully excluded from the story, either by accident or by design, I'm not sure. I got the impression that the stature of science would somehow be lessened if we included human relationships. So when Jeannie asked me to be a partner in guiding plant walks at Onondaga Nation, I was at first reluctant. I admitted with regret that all I could offer were names and explanations of ecology. I found that Jeannie valued the scientific way of knowing that I could bring to our class, but of course, I ended up learning much more than I taught.

I have been blessed with good teachers. I am grateful for the guidance of my friend and teacher, Jeannie Shenandoah, a traditional Onondaga herbalist and midwife. There is solidity about her, she moves as if she is aware of the ground beneath her feet. We grew to share a wonderful partnership in our teaching. I'd contribute whatever I knew about the biology of the plants we found, and she would share her knowledge of traditional uses. Walking beside her, clipping twigs of crampbark for childbirth, poplar buds for salves, I began to understand the woods in a different way. I had studied with fascination the intricate connections between plants and the rest of the ecosystem. But the web of interconnection had never before included me, except as an observer, outside looking in. Then from Jeannie I learned to treat my daughter's cough with syrup from the black cherry on my hilltop, and lower a

fever with boneset collected from the edge of my pond. As I gathered greens for dinner I regained my childhood relationship with the woods, one of participation, of reciprocity, and thanksgiving. It's just about impossible to feel academic detachment from the land with a bellyful of wild leeks, fragrant, hot, and buttered.

I have been wrapped up in the lives of mosses for lots of years, but I understand that our encounters had been at arm's length. We met on an intellectual plane. They teach me about their lives, but our lives have not been joined. To really know them, I need to know what role was given them when the world was beginning. What did the Creator whisper to them about their gift in caring for people? I asked Jeannie about how her people had used mosses and she didn't know. They weren't used as a medicine or a food. I know that mosses must be a part of this web of reciprocal relationship, but generations removed from the immediate connection, how are we to know? Jeannie showed me that the plants still remember, even when the people have forgotten.

In traditional ways of knowing, one way of learning a plant's particular gift is to be sensitive to its comings and goings. Consistent with the indigenous worldview that recognizes each plant as a being with its own will, it is understood that plants come when and where they are needed. They find their way to the place where they can fulfill their roles. One spring Jeannie told me about a new plant that had appeared along the old stone wall in her hedgerow. Among the buttercups and mallows was a big clump of blue vervain. She'd never seen it there before. I offered up some explanation about how the wet spring had changed the soil conditions and made way for it. I remember how she raised a skeptical eyebrow, but respectfully did not correct me. That summer, her daughter-in-law was diagnosed with liver disease. She came to Jeannie for help. Vervain is an excellent tonic for the liver and it was waiting in the hedgerow. Over and over again, plants come when they are needed. Is there something in this pattern that can tell us anything about how mosses were used? They occur everywhere, as part of the everyday landscape, so small that they often escape our notice. In the language of plant signs, perhaps this speaks of their role in human households, a small and unobtrusive role. It's the small everyday items we miss the most when they are gone.

I asked Big Bear and other elders what they could tell me of moss use and found nothing. There are too many generations and too much government-sponsored assimilation between the elders today and those who used the mosses. So much has been lost through disuse. So like any good academic I went to the library. I pored over the archived field notes of anthropologists to forage for old connections to mosses, reading old ethnographies to try and glean a hint of what the old ones would say if I could only ask. I hoped these pages would be like the sage smoke, their thoughts made visible.

I take great pleasure in gathering plants, filling my basket with roots and leaves. Usually I go with a specific plant in mind, when it's time for elderberries or the bergamot is heavy with oils. But it's the wandering itself that has such appeal, the unexpected discoveries while looking for something else. I get the same feeling in the library. It's so very much like picking berries—the peaceful field of books, the concentrated attention of the search, and the knowledge that hidden somewhere in the thicket is something worth finding.

I sifted through dictionaries of native languages, looking to see if there were indigenous words recorded for moss. I assumed that if moss was part of the everyday vocabulary, then it was also part of everyday use. In obscure proceedings of various academic societies, I found not one word, but many. Words for moss, for tree moss, berry moss, rock moss, water moss, and alder moss. The English dictionary on my desk has only one, reducing the 22,000 species to a single type.

While mosses live in every habitat, and are named by the people, I'm finding scarcely a trace of them in the transcribed notes from anthropologists. Maybe they played so small a role that their presence was scarcely worth reporting. Or maybe the reporters didn't know enough to ask. For example, I'm finding accounts of building homes, from longhouses to wigwams, replete with construction details on the way that planks were hewn and bark shingles applied. There is hardly a mention that mosses were used to chink the cracks between the logs. That's not very noteworthy until the winter wind comes rushing in. An icy wind at the back of your neck does tend to grab your attention.

The insulating nature of packed moss was also good for keeping winter cold away from fingers and toes. In browsing through source

after source, I find that northern people traditionally lined their winter boots and mittens with soft mosses for an extra layer of insulation. When the renowned "Ice Man," a 5,200-year-old body from a melting Tyrolean glacier, was recovered, his boots were found to be packed with mosses, including *Neckera complanata*. The moss actually provided an important clue as to his origins, since *Neckera* was known to occur only in lowland valleys, some sixty miles to the south. In the boreal forest, where feather mosses are a blanket beneath the spruces, their warm cushioning was also put to good use in bedding and pillows. Linnaeus, the "father of modern plant taxonomy," reports sleeping on a bedroll of portable *Polytrichum* moss, as he traveled among the indigenous Sammi peoples of Lapland. A pillow made of *Hypnum* mosses was said to impart special dreams to the sleeper. In fact, the genus name *Hypnum* refers to this trancelike effect.

I can glean that mosses were woven as decoration into baskets, used as lamp wicks and for scrubbing dishes. I'm pleased to have discovered these small notes that show that people were not oblivious of mosses, that they did play a role in daily life. But I'm also disappointed. There is nothing here that speaks of a special gift from the Creator, a unique role that could be fulfilled by no other plant. After all, dry grass can also insulate boots and a layer of pine needles can make a soft bed, too. I was hoping to find a use that reflects the essence of mossness. I was hoping to find that the people of that distant time knew mosses the way I do.

The library brought me a little further, but intuition told me that the story found there was incomplete. Every way of knowing has its own strengths and weaknesses. Taking a breather, hidden behind the accumulated stacks of books, I remembered going with Jeannie to look for plants just as soon as the snow melted and green shoots started to poke up through the winter's matted leaves. One of the first plants we found in bloom was coltsfoot, growing along the gravelly bank of Onondaga Creek. A botanist might explain this preference for March streambanks by its physiologic requirements, or perhaps its intolerance of competition. This is quite probably true. However, in the Onondaga understanding, coltsfoot grows here because it is near to its use; the medicine lies close to the source of the illness. After a long winter, just

after the ice goes out, the running water is irresistible to kids. They wade and splash and race sticks in the current, soaking themselves, oblivious to the deep chill until they get home and wake up coughing in the night. Coltsfoot tea is good for just that kind of cough, the kind that comes with wet feet in small children. Another tenet of indigenous plant knowledge is that we can learn a plant's use by where it occurs. For example, it's well known that a medicinal plant frequently occurs in the vicinity of the source of the illness. There's nothing in Jeannies' telling that negates the scientific explanation. It expands the question beyond how coltsfoot lives beside the creek, to the question of why, crossing over a boundary where plant physiology cannot follow.

The plant's purpose can be read through its place. I remember this when I'm tromping through the woods and mistakenly grab a vine of poison ivy to haul myself up a steep bank. I look immediately for its companion. Remarkable in its fidelity, jewelweed is growing in the same moist soil as the poison ivy. I crush the succulent stem between my palms with a satisfying crunch and a rush of juice, and wipe the antidote all over my hands. It detoxifies the poison ivy and prevents the rash from ever developing.

So, if plants show us their uses by where they live, what is the message from mosses? I think of where they live, in bogs, along streambanks, and in the spray of the waterfalls where salmon jump. And if this weren't sign enough, they reveal their gifts every time it rains. Mosses have a natural affinity for water. Watch a moss, dry and crisp, swell with water after a thunderstorm. It's teaching its role, in language more direct and graceful than anything I've found in the library.

Perhaps the limited information on mosses in nineteenth-century anthropology is rooted in the fact that most of the observers of indigenous communities were upper-crust gentlemen. They focussed their studies on what they could see. And what they could see was conditioned by the world they came from. Their notebooks bulged with records of the pursuits of men; hunting, fishing, and making tools. When moss once appeared in a weapon, as wadding behind a harpoon tip, it was described in considerable detail. Then, just at the point when I'm ready to give up the search, I find it. A single entry. You can almost

see the blush in the brevity of the statement: "Moss was in widespread use for diapers and sanitary napkins."

Imagine the complex relationships that lie behind that one entry, reduced to a single sentence. The most important uses of mosses, roles that reflect their best gifts, were everyday tools in the hands of women. Somehow I'm not surprised that the gentlemen ethnographers did not delve into the details of baby care, particularly the unglamorous but inescapable issue of diapers. And yet what could be more fundamental to the survival of a family than the well-being of babies? In this time of disposable diapers and antiseptic baby wipes, it's hard to envision infant care without this technology. If I try to imagine carrying an infant on my back all day without benefit of diapers, I don't like the image that comes to mind. I know with certainty that our grandmothers' grandmothers would have figured out an ingenious solution. In this most fundamental aspect of family life, mosses showed their great utility. To say nothing of humility. Babies were packed in their cradleboards in a comfy nest of dried moss. We know that *Sphagnum* moss can absorb twenty to forty times its weight in water. This rivals the performance of Pampers, making it the first disposable diaper. A pouch filled with mosses was probably as vital to those mothers as is the ubiquitous diaper bag today. The plentiful air spaces in dried *Sphagnum* would wick the urine away from the baby's skin, just as it wicks up moisture in a bog. The acid astringency and mildly antiseptic properties even prevented diaper rash. Like the coltsfoot, the spongy mosses placed themselves near at hand, right at the edge of the shallow pools where mothers knelt to wash their babies. They came where they were needed. As a mother at the beginning of a new millennium, I feel a certain regret that my babies never felt the touch of soft moss against their skin, forging a bond with the world that Pampers can never provide.

A woman's life was also intertwined with mosses during her menstrual period, known as her "moontime" in many traditional cultures. Dry mosses were widely used as sanitary napkins. Again, the ethnographic information is sketchy here, as males were not privy to the activities of women in menstrual seclusion huts. I imagine the huts as gathering places for the women in synchronous moontime, which occurs in

communities subject to night skies uninterrupted by artificial light. The conventional wisdom of anthropologists is that menstruating women were isolated from daily life because they were unclean. But this interpretation grew from the cultural assumptions of the anthropologists and not from indigenous women themselves, who tell a different story. Yurok women describe a time of meditation and speak of special mountain pools where only moontime women were permitted to bathe. Iroquois women tell that any prohibitions on women's activities in their moontime arose because women were at the height of their spiritual powers at this time, and the powerful flow of energy could disrupt the balance of energy around them. In some tribal people, menstrual seclusion was a time of spiritual purification and training, akin to the sweat-lodge training of men. Tucked among the objects in their huts must have been baskets of mosses, selected with great care for their purpose. It seems an inescapable conclusion that women were skilled observers of different moss species, knowing their texture and creating an intimate taxonomy long before Linnaeus. The good missionary ladies must have grimaced in horror at this practice, but I think something was lost in the transition to boiled white rags.

I find another ethnography, this one written by a woman, Erna Gunther. It is full of observations of the work of women, particularly food preparation. Mosses themselves were not used for food. I've tasted them and one bitter gritty taste will dispel any thought of a meal of mosses. But while they were not eaten directly, they were an important part of food preparation among the tribes of the rainy Pacific Northwest where mosses are especially abundant. The two staple foods in the watershed of the Columbia River are salmon and camas root, both of which are revered for their gifts of sustaining the people and both of which are connected to mosses.

Salmon harvesting is generally an activity that requires the contribution of the entire family. Fishing itself is the province of the men and the women prepare the fish for drying over an alderwood fire. The dried smoked salmon will feed the tribe throughout the year and the process must be done carefully in order to assure the quality and the safety of the food. Prior to drying, the slimy coating on the newly caught fish must be wiped away. This removes potential toxins and

keeps the fish from shriveling up when it is dried. In early days, salmon wiping was done with mosses. Ethnographies of the Chinook-speaking peoples describe how women would store large quantities of dry moss in boxes and baskets, to have an ample supply on hand when the salmon were running.

Mosses play a supporting role in another staple food of the Northwest, camas. Camas (*Camassia quamash*) is a member of the lily family and produces a spray of royal blue flowers in the spring. The wet meadows where it occurs were carefully tended by the tribes, including the Nez Perce, the Calapooya, and the Umatilla. Careful tending by burning, weeding, and digging produced large camas prairies. Lewis and Clark reported expanses of blooms so huge that from a distance they mistook the camas swales for shimmering blue lakes. The expedition had survived a difficult crossing of the Bitterroot Mountains and was near starvation. The Nez Perce fed them on their winter stores of camas and saved their lives.

The underground bulb is starchy and crisp, tasting somewhat like a raw potato. It is usually not eaten fresh, but painstakingly prepared by a method that yields a thick paste with the sweetness of molasses. The camas was prepared by creation of a pit oven for baking and steaming. The earthen pit was lined with hot rocks and layers of camas bulbs were placed in the pit. A mat of wet moss was then laid over the camas, building up a stack of alternating layers of moss and camas. The entire oven was topped with ferns and a fire built over the top, which burned all night long. The wet mosses provided a source of steam, which permeated the camas bulbs and baked them to a deep brown color. When the oven was opened and cooled, the steamed camas was shaped into loaves or bricks for storage. Camas was consumed all year round and traded widely throughout the west, packaged in a wrapping of moss and ferns.

Camas remains an honored ceremonial food among the western tribes, even today. At Onondaga in upstate New York, the year is marked by ceremonies of thanksgiving to the plants, as they appear each in their turn, first the maples, then the strawberries, the beans, and the corn. October at Big Bears in California brings a feast to acknowledge the acorns. As far as I know, there is no special ceremony for mosses.

Maybe it's more fitting to honor these small everyday plants in small everyday ways. Cradling our babies, holding our blood, stanching a wound, keeping out the cold—isn't this the way we find our place, by participation in the life of the world?

The people gather together to give thanks that the plants, the grand and the humble, have once again fulfilled their caregiving responsibilities to the people. Tobacco will be burned in their honor. In my culture, tobacco is a bringer of knowledge. I think it's also important that we honor the different paths that lead to knowledge, the teachers in the oral tradition, the teachers in the written tradition, and the teachers among the plants. It's the time we should also turn our thoughts to our own responsibilities. In the web of reciprocity, what is our special gift, our responsibility that we offer to the plants in return?

Our ancient teachers tell us that the role of human beings is respect and stewardship. Our responsibility is to care for the plants and all the land in a way that honors life. We are taught that using a plant shows respect for its nature, and we use it in a way that allows it to continue bringing its gifts. The role of our sacred sage is to make thoughts visible to the Creator. We can learn from this teacher and live in such a way that our thoughts of respect and gratitude are also made visible to the world.

The Owner

The letter had no return address. I'd been summoned by an invisible man, with an offer I couldn't refuse. The letter, on thick white paper, requested my "expert services as a bryologist, to consult on an ecosystem restoration project". It sounded pretty good.

The goal was to "create an exact replica of the flora of the Appalachians, in a native plant garden." The owner was "committed to authenticity and wished to ensure that mosses were included in the restoration." Not only that, he requested "guidance on matching the correct species of moss to the proper rock types in the landscape." That was to be my task should I accept their generous offer. The letter had no personal signature, just the name of the garden. I read the letter again. It sounded too good to be true. There are few people interested in ecological restoration, let alone restoration of mosses. One of my research interests at the time was to understand how mosses were able to establish themselves on bare rock. This invitation seemed like the perfect match. I was intrigued by the project, and as a new professor, I was admittedly flattered by the prospect of using my expertise and getting paid consultant fees to do it. The letter had an air of urgency about it, so I made plans to go as soon as possible.

I pulled over to the roadside to unfold the directions which lay on the seat beside me. My instructions requested precise punctuality and I was trying to oblige. I'd been driving since dawn to reach this lovely valley, where bluebirds dove across the winding road into impossibly green pastures of June. An old rock wall ran beside the road and even from the car I could admire the mossy cover it had amassed over its long life. Down South, they call these "slave fences" in acknowledgement of the hands that laid the rocks. A century's worth of *Brachythecium* softens the edges and the memory. The directions had me follow the stone wall until the chain-link fence began. "Turn left to the gate. It will open

at 10:00 a.m." Indeed, just as I arrived, the massive gate rolled smoothly away to the side, responding to some unseen commander. It was startling to find such security in this valley, which seemed more suited to horse-drawn wagons than electric eyes.

I started up the steep hill, gravel crunching under my tires. I had four minutes. Around a bend in the road, I could see a rooster tail of dust against the blue morning sky. It was creeping up the hill ahead of me so slowly I know I'd be late. Around the switchback, laboring up the hill, I got a glimpse of what I was following. My brain rejected the image. Trees don't move. But there it was again—the bare spring branches of a tree visible against the hillside, and it was heading uphill. I could see clearly now. It was an oak tree, riding piggyback on a flatbed truck. Now this was not a standard nursery-size tree with tidy burlapped root ball. No, this was a big old granddaddy oak. We had one like it on our farm in Kentucky, a huge burr oak with low spreading branches that cast a pool of shade the size of a house. It took two of us to reach our hands around it. There is no way you can move trees of this stature. And yet here it was—strapped to a truck like a circus elephant on a parade float. The root ball was twenty feet across and tethered to the truck with steel cables. The truck pulled over and steam rose from under the hood as I passed by, staring.

The road ended in a lot full of construction vehicles, all with engines running. The scraped earth was surrounded by a collection of barns and open-doored garages. I parked next to a row of dusty Jeeps and looked around for my host. There were dozens of people moving about, at a frenetic pace that reminded me of an anthill disturbed. Trucks were loaded and sped away. Most of the workers were dark and small. They wore blue jumpsuits and called to each other in Spanish. One man stood out in his red shirt and white hardhat. His folded arms announced that he was waiting for me and that I was late.

Introductions were brief. Looking at his watch, he commented that the owner monitors the use of consultants' time carefully. Time is money. He pulled the radio from his belt to inform some higher authority of my arrival. I was handed off to a young man who emerged from an office in the barn. His shy smile and warm handshake felt like an apology for the brusque welcome and he seemed eager to escort me away from

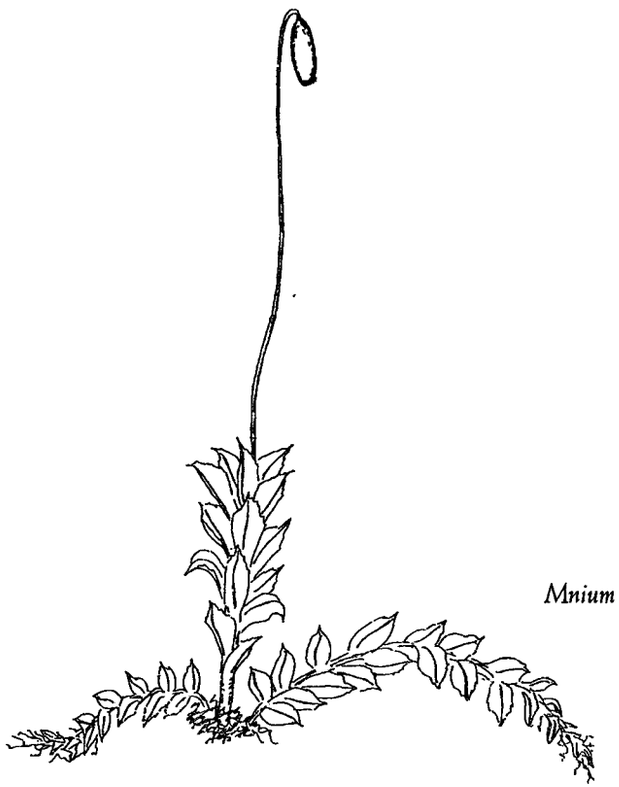
the center of activity. This was Matt, fresh out of college with a newly minted horticulture diploma. It was his second year working on the garden and it was he who had petitioned the owner to invite in a moss consultant to help with his assigned and somewhat overwhelming task of moss restoration. Matt knew that his work had high visibility in the design of the garden. Apparently the owner was especially fond of mosses, so the pressure for success was high. His goal was botanical accuracy in the plantings, and erasing the newness of the garden by introducing mosses throughout the landscape. Matt strode ahead and I followed, down a newly poured sidewalk through the construction site. He wanted me to look first at the moss garden. We could cut through the house to get there, since the owner was not at home.

The brand-new house had the look of an old manor and was surrounded by huge trees set into the bare soil: tulip poplar, buckeye, and a gnarled sycamore. Each was anchored by guy wires and black tubing ran through the canopy. The oak I had met on the road had arrived and a gaping hole stood ready for its roots. It would stand right outside a wall of leaded glass windows. "I didn't know you could buy trees that big," I said. "You can't," Matt replied. "We have to buy the land and then dig them up. We have the biggest tree spade in the world." He watched the shock on my face for a moment and then looked away, picking sheepishly at his hands, and then recovered his professional demeanor. "This one came in from Kentucky." He explained that every tree was treated with chemicals to reduce transplant shock and then a drip irrigation system was installed in its canopy. It operated on a timer and delivered a spray of nutrients and hormones to stimulate root growth. The garden had a team of expert arborists, and they had not lost a tree yet. The entire grove around the house had been transplanted, trees cut from their soil by enormous tree spades and trucked here to restore an ecosystem.

Matt disarmed the security system with a swipe of a card and we passed into the air-conditioned dimness of the house. This side entryway was a virtual gallery of African art. Carved masks and geometric weavings lined the walls. A cowhide drum, a wooden flute stood on stone pedestals and I stopped and stared. "It's all authentic," Matt told me, proudly. "He's a collector." He stood by as I looked around and let my amazement

polish his status. Each piece was labeled with its village of origin and the name of the artist. It was an impressive display. At the center of the atrium in a discreetly alarmed case spotlights were focused on an elaborate hairpiece. Its intricate design of bees and flowers was carved from luminous ivory. I was immediately struck by how out of place it seemed on its velvet platform, more like a stolen treasure than a work of art. How much more beautiful it would have been in the black oiled hair of the artist's wife. And more authentic. In a display case, a thing becomes only a facsimile of itself, like the drum hung on the gallery wall. A drum becomes authentic when human hand meets wood and hide. Only then do they fulfill its intention.

We passed through a vaulted room holding the swimming pool and I was unquestionably dazzled. The pool stood in a room decorated with hand-painted tiles and lush tropical vegetation. The marble floor glowed and the pool gurgled invitingly. I felt as if I had walked onto a movie set. Lounge chairs were casually placed around the pool, thick towels folded and ready for the convenience of guests. The stemware



Mnium cuspidatum

arranged on the patio tables was exactly the same ruby color as the towels. "The owner will be here this weekend," Matt said, waving his hand at the preparations. We finally made it to the kitchen, where I was offered a drink of water from a Dixie cup.

The courtyard garden at the center of the house was Matt's first concern. He walked a little taller through the lush green he'd created. Every manner of tropical plant was there: birds of paradise, orchids, tree ferns. Paving stones made a path completely carpeted by *Mnium*. It was a spectacular array of feathery green as smooth as the mossy lawn of a Japanese garden. He'd been having trouble keeping the moss alive and constantly had to go back out to the woods to get more to maintain the unbroken surface. So we spoke of water chemistry and soil conditions as he scribbled in his notebook. I was feeling useful at last, giving advice on matching the right moss species to the garden environment so that it might naturally regenerate itself. I cautioned him about the ethics of wild gathering. The woods shouldn't be a nursery for his garden. His garden would be successful only when it became self sustaining. At the center of the garden stood a sculptured rock taller than either of us and beautifully covered with mosses. Each carefully chosen clump accented the irregularities of the boulder. An eroded pocket in the rock was filled with a perfect circlet of *Bryum*. The artistry rivaled any piece we had seen in the gallery and yet it struck the wrong note; the collection was only an illusion of nature. *Plagiothecium* can't grow in crevices like that, and *Racomitrium* wouldn't share a habitat with *Anomodon*, despite the beauty of their colors side by side. I wondered how this beautiful but synthetic creation passed the owner's standard of authenticity. The mosses had been reduced from living things to mere art materials, ill used. "How did you get these to grow like this?" I asked. "It's very—unusual," I hedged. Matt smiled like a kid who had outsmarted his teacher and answered, "Superglue."

Moss gardens are a demanding exercise and I was impressed by what they'd accomplished. But where was the ecosystem restoration that all those trucks and workers were devoting themselves to? When at last we went outside there was no native plant garden, just the bare skeleton of a golf course under construction. A little tornado of dust rose up from the bare ground. The cart paths were lined with great slabs of

rock placed in anticipation of the grass to come. The rocks themselves were beautiful behemoths of mica schist, the native bedrock which glittered like gold in the spring sunshine. A drainage pond had been cut into the golf course and was bordered by a wall from which the rocks had been recently quarried in terraced steps.

Matt led me up to the top of the quarry wall and we looked out over the scene. Bulldozers scraped and shoved, reshaping the land for the play of the game. Matt explained that the owner didn't like to see the raw rock around the pond. It looked as if it had just been blasted, which in fact, of course, it had. The owner requested that I give them a method for growing mosses to carpet the quarry wall. "It's the backdrop for the golf course and the owner wants it to look like it's been here for years," explained Matt. "Like an old English course. The mosses will make it look old, so we need to get them growing". It's way too big to use Superglue.

There are only a handful of moss species that can colonize the harsh surface of acidic rocks and none of them is exactly luxuriant. Most form brittle, blackish crusts that are well adapted to withstand the stressful environment, but which would not even be noticed by a passing golfer. The black color of mosses which grow in full sun is produced by anthocyanin pigments which shield the plant from the damaging ultraviolet wavelengths that their shade-loving counterparts can avoid. I explained that moss growth depends heavily on a supply of water that this bare rock wall simply didn't possess. Without moisture, even centuries of moss growth would yield only a black crust. "Oh, that's not a problem," Matt responded. "We can install a misting system. We could run a waterfall over the whole thing, if that would help." Evidently, money was no object. But it was not money that the rocks required, it was time. And the "time is money" equation doesn't work in reverse.

I tried to be diplomatic in my answer. Even with a watering system, the green carpets envisioned by the owner would take generations to grow. In fact, growth itself was not the issue. The critical step in moss growth comes at the birth of a colony. I'd spent considerable effort in researching how mosses decide to take hold of a rock. We have an idea of "how," but the "why" is very poorly understood. Wind-blown spores, finer than powder, must be stimulated to germinate by just the right

microclimatic conditions. Raw rock is inhospitable to mosses. The surface must first be weathered by wind and water, and then etched by the acids produced by a lichen crust. The spore then forms delicate green filaments called *protonema*, which attach firmly to the rock. If they survive, tiny buds will form and sprout into leafy shoots. In experiment after experiment, we see that the probability of a single spore ever producing a single moss shoot is vanishingly small. And yet under the right circumstances, and given enough time, mosses will blanket a rock, like the old stone slave fence. So creating a colony of moss on a rock is no small feat, a mysterious and singular phenomenon which I have no idea of how to reproduce. Much as I would have liked to be the successful problem-solving consultant, I had to deliver the bad news. It couldn't be done.

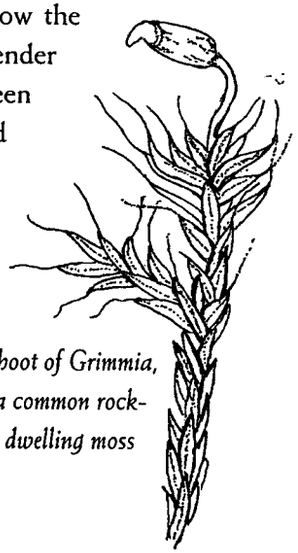
Each time we changed locations, Matt would call in on the radio. I wondered who would care exactly where we were. We walked back up to the house where truckloads of huge rocks were unloading. "This is where they'll build the terrace," said Matt. "The owner wants mosses to grow on all these rocks, too. It will all be shaded, so do you think we could grow them here? With a mist system installed?" Matt pressed his case. If giant oaks could be transplanted, why not mosses? Couldn't you get mosses on the rocks simply by transplanting them? If you could provide the right shade and water and temperature, shouldn't they survive? Again, the answer was not what the owner would want to hear.

You'd think that, without the complication of having roots, moving mosses to a new home would be quite simple. But mosses are not like the plants in my perennial bed that I can move about the garden like rearranging furniture. A few soil-dwelling mosses like *Polytrichum* can be transported much like a grass sod, but rock-loving mosses are inordinately resistant to domestication. Even with the greatest care, moss transplants from rock to rock are generally doomed for failure. It may be that dislodging them tears nearly invisible rhizoids or crushes cells beyond repair. Or our studied duplication of their habitat is lacking in some key ingredient. We don't really know. But they nearly always die. I wonder if it's a kind of homesickness. Mosses have an intense bond to their places that few contemporary humans can understand. They must be born in a place to flourish there. Their lives are supported

by the influences of previous generations of lichens and mosses, who made the rock into home. In that initial settling of spores they make their choice and stick to it. Relocation is not for them.

"Well, what about sowing them, then?" Matt asked. He looked so hopeful. This was his first job, with a demanding boss and a nearly impossible task. I felt compelled to meet his hope halfway and, perhaps, to salvage his expectations of my supposed expertise.

There's no good science to suggest how to start mosses on rocks, but there are reports of a kind of moss magic in the folklore of gardeners. It's worth a try, I suppose. Garden enthusiasts have long looked for ways to speed up the growth of mosses on rock walls, to induce bare rock to assume the patina of mossy old age. I've heard of dousing the wall repeatedly with acid. Supposedly, it dissolves the surface of the rock and creates tiny pores where mosses can gain a foothold. In a way it mimics the action of lichen acid, slowly eating away at the rock. Other gardeners swear by swabbing a slurry of horse manure over the rocks. It's a bit rank at first, but the mosses seem to follow in short order. The most common recommendation is much more hygienic, a moss milkshake. The recipe goes like this: collect the moss species of interest from similar rocks in the forest. Be sure to take only mosses growing in the same conditions that are found in your garden. The same kind of rock, the same light and humidity. No cutting corners allowed, the mosses will know the difference. The moss is then placed in a blender with a quart of buttermilk and whirred to a green froth. Painting this mixture onto rocks is said to yield a coating of moss within a year or two. There's a great variety of recipes out there, some using yogurt, egg whites, brewers yeast, and other household items. Hypothetically, there's some sense to these concoctions. Mosses can indeed regenerate themselves from severed leaves and stems. Under the right conditions a fragment will put out proonema to anchor itself to the new substrate and tiny little shoots can arise in this way. Mosses propagate themselves this way in nature, so perhaps a blender will help the process along. Many mosses prefer an acidic habitat, which might be provided by the buttermilk, at least until the first rain.



Shoot of Grimmia, a common rock-dwelling moss

Since Matt was grasping at straws, I promised to write up the recipes for moss milkshakes, but cautioned that I had little confidence in any technique to grow instant moss.

We strolled along the site of the new terrace, just talking. There was a rocky flower bed along the path, full of native spring wildflowers. There were trillium and bellwort and a whole patch of leaves which I recognized as lady's slipper. Protected species, every one. Was this what they meant by an ecological restoration? A flower bed? I asked where the plants had come from and along with a "none-of-your-business," look I was assured that they'd been bought from a nursery which grew all their own plants. Indeed, each still had a nursery tag. Not a single one had been taken from the wild, he said with emphasis.

All day, Matt had made a concerted effort to adhere to a close-mouthed professionalism, but gradually his natural ease and openness couldn't be held back. He reminded me of my own students, eager to be out in the world and make a difference. This position was his first job offer and it had seemed too good to be true. The work was creative and he was better paid than he had thought possible for a rookie. After he'd been here for a year or so, he had had some doubts about the way things worked here and thought about moving on. But the owner had offered him a raise, if he'd stay. He'd just bought a nice little house and had a baby on the way, so he'd be around for awhile.

Back in view of the man in the white hardhat, Matt picked up his pace and strode across the construction yard like a man with a purpose, speaking into his radio. I followed along behind and hoped that I too presented the image of a busy professional. "Time is money," I heard him say in my head. We headed down one of the many roads that ran from the yard like spokes of a wheel.

When we were out of sight of the buildings, Matt looked once more over his shoulder and slowed down. "Do you mind if we walk cross-lots?" he asked. We stepped off the road into the trees and in only a few steps the smell of diesel was washed away by the smell of the spring

woods. In the concealment of the trees, he visibly relaxed. He grinned as he turned off his radio with a conspiratorial look and stuffed his hat into his back pocket. We suddenly felt like kids sneaking off from school to go fishing. "It's not too far," he said. "I want you to see what the native mosses are like here. Maybe you could tell if they're the right ones for trying to plant on the terrace. I'd like to try that milkshake method." He led me cross-country through the oak woods. In places, there were rocks strewn on the forest floor and I paused to look at their mosses. Matt was impatient. "We don't need to bother with these, the good stuff is right up here." He was right.

At the top of the rocky ridge, the land fell away sharply to a shady glen below. We scrambled down over the ledges of the massive outcrop, taking care not to scuff up the carpets of moss. The Appalachian bedrock here was folded and contorted by eons of geologic pressure, and then rearranged by the action of glaciers. The result was a fractured stone sculpture of unlikely angles, a cubist painting of a mossy landscape. The surface of each rock was etched by time into crevices like the wrinkles on an old man's face. Black trails of *Orthotrichum* traced the crevices, and thick beds of *Brachythecium* lay on the moist ledges. I thought I could see here Matt's inspiration for his superglued creation in the garden. It was lovely, a breathtaking tapestry of old mosses. Matt showed off every nook and cranny of the outcrop with evident familiarity. I suspect he'd played hooky and come here more than once. "This is exactly what the owner wants it to look like up at the terrace," he said. "I brought him here once and he just loved it. I just need to find a way to get it to grow like this up at the house." Somehow, I was getting the impression that I had not communicated the problem very well. One more time I launched my explanation of the relationship between time and mosses. The moss beds on this outcrop were probably centuries old. If it were possible to exactly duplicate this microclimate, and then sow these same species in a moss milkshake, you might have a chance. But, even then it would take years. Matt wrote it all down.

We walked back out to the road and checked our watches. Our appointed hours for consulting were over. Matt confided that the owner was extremely frugal and, especially with hiring outsiders, schedules had to be adhered to. The workers were climbing into trucks where

they'd be driven down to the front gate, which was locked at 5 p.m. Standing by the cars, Matt gave me instructions from the owner about the report he would like to receive in three days' time. Before I left I had to ask, since no one ever said his name. "Who is the owner? Whose idea is behind this project?" His practiced answer came back quickly without his meeting my eyes. "I'm not at liberty to say. He's a very wealthy man." That much I had deduced.

Driving out to the gate, I scanned the landscape for signs of the ecosystem restoration I had never seen. But all I saw was the house and the golf course. It was too good to be true. I puzzled over the namelessness, the invisibility of this powerful man who had amassed all these resources to make a garden. Was this the anonymity of a discreet philanthropist or the concealment of a notorious identity?

My imminent departure was radioed ahead and when I reached the edge of the property, the gate opened and smoothly shut behind me.

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Back at my office I wrote up an innocuous little report. I tried to educate The Owner as to the near impossibility of the task he proposed. All the money in the world won't get mosses to grow quickly on bare rock. That takes time. I included a species list of all the species we had seen, their environmental requirements, and guidelines for choosing the right species for a moss garden. Like a good academic, I suggested that if they really wanted to grow moss on rocks they should consider underwriting a cooperative research project. And I included the milkshake recipes for buttermilk and manure—who knows?

A few weeks later I got my check in the mail. I can't say that I felt very pleased with the work. What had been advertised as an educational project in vegetation restoration looked suspiciously like a tax shelter to landscape the new home of a wealthy man with a love for mosses and a passion for control. There may well have been good restoration work going on, off where the men in trucks were going, but I never saw it.

So I was surprised when Matt phoned me a year later. He asked if I could come down and help again. He said they'd made a lot of progress

and he was eager to show me the garden. When I arrived he was nowhere to be seen. I was escorted off by a brisk young woman who had been delegated to show me the gardens. I asked about Matt, and she said he'd been reassigned to another project, maybe the azalea garden. She whisked me over to the house. "The Owner wanted you to see what they've done with the mosses on the terrace. We just finished last month."

What a transformation had been wrought. The place had aged a century in only twelve months. The Kentucky oak looked as if it had been born there and green lawns had materialized over the construction rubble. Where the pile of bare rocks had stood last spring, there was now a stunning replica of the native flora of an Appalachian ridgetop. Flame azaleas with sinuous trunks cast a light shade over the dark rocks, placed in a convincing jumble so that pitch pines appeared to emerge from the deep crevices. Clusters of bracken fern and myrica gale posed along the pathways which led to gatherings of weathered garden chairs. It did indeed look old. And much to my amazement, every rock was upholstered with mosses, lovely thick carpets of exactly the right species. *Brachythecium* capped the rocktops, with *Hedwigia* trailing down the sides. *Orthotrichum* artfully followed the etched ridges in the stone, like black calligraphy on old parchment. It was breathtaking. It was perfect in every detail. It was two weeks old. Perhaps I'd better rethink the merits of moss milkshakes, if this was the outcome.

My attendant was not much interested in my effusive praise of the garden. She was on a schedule and hurried me off to a patio on the other side of the house. It was a beautiful expanse of flagstone paving under the transplanted trees. "The Owner would like to know how to get rid of the moss that keeps coming up between the stones," she said, and waited with pen poised over notebook. I had no answer. All this work to get mosses to grow in one place, but where they spontaneously appeared he wanted them exterminated.

Back we went to the main staging area where earth-moving machinery rolled in and out. The squawking radios, uniformed men, and sense of urgency made it feel like a military operation. The hard hat sergeants rode around in jeeps while open trucks of Guatemalan infantrymen

bearing shovels and pruning saws were carried away, all under the orders of the Owner.

I too was bustled into a Jeep and we bounced along a rough new road, cut like a gash into the oak woods. A driver had been sent for me, but offered little in the way of information as to where we were going. I wondered if I'd get to see Matt. The driver barked into his radio that we were nearly there. The makeshift road ended in a small clearing where a bright yellow crane stood. Empty pallets were stacked in the sun. In the shade of the perimeter were mysterious figures shrouded in burlap and wrapped with baling twine, like so many statues waiting to be unveiled. A cluster of muscled men stood in the woods, with their hard hats bowed together in consultation. One came forward and enthusiastically introduced himself as Peter, a designer specializing in natural rock. He was just ever so glad to see me because they needed advice before proceeding any further. He was here from Ireland and spoke with a lovely lilt. The Owner had brought him over especially for the job. He was concerned that they might be botching the moss bit and so would I come take a look? We joined the clustered men and they took their time sizing up the newcomer, the moss lady.

These gentlemen were introduced to me as the precision explosives team. They'd been sent for from Italy, a crack group of stonecutters. Before us stood the object of their scrutiny, a craggy rock outcrop covered deep in mosses. I recognized it immediately as the beautiful little glen where Matt had brought me the previous year. Half of it was gone. They were quite a dedicated team. Peter, the rock designer, would select the sectors of the cliff which were most beautiful, a place where a quartz vein ran through the schist and the mosses were especially well placed. The stonecutters would then carefully calculate the position for the precision charges and blow the rock off the cliff face. Lesser men then hoisted the rock with the crane and placed it on a pallet where it was wrapped in moist burlap to protect the precious mosses. I suddenly understood that the lovely rocks on the terrace owed nothing to applications of buttermilk. I felt my hands grow clammy.

They had so many questions. Should they burlap the rocks before the blast? Was Peter choosing correctly—would these particular mosses

survive the move? How long could the mosses stay wrapped? Could I work with Peter to make recommendations about exactly where to place each rock for the well-being of the mosses? The Owner was upset that the mosses seemed to lose vigor once they were placed in the landscape. The cost of extracting each rock was very high and he didn't want to waste a single one. They considered me a new member of their team, hired to do this thing. I scanned all their faces for a sign of dissension but I saw only eagerness to get the job done. I felt numb, and somehow trapped as the Owner's hired gun. I had never dreamed that my advice would be put to such a use, that I would become an unwitting consultant for destruction.

The workers were very thorough in their care of the stolen mosses, and genuine in their concern for their well-being. They were watered and carefully swaddled in burlap for their removal. They'd do whatever I told them to help them survive. Once separated from their homes, the mosses seemed to sicken and the lush green turned to yellow. The Owner didn't want to waste money transplanting rock if the mosses were going to die. So, they had set up a triage area to try and nurse the likely candidates back to health and cull out the ones who wouldn't make it. The facility was a big white tent set up in a meadow alongside the road back to the house. It looked for all the world like a field hospital set up for the wounded. Shade screens were rolled down the sides to maintain humidity within. Mist nozzles sprayed out jets of water. No expense had been spared. Lying on their pallets were the blast-scarred rocks with their mosses lying sickly upon them.

My task was to make diagnoses and write the prescriptions. Which could safely be moved to the house and which should be abandoned? I thought of the doctors consigned to meet the slave ships at the shore. They would inspect the human cargo to pick out the healthiest for sale, the ones most likely to survive in their transplanted environment. And which was the lesser evil? To be sold into bondage or to be left behind to die? I wandered among the ailing rocks and felt as dislocated and powerless as they were. I wanted to shout at them to stop, but it was too late. And I was an accomplice to this. I don't remember what I said. I hope I said to save them all.

I wanted to see the Owner and confront him face to face with this betrayal, but he was invisible. Who was this man who would destroy a wild outcrop lush with mosses so that he might decorate his garden with the illusion of antiquity? Who was this man who bought time and who bought me? The Owner. What was this power of facelessness, so that no one uttered his name?

I am trying to understand what it means to own a thing, especially a wild and living being. To have exclusive rights to its fate? To dispose of it at will? To deny others its use? Ownership seems a uniquely human behavior, a social contract validating the desire for purposeless possession and control.

To destroy a wild thing for pride seems a potent act of domination. Wildness cannot be collected and still remain wild. Its nature is lost the moment it is separated from its origins. By the very act of owning, the thing becomes an object, no longer itself.

Blowing up a cliff to steal the mosses is a crime, but it's not against the law, because he "owns" those rocks. It would be easy to call this abduction an act of vandalism. And yet, this is also a man who imports a team of experts for the gentle wrapping of mossy rocks. The Owner is a man who loves mosses. And the exercise of power. I have no doubts of his sincerity in wishing to protect them from harm, once they conformed to his landscape design. But I think you cannot own a thing and love it at the same time. Owning diminishes the innate sovereignty of a thing, enriching the possessor and reducing the possessed. If he truly loved mosses more than control, he would have left them alone and walked each day to see them. Barbara Kingsolver writes, " It's going to take the most selfless kind of love to do right by what we cherish and give it the protection to flourish outside our possessive embrace".

When the Owner looks at his garden, I wonder what he sees. Perhaps not beings at all, only works of art as lifeless as the silenced drum in his gallery. I suspect that the true identities of mosses are invisible to him and yet he wanted authenticity more than anything. He was willing to pay huge sums to have authentic moss communities at his doorstep where his guests might praise his vision. But in possessing them, their authenticity is lost. Mosses have not chosen to be his companion, they have been bound.

I was dropped back at the staging area, with the coolness reserved for a team member who won't play the game. I was wearily walking to my car when I saw Matt getting into his truck. He was friendly enough and said that he'd been reassigned to another project. Mosses were no longer his responsibility, he said, with bright conviction in his face. But, knowing my interest, he wanted to show me just one more thing. He was on his way home, no longer on the Owner's time. So we got into his battered pickup and he clicked off his radio and its constant demands. We talked of his baby daughter and of azaleas but not of the terrace garden. He drove me through the woods to the far edge of the property along the security road. The boundary was marked by a four-strand electric fence angled outward to foil deer and other intruders. The entire perimeter beneath the fence had been treated with Roundup, killing all the vegetation. All ferns, wildflowers, shrubs, and trees had been eliminated in a ten-foot swath. All were dead except the mosses. Immune to the chemicals, the mosses had taken over, colonies coalescing into a crazy quilt in a thousand shades of green. Here was the real moss garden of the Owner, a mile from his house living under an electric fence in an herbicide rain.