Fostering a natural history community

Andrew L. Hipp
Director of the Herbarium and Senior Scientist in Plant Systematics, The Morton Arboretum
President (2025-2026), American Society of Plant Taxonomists (ASPT)
The Morton Arboretum, 4100 Illinois Route 53, Lisle IL 60532-1293, USA
ahipp@mortonarb.org

Abstract

Natural history is an individuals-first approach to natural science in which the subject of our study leads us into novel and integrative questions. It is, in Ann Zwinger's words, a set of practices aimed at "tying together yesterday and tomorrow within the framework of today's natural world." Public-school curricula have dropped much of the natural history education that was common through the first decades of the 20th century. Yet the foundational practices of natural history are the bedrock of science. In this essay, I illustrate how we as naturalists employ stories, specimens, exploration of the natural world, and the practices of natural history to build our understanding of the world from the bottom up. I argue for the importance of natural history as a set of skills and habits that help expose what we don't yet know and an inherently decentralized approach to natural science. Natural history puts the onus on each of us to learn something new before we lose any more pieces, and it gives us the practices to do so. As the American Society of Plant Taxonomists (ASPT) approaches its centennial, our continued success will depend on the strength of a diverse community of artists, educators, researchers, land practitioners, horticulturalists, gardeners, and enthusiasts. We are part of the

global community of naturalists. Supporting and continuing to build this community is our best way to ensure its effectiveness and strength.

Keywords: Edgar Anderson, herbarium / herbaria, natural history education, specimens, stories, systematics

Note: This essay is based on the ASPT Incoming President's Lecture, originally entitled "The peculiar advantages of Natural History," delivered by the author on July 29, 2025 at the Botany 2025 Conference, Palm Springs, California.

From April 18 to June 1, 1887, a student named Minnie Potter collected and preserved 52 plants near her home in Aurora and West Aurora, Kane County, Illinois. Her collection is now deposited in the herbarium I lead at The Morton Arboretum. We can learn a little bit about Potter and her life from studying her collection. She gathered woodland plants such as Hepatica (*Hepatica* sp.), spring beauty (*Claytonia virginica*), Jacob's ladder (*Polemonium reptans*), white trout lily (*Erythronium albidum*), and rue anemone (*Thalictrum thalictroides*) on nearly every day of the week except for Sunday, telling us she probably lived near an intact woodland. She made a one-day excursion to a particularly rich forest in nearby Sugar Grove, where she

collected wild ginger (*Asarum canadense*), large-flowered bellwort (*Uvularia grandiflora*), nodding and sessile trilliums (*Trillium flexipes* and *T. recurvatum*), Dutchman's breeches (*Dicentra cucullaria*), even spring blue-eyed Mary (*Collinsia verna*) and goldenseal (*Hydrastis canadensis*), both uncommon in our area any longer. She collected a handful of spring-flowering prairie plants: shooting star (*Dodecatheon meadia*), prairie phlox (*Phlox pilosa*), and fringed puccoon (*Lithospermum incisum*). These prairie species are vanishingly rare on our landscape today. Yet they were common enough that they ended up in Potter's collection, 50 years after the invention of the John Deere steel plow marked the demise of North America's once-widespread tallgrass prairie. She collected a smattering of garden plants, including a daffodil on a Sunday in the middle of May (her only Sunday collection); several cultivated shrubs; native yard weeds like blue violet (*Viola sororia*) and strawberry (*Fragaria virginiana*), both of which might also have come from nearby woodlands; and shepherd's purse (*Capsella bursa-pastoris*), a Eurasian weed that comes along with home-building and gardening.

Potter's collection was a school project. Each of her herbarium sheets was preprinted with the words, "Aurora Public Schools: West Side" in an ornate typeface. Each included spaces for the pupil's name, the date—1880-blank, suggesting that the school expected to go through a good number of these over the course of the decade—and blanks for order, genus, and species, three ranks of the plant's taxonomy.[1] There was a blank for the English name, the date and locality of collection, and even places to indicate the page numbers of reference books used to

[1] Potter's "orders" are not aligned with today's ordinal system for flowering plants, but rather follow the natural orders of Bentham and Hooker and other authors of the 19th century and earlier, as Potter would have found in *Gray's Manual* or *Wood's Manual*. These accord closely with today's plant families.

identify the plants, specifying *Gray's Manual* and *Wood's Manual* as the only two options.[2] Potter arranged each plant carefully, so that the whole plant was visible; glue marks outline where she affixed each plant even though many came loose before our herbarium inherited the collection. She peeled back the corollas of some of the flowers to expose their insides.

Minnie Potter was not, however, a seasoned naturalist. She mistook large-flowered bellwort (*U. grandiflora*) for sessile-leaved bellwort (*U. sessilifolia*), Virginia bluebells (*Mertensia virginica*) for clustered bellflower (*Campanula glomerata*), and hispid buttercup (*Ranunculus hispidus*) for small-flowered buttercup (*R. abortivus*). She likely had minimal experience using an identification key. She was, in other words, probably a very typical student. There are collections like hers in herbaria around the world. Even more have sat in the bottom of a drawer or a box beneath someone's bed for decades before they were tossed out, never to enter the public record.

Potter lived at a time when plant collecting was a common part of the curriculum. So was botany: Almira Hart Lincoln Phelps' extremely popular *Familiar Lectures on Botany* was first published in 1829, then went through at least 39 printings and sold a publisher-claimed 375,000 copies by 1868.[3] If Potter had been born a generation later, she might been taught from Anna

---

[2] Potter only filled in page numbers for *Woods' Manual*, which went through several editions. Her page numbers correspond to the 1877 edition: Alphonso Wood, *The American Botanist and Florist: Including Lessons in the Structure, Life, and Growth of Plants: Together with a Simple Analytical Flora, Descriptive of the Native and Cultivated Plants Growing in the Atlantic Division of the United States* (A. S. Barnes, 1877), 1–636, https://doi.org/10.5962/bhl.title.947.

[3] Emanuel D. Rudolph, "Almira Hart Lincoln Phelps (1793–1884) and the Spread of Botany in Nineteenth Century America," *American Journal of Botany* 71, no. 8 (1984): 1161–67, https://doi.org/10.1002/j.1537-2197.1984.tb11969.x.

Comstock's (1911) popular, encyclopedic *Handbook of Nature Study*,[4] which at more than 900 pages was packed full of practical natural history insights and lore, from life histories of the Johnny Darter, Chickaree, Earthworm, and Pearly Everlasting to chapters offering such insights into The Teaching of Nature-Study as "When and why the teacher should say I do not know" and "Should the nature study teacher teach how to destroy life?".

Potter's community cultivated natural history knowledge through practical, hands-on guidance. They valued that knowledge enough to spend school time on it. By contrast, few students today are required to make a plant collection, learn the local birds, recognize how glaciers carved up their neighborhoods, or identify the trees that line their streets. Perhaps this is because people today view natural history as a trivial pursuit. Yet this is not a new problem. As early as 1750, Swedish botanist Peter Kalm claimed that American adults take "little account of Natural History… that science being… looked upon as a mere trifle, and the pastime of fools."[5] Perhaps it is because natural history is viewed by many as a discipline lacking in rigor: the Oxford English Dictionary, for example, describes it as "the study of animals and other living organisms, esp. as presented in a popular rather than in a strictly scientific manner."

Natural history is neither trivial nor slapdash. Natural history is a suite of approaches to working one's way from the particular toward the universal, to "tying together yesterday and

---

[4] Anna Botsford Comstock, *Handbook of Nature Study*, with Verne N. Rockcastle (Cornell University Press, 1911), https://www.cornellpress.cornell.edu/book/9780801493843/handbook-of-nature-study/.

[5] Gary Nabhan and Stephen Trimble, *The Geography of Childhood: Why Children Need Wild Places* (Beacon Press, 1995), 40.

tomorrow within the framework of today's natural world," in Ann Zwinger's words.[6] As naturalists, we turn our attention to particular lineages, organisms, biotic communities, or landscapes. Then we pull in background information, supplementary observations, seemingly unrelated patterns and measurements to span years and landforms and branches of the Tree of Life. Observations and analyses synchronize like a sensor array focused on the subject of our affection. The practices of natural history aggregate herbarium collections from Kane County, watercourses barely visible in suburban backyards and sewers, moth and vegetation histories to yield a composite history of individuals, and thus of the world.

We have expended a lot of energy since the 1950s, when U.S. educational practices veered away from hands-on natural history and toward scientific processes, on teaching students to reason scientifically, to answer question X using organism Y as a model. This has been effort well-spent, and we need more of it. Scientific inquiry in the classroom and teacher-research collaborations help build students' sense of themselves as scientists and their ability to think critically as scientists.[7] But these educational advances would serve students best if they were coupled with time spent going in the other direction as well, studying organism Y in its natural environment and, through that study, coming to understanding what questions (X) are most

---

[6] Ann Zwinger, "A World of Infinite Variety," in *On Nature: Nature, Landscape, and Natural History*, ed. Daniel Halpern (North Point Press, 1987), 34,35.

[7] Jeffrey Grant et al., "Collaboration to Cultivate the Practices of Science: Local Ecological Research as a Gateway to Biodiversity Science," *The American Biology Teacher* 87 (2025): 220–25; Eve Manz et al., "Rethinking the Classroom Science Investigation," *Journal of Research in Science Teaching* 57, no. 7 (2020): 1148–74, https://doi.org/10.1002/tea.21625; Alexandra C. Cooper and Molly S. Bolger, "The Classroom-Research-Mentoring Framework: A Lens for Understanding Science Practice-Based Instruction," *Science Education* 108, no. 1 (2024): 275–307, https://doi.org/10.1002/sce.21835.

exciting.[8] So I ask: How do we help students learn the organism or landscape in front of them, then follow that knowledge into new questions? How can we nourish the individuals-and-organisms-first, bottom-up study of the natural world that is the bedrock of the natural sciences? How do we build the enthusiasm that propels a person into a scientific career or a lifelong passion for science, something deep enough to nourish advocacy, support, and commitment?

One of our best models for this kind of natural history education comes from what may seem an unlikely source. In 1956, Edgar Anderson of the Missouri Botanical Garden wrote, "Confronted with any large and complex problem, in any field, the scientist who has had effective training in Natural History knows more or less instinctively what to do. Everything looks chaotic at first but we do not live in a chaotic universe. There may be confusion in our minds but there is no chaos in the way the world is running. Faced with such a problem, the properly trained scholar looks around for significant repeatable patterns in the data and reasons back and forth from observation to hypothesis until he has found his way into it."[9] Anderson had been hired as "Geneticist to the Garden" 34 years earlier,[10] having just

---

[8] Heather King and Marianne Achiam, "The Case for Natural History," *Science & Education* 26, no. 1 (2017): 125–39, https://doi.org/10.1007/s11191-017-9880-8; Robert Michael Pyle, "The Rise and Fall of Natural History," *Orion: People and Nature* 20, no. 4 (2001): 16–23; Gary Yee and Michael Kirst, "Lessons from the New Science Curriculum of the 1950s and 1960s," *Education and Urban Society* 26, no. 2 (1994): 158–71, https://doi.org/10.1177/0013124594026002004.

[9] Edgar Anderson, "Natural History, Statistics, and Applied Mathematics," *American Journal of Botany* 43, no. 10 (1956): 882–89, https://doi.org/10.2307/2439005.

[10] For some of the relevant biographical and scientific context on Anderson: Kim Kleinman, "From Geneticist to the Garden to Senior Botanist: Edgar Anderson and the Study of Plants in the 20th Century," *Annals of the Missouri Botanical Garden* 105, no. 4 (2020): 578–87, https://doi.org/10.3417/2020444; G. Ledyard Stebbins, "Edgar Anderson," *National Academy of Sciences: Biographical Memoirs* 49 (1978): 3–23; Charles B. Heiser, "Edgar Anderson, Botanist and Curator of Useful Plants," *Annals of the Missouri Botanical Garden* 82, no. 1 (1995): 54–60, https://doi.org/10.2307/2399980.

completed his PhD on the genetics of self-incompatibility in tobacco (*Nicotiana*). In his new position, Anderson created methods for representing a complex population in two dimensions and then using those visualizations to infer the genetics of variation.[11] He co-opted the term "introgression" to describe the movement of genes from one species into another through hybridization and backcrossing.[12] He researched the origins of maize cultivars, boxwoods, and other domesticated plants, working closely with breeders and studying the source populations of the species as best he could. Alongside his research interests in the nature of plant species, and in part because of them, Anderson led countless students into the field to learn the plants and landscapes that surrounded them. "I taught genetics," he wrote, "but I explored the Ozarks with my students. They learned about genetics from me, and they convinced me that I should take a serious interest in taxonomy."[13]

In his 1956 article, "Natural history, statistics, and applied mathematics," Anderson describes bringing a class to the forest. One of Anderson's students has a masters in botany. Another is a wholesale grocer. Others include a high school biology teacher, an investment banker, and the president of the city's "most exclusive garden club." Anderson's job is to teach them about the natural history of the area without boring one set of students while overwhelming the others.

---

[11] Edgar Anderson and Thomas W. Whitaker, "Speciation in *Uvularia*," *Journal of the Arnold Arboretum* 15, no. 1 (1934): 28–42; Edgar Anderson, "Efficient and Inefficient Methods of Measuring Specific Differences," *Statistics and Mathematics in Biology*, Iowa State College Press Ames, Iowa, 1954, 93–106.

[12] Edgar Anderson and Leslie Hubricht, "Hybridization in *Tradescantia*. III. The Evidence for Introgressive Hybridization," *American Journal of Botany* 25, no. 6 (1938): 396–402, https://doi.org/10.2307/2436413.

[13] Edgar Anderson, "What We Do Not Know about *Zea Mays*," *Transactions of the Kansas Academy of Science (1903-)* 71, no. 3 (1968): 373, https://doi.org/10.2307/3627155.

He presents them with the barest scrap of background information you could hope for: the land they are visiting was settled by Europeans about 100 years earlier. Then he asks the students to figure out how the site has changed in the past century, and why. He gives them an hour to figure it out. As he talks, Anderson provides a hint that most don't notice: he plucks at an end of barbed wire protruding from the white oak he is leaning against. A few catch on immediately. Most assemble the clues more slowly. There are barbed wire scars along a row of white oaks. The forest on one side of the row of oaks is dominated by big, single-trunked trees. The forest on the other side is composed of smaller trees, many of them two- or three-trunked. By the end of the field trip, the story of the site is clear, and it is a common one in the Midwest. Fences separate properties with different ownership and land use histories. Trees often grow up along these fences, forming a line. In second-growth forests, many trees are multiple-trunked, resprouts from cut stumps. The particular history of the site follows from a few general principles.

Inferring the natural history of this site required background knowledge about how trees grow and respond to changes in disturbance. This knowledge Anderson conveyed in lectures and field trips. The practices of looking closely and asking how the facts before you fit together are harder to teach. There are some "recipes and clever devices,"[14] but they do not suffice. There is no one measurement—no "pointer reading," in Anderson's words—that tells the story. You could genotype every plant on the site. You could analyze soil texture or organic carbon,

[14] Jacques Maritain, *Art and Scholasticism and the Frontiers of Poetry*, trans. Joseph W. Evans (Charles Scribner's Sons, 1962), 42.

estimate tree ages or measure the distances between trunks, but there is no quantity that answers the question, "what happened here"? Instead, there are multiple observations anyone can make—the barbed wire, the row of oaks, the growth form of the trees on both sides of fencerow—that together tell a story about the site. "In the early stages of a problem," Anderson writes, "accurate, unrelated data, if collected in big enough quantities by many people and scattered through numerous papers, may actually obscure the problem and hinder its solution." Stepping back and looking at the big picture enables you to identify the measurements that are needed. That is the practice of natural history.

Reading Anderson's essay made me think about how I teach natural history. My practices as a naturalist began as techniques I learned from other naturalists but that quickly grew into my own habits. Natural history begins, for me, with stories. When I started teaching in the early 1990s, I told stories not for any good pedagogical reason, but because I was working with kids and didn't know how to get their attention any other way. I relied primarily on Ovid's *Metamorphoses*, *Grimms' Tales for Young and Old*, and *American Indian Myths and Legends* by Richard Erdoes and Alfonso Ortiz. The students liked stories where creatures were punished for being naughty, or they did the right thing and were punished anyway, then had the last laugh in the end. Arachne weaved more beautifully than the goddess Minerva, who beat her to the point of despair as punishment. Minerva saved Arachne from death at the 11th hour by transforming her into a spider. Arachne is still the finest weaver. In another story, the wren won a flying competition to become king of the birds, but he did so through trickery: he hid in the feathers of an eagle and only started flapping his wings once the eagle was exhausted and couldn't fly any higher. The wren was jailed underground for his cleverness, then he escaped,

and now he wakes up the entire neighborhood protesting that he's the real hedge king. Did students retain more facts about spiders or birds because of the stories? Maybe. But I didn't tell stories to teach facts. I chose stories that I found engaging and that might engage the students' imagination, create mental hooks on which to hang a few of their observations. Benson Lewis, of the Cibecue Apache, said that "Stories go to work on you like arrows."[15] Stories tap our emotions and intellect and stitch experience together with memory.

Along with stories, I relied on specimens. As a naturalist at an area preschool, I found or borrowed any interesting specimen I could carry on the bus or fit into my backpack. I became friends with the curator of the UW Madison zoology museum. He lent me preserved animals that had been confiscated post-taxidermy. I remember a gray squirrel, a mallard, and a woodcock, though I'm certain there were others as well. I brought cicada exoskeletons, chewed deer antlers, and worm castings. I once found a rock dove freshly dead on the sidewalk outside Memorial Union. It was still warm and in perfect shape. I wrapped it in a plastic bag and then froze it at home. Several times I biked to the preschool with it in my backpack and promptly stuck it in the school freezer when I arrived. I would take it out for each class I visited, then run it back to the freezer between classes. It never fully thawed, of course, but the eyes did get increasingly juicy over the course of the morning, even with the refreezing. The eyeballs were for some of the students the best part of the class.

---

[15] Keith H. Basso, "'Stalking with Stories': Names, Places, and Moral Narratives among the Western Apache," in *On Nature: Nature, Landscape, and Natural History*, ed. Daniel Halpern (North Point Press, 1987), 96, 97.

Specimens give students a chance to be close to an organism that they could not otherwise approach. They focus students' attention on one node of the Tree of Life. They connect to human history as well: even young children can grasp that a specimen is, in Mary Oliver's words, *an instance of attention*,[16] the product of someone's decision at a particular place and time in the past to notice this thing and collect it, so we could look at it today or 500 years from today. Specimens are a bridge between the past and the future.

Students at the preschool invariably asked questions like, "How did it die?" "Where did it live?" "Was it a baby?" As students looked at the specimen, handled it if it was a pelt or skull or something else I could pass around, I would talk about what deer mouse or vole might have chewed on this antler, or about how feathers play with light to make us perceive them as blue. These natural history stories take what Scott Donald Sampson calls the "cosmolocal approach" to telling the "epic of evolution."[17] They insert the here-and-now into the big story of the universe. A grasshopper or rock dove is a point of entry into the network of beings that began evolving 4 billion years ago, ramified across the globe, and includes us, each swimming with nuclei and mitochondria, colonized by bacteria and fungi, the ecosystem that makes an individual and the communities of individuals that make up ecosystems.

Stories and specimens lead us outward to exploration. At the preschool, we would cross a winding suburban road lined with high white curbs and mowed-lawn margins to reach the "pine

---

[16] Mary Oliver, *A Poetry Handbook: A Prose Guide to Understanding and Writing Poetry* (Houghton Mifflin Harcourt, 1994), 74.

[17] Scott Donald Sampson, "The Topophilia Hypothesis: Ecopsychology Meets Evolutionary Psychology," in *Ecopsychology: Science, Totems, and the Technological Species*, ed. Peter H. Kahn Jr. and Patricia H. Hasbach (MIT Press, 2012), 43, 44.

forest." This forest was a red pine stand of such small extent that we could count windows of the research park buildings on the far side. Beside it was a small prairie seeded with flowering annuals intended to ward off complaints of ugly weeds while the prairie established. To the students, these were wild places. There was a great horned owl nest with fresh droppings on the ground beneath and splashed down the tree trunk. Occasionally there was an owl pellet. There were pine cones whose seeds and scales had been chewed off by squirrels as though the cones were ears of corn. There were woodpecker and bluejay feathers. In the prairie there were caterpillars, beetles, grasshoppers, wild rye in fruit, sunflower heads to break open, beebalm inflorescences filled with seeds to shake into our hands. Students spent most of their time in the field running off to find things they could share, wondering what each was. Most of it was not museum-quality, but each specimen was a treasure. The place was packed full of what Robert Pyle calls "low adventure."[18]

Exploring is unscripted, making it an opportunity to practice and model close observation and inference. Students watch how we approach learning as we stumble across things we don't know. In the field, through observation and dialogue, students learn how to make structured observations that advance their understanding.[19] As naturalists, we show what close observation looks like and how we keep ourselves engaged with questions. When someone shows us a leaf and asks, "what is this?" we respond, "How big is it? What shape is it? What

---

[18] Robert Michael Pyle, *The Thunder Tree: Lessons from an Urban Wildland* (Oregon State University Press, 2011), 20.

[19] Catherine Eberbach and Kevin Crowley, "From Everyday to Scientific Observation: How Children Learn to Observe the Biologist's World," *Review of Educational Research* 79, no. 1 (2009): 53, https://doi.org/10.3102/0034654308325899.

does it feel like between your fingers? What do you see when you look at it through your hand lens? What more do you see if you hold it under the lens for an extra 10 seconds?" As naturalists, we have cultivated the habits of looking at something up close, then raising our heads to ask where it came from and what the organism looks like in its landscape. We spend many years conditioning ourselves to see and to study. Having developed these habits long ago, we may have to remind ourselves that moving back and forth from observation to question, from ruminations about the history of a thing to direct observation of the thing, are learned habits, so that we can help guide others.

Yi-Fu Tuan quotes art historian Kenneth Clark as saying, "I fancy that one cannot enjoy a pure esthetic sensation (so-called) for longer than one can enjoy the smell of an orange, which in my case is less than two minutes."[20] Tuan, who was a human geographer, observed that one's appreciation of natural beauty is similarly "fleeting unless one's eyes are kept to it for some other reason, either the recall of historical events that hallowed the scene or the recall of its underlying reality in geology and structure." Background knowledge about a thing can keep you looking at it long enough that you have time to be moved by it again, and then to notice something new about it. As naturalists, part of what we model is keeping ourselves engaged by turning the subject of our study over and over in our hands and minds, asking some new question, moving off to a different thing and then coming back. Our fascination grows in this way rather than languishing for want of novelty.

---

[20] Yi-Fu Tuan, *Topophilia: A Study of Environmental Perception, Attitudes, and Values* (Prentice-Hall, Inc., 1974), 93–94.

Ultimately, natural history begins with and aims at understanding the universal story embedded in individual stories. The practices of natural history are not unique to any one person. But each of us is in a unique position to explore the landscapes we know best, draw inferences about the organisms that excite us the most. We all have particular expertise in some aspect of the grand story that binds together organisms and landscapes as they evolve and interact. Many of us have direct access to specimens. We know how to explore landscapes at different scales and winnow the known from the vast pool of the unknown. We are practiced in hooking the unknown bits to something we do know to improve our understanding.

And most importantly, we can recognize the gaps in our knowledge and take delight in them. Edgar Anderson, when introduced to audiences as an authority on corn, preferred to respond that he was not an authority on corn, but on what was not yet known about corn.[21] As naturalists, we have chosen this life of pecking away at the brightest, most exciting areas of our ignorance. We have a great opportunity to share this enthusiasm with students of all ages—from preschoolers to their grandparents or even great-grandparents, who might well be volunteers in our herbaria. Natural history shows us with crystal clarity exactly what we and all the other brilliant people in the world don't know yet. Then it puts the onus on each of us to learn something new before we lose any more pieces.

There are still a few substantial tracts of forest near where Minnie Potter might have collected in Kane County in 1887, yielding the 52 specimens that sit in The Morton Arboretum

---

[21] Anderson, "What We Do Not Know about *Zea Mays*."

herbarium today. I recently searched the main data portal for U.S. herbaria, SEINet, and found Kane County plant specimens from 68 institutional herbaria. It appears there are exactly two herbarium specimens of goldenseal from Kane County: one collected by Minnie Potter in 1887, and one by Dick Young, author of the Flora of Kane County, in 1975. Both sit together in our herbarium, separated by 90 years.

But there are 16 records of the species in iNaturalist from 12 different observers, recorded over a 12-year span.[22] Twenty iNaturalist users have pitched in with suggestions on identification. The observers describe themselves as a natural resource specialist at Fermilab who volunteers as a plants-of-concern monitor and a forest preserve steward; a field botanist and ecological restorationist; "an all-around naturalist"; a science teacher; a plant ecologist and "at-large land steward"; an environmental interpreter; an "ok birder and former HS Science Olympiad herpetology champ who has forgotten just about everything"; the Vice president of the Illinois Native Plant Society Kankakee Torrent Chapter and volunteer plants-of-concern monitor; and three who have left their profiles at the anonymous "____ is a naturalist!" They appear to range from just out of school to post-career. Several have posted thousands of observations since joining iNaturalist. Three have posted more than 10,000.

Natural history—both the individuals-first approach to biology that starts with a passion for particular living organisms and the inference of histories from complex patterns—is far from dead. But I think it could use some helping along. Today's world is complicated in new ways.

---

[22] https://www.inaturalist.org/observations?nelat=42.058762222580604&nelng=-88.22423972814649&subview=map&swlat=41.66658614847265&swlng=-88.5903934451875&taxon_id=118769 [accessed 2025-07-12].

Kids get outside on their own much less than they did a generation ago. Many experience the natural world online more often than they do in person.[23] I was struck in reading Marston Bates' *The Nature of Natural History*, written in 1950, by this throw-away line: "There is probably no use in writing very much about the seed plants here. We all know the more obvious things about them, remembered from high school botany or picked up at meetings of the Garden Club."[24] I was born only 20 years after he published this, but none of my peers had a high school botany course. I left high school seeing plants as a vaguely distinguished cloud of green. My experience is hardly unique. In 2015, Andrea Kramer and Kay Havens demonstrated "severe shortages of botanists" and "alarming declines" in basic botanical education.[25] The students I work with in our local high school have an exceptionally strong science department that embraces and invests in hands-on science education. Yet the only botany most of the students learn is wedged into their AP biology or environmental science curriculum, packed in around the core requirements. Most don't even take these courses.

People still want a natural history community. We see it in the growth of iNaturalist not just a place to deposit your photos, a natural-history analogue to flickr, but also as a joyous and serious running dialogue about what species are, what we should call them, and where people

---

[23] Based on interviews with 52 Anglo, Hisplanic, O'odham, and Yoeme (Yaqui/Mayo) children in summer of 1992, Gary Nabhan and his colleague Sara St. Antoine found that 77% of the Mexican kids, 61% of U.S. (non-Yaqui and non-O'odham), 60% of Yaqui, and 35% of O'odham kids "felt that they had seen more animals on television and in movies than they had personally seen in the wild." A 1992 survey of US 5th and 6th graders found that 53% reported media as their primary source of information about the environment; 31% reported school, 9% reported home or the wild. Nabhan and Trimble 1995, 87-88.

[24] Marston Bates, *The Nature of Natural History* (Princeton University Press, 1950), 32.

[25] Andrea T. Kramer and Kayri Havens, "Report in Brief: Assessing Botanical Capacity to Address Grand Challenges in the United States," *Natural Areas Journal* 35, no. 1 (2015): 83–89, https://doi.org/10.3375/043.035.0112.

are finding them. People come out for lectures on the natural history of trees. Natural history writing is alive and well: Robin Wall Kimmerer, Robert Macfarlane, J. Drew Lanham, Douglas Tallamy, Arati Kumar-Rao, Edwardo Kohn, Theresa Crimmins and scores of others are writing popular books about niche topics like phenology, oak ecology, landscape history, the land ethic, whether forests and rivers are alive. The fact that people are reading these books suggests that the natural history urge is far from languishing.

Organisms and the complex weave of their ecosystems are nonetheless at risk. David Gilligan, in describing how the Sterling College Program in Natural History was conceived and created, wrote that "Today's naturalists are translators of scientific and aesthetic vernacular, necessary liaisons between specialists and laypeople, committed practitioners of observation and interpretation of a natural world that is changing more quickly than we can know."[26] An essential part of saving what we have is ensuring that people know it. We all have a lot on our plates, but if everyone reading this does just one new thing in the coming year to support the stories, the specimens, the exploration of the world, the habits of observation and inference that are natural history's unique peculiar advantages, we can strengthen the entire natural history community. And to our whole community of naturalists, I ask this: can we each bring one new member into our community and society in the coming year, someone working on their own who may not even know that there is such a community?

---

[26] David Gilligan, "Natural History from the Ground Up: Developing a College-Level Natural History Program in the New Millennium," *The Journal of Natural History Education and Experience* 3 (2009): 24–29.

Anderson's insistence that "there is no chaos in the way the world is running" seems a little out of step today. Many changes in just the past year undermine or directly reduce federal investment in the natural sciences, education, and environmental protection. Many working in these fields and others have lost their jobs or seen experiments and projects cancelled with almost no warning. As a community of naturalists working in a range of disciplines, it is more important than ever that we work together and build outward to create a culture in which all of our senses are honed. We can help keep the gates of perception open and the wheels of inference rotating freely. We can help everyone in our society—each other and ourselves included—become more attuned to the processes that make Earth uniquely suited to the life we know.

You may have noticed that I haven't yet given you an answer to the question, "how do we teach natural history?" Anderson didn't either. He modeled it. The practices of natural history carry into and beyond the knowledge of animals from their tracks and the identification of sedges. Our calling as naturalists is to learn and share these practices for what they can teach us about living in this world.

Acknowledgments

This essay owes a great deal to Alan Whittemore, who shared Anderson's 1956 article and talked through different views of natural history with me. He and Rachel Davis each read early drafts of this essay and made key points that shaped its development. Members of the Morton Arboretum Plant Systematics Research Group and Herbarium read Anderson's 1956 article

together and provided insights and discussion, as well as feedback on an early draft of this essay. Jeff Grant, Boris Igić and his lab group, Jonathan Losos, Marvin Lo, Karen Magid, Joshua Moses, Brooke Pudar, and Rick Ree provided written and verbal feedback that improved the essay. Staff and volunteers of The Morton Arboretum viewed a practice lecture and provided input. ASPT members and many other attendees of the Botany 2025 conference (July 2025, Palm Springs, CA, USA) viewed the lecture on which this essay was based and also provided important feedback. I am particularly grateful to the ASPT membership for their confidence in electing me as president, and to Daniel Potter, Editor-in-chief of *Systematic Botany*, and the ASPT publications committee for their willingness to consider this essay for the society journal.

References cited

Anderson, Edgar. "Efficient and Inefficient Methods of Measuring Specific Differences." *Statistics and Mathematics in Biology*, Iowa State College Press Ames, Iowa, 1954, 93–106.

Anderson, Edgar. "Natural History, Statistics, and Applied Mathematics." *American Journal of Botany* 43, no. 10 (1956): 882–89. https://doi.org/10.2307/2439005.

Anderson, Edgar. "What We Do Not Know about *Zea Mays*." *Transactions of the Kansas Academy of Science (1903-)* 71, no. 3 (1968): 373–78. https://doi.org/10.2307/3627155.

Anderson, Edgar, and Leslie Hubricht. "Hybridization in *Tradescantia*. III. The Evidence for Introgressive Hybridization." *American Journal of Botany* 25, no. 6 (1938): 396–402. https://doi.org/10.2307/2436413.

Anderson, Edgar, and Thomas W. Whitaker. "Speciation in *Uvularia*." *Journal of the Arnold Arboretum* 15, no. 1 (1934): 28–42.

Basso, Keith H. "'Stalking with Stories': Names, Places, and Moral Narratives among the Western Apache." In *On Nature: Nature, Landscape, and Natural History*, edited by Daniel Halpern. North Point Press, 1987.

Bates, Marston. *The Nature of Natural History*. Princeton University Press, 1950.

Comstock, Anna Botsford. *Handbook of Nature Study*. With Verne N. Rockcastle. Cornell University Press, 1911. https://www.cornellpress.cornell.edu/book/9780801493843/handbook-of-nature-study/.

Cooper, Alexandra C., and Molly S. Bolger. "The Classroom-Research-Mentoring Framework: A Lens for Understanding Science Practice-Based Instruction." *Science Education* 108, no. 1 (2024): 275–307. https://doi.org/10.1002/sce.21835.

Eberbach, Catherine, and Kevin Crowley. "From Everyday to Scientific Observation: How Children Learn to Observe the Biologist's World." *Review of Educational Research* 79, no. 1 (2009): 39–68. https://doi.org/10.3102/0034654308325899.

Gilligan, David. "Natural History from the Ground Up: Developing a College-Level Natural History Program in the New Millennium." *The Journal of Natural History Education and Experience* 3 (2009): 24–29.

Grant, Jeffrey, Patrick Murphy, Rebecca S. Barak, Marlene Hahn, Emma Leavens, and Andrew L. Hipp. "Collaboration to Cultivate the Practices of Science: Local Ecological Research as a Gateway to Biodiversity Science." *The American Biology Teacher* 87 (2025): 220–25.

Heiser, Charles B. "Edgar Anderson, Botanist and Curator of Useful Plants." *Annals of the Missouri Botanical Garden* 82, no. 1 (1995): 54–60. https://doi.org/10.2307/2399980.

King, Heather, and Marianne Achiam. "The Case for Natural History." *Science & Education* 26, no. 1 (2017): 125–39. https://doi.org/10.1007/s11191-017-9880-8.

Kleinman, Kim. "From Geneticist to the Garden to Senior Botanist: Edgar Anderson and the Study of Plants in the 20th Century." *Annals of the Missouri Botanical Garden* 105, no. 4 (2020): 578–87. https://doi.org/10.3417/2020444.

Kramer, Andrea T., and Kayri Havens. "Report in Brief: Assessing Botanical Capacity to Address Grand Challenges in the United States." *Natural Areas Journal* 35, no. 1 (2015): 83–89. https://doi.org/10.3375/043.035.0112.

Manz, Eve, Richard Lehrer, and Leona Schauble. "Rethinking the Classroom Science Investigation." *Journal of Research in Science Teaching* 57, no. 7 (2020): 1148–74. https://doi.org/10.1002/tea.21625.

Maritain, Jacques. *Art and Scholasticism and the Frontiers of Poetry*. Translated by Joseph W. Evans. Charles Scribner's Sons, 1962.

Nabhan, Gary, and Stephen Trimble. *The Geography of Childhood: Why Children Need Wild Places*. Beacon Press, 1995.

Oliver, Mary. *A Poetry Handbook: A Prose Guide to Understanding and Writing Poetry*. Houghton Mifflin Harcourt, 1994.

Pyle, Robert Michael. "The Rise and Fall of Natural History." *Orion: People and Nature* 20, no. 4 (2001): 16–23.

Pyle, Robert Michael. *The Thunder Tree: Lessons from an Urban Wildland*. Oregon State University Press, 2011.

Rudolph, Emanuel D. "Almira Hart Lincoln Phelps (1793–1884) and the Spread of Botany in Nineteenth Century America." *American Journal of Botany* 71, no. 8 (1984): 1161–67. https://doi.org/10.1002/j.1537-2197.1984.tb11969.x.

Sampson, Scott Donald. "The Topophilia Hypothesis: Ecopsychology Meets Evolutionary Psychology." In *Ecopsychology: Science, Totems, and the Technological Species*, edited by Peter H. Kahn Jr. and Patricia H. Hasbach. MIT Press, 2012.

Stebbins, G. Ledyard. "Edgar Anderson." *National Academy of Sciences: Biographical Memoirs* 49 (1978): 3–23.

Tuan, Yi-Fu. *Topophilia: A Study of Environmental Perception, Attitudes, and Values*. Prentice-Hall, Inc., 1974.

Wood, Alphonso. *The American Botanist and Florist: Including Lessons in the Structure, Life, and Growth of Plants: Together with a Simple Analytical Flora, Descriptive of the Native and Cultivated Plants Growing in the Atlantic Division of the United States*. A. S. Barnes, 1877. https://doi.org/10.5962/bhl.title.947.

Yee, Gary, and Michael Kirst. "Lessons from the New Science Curriculum of the 1950s and 1960s." *Education and Urban Society* 26, no. 2 (1994): 158–71. https://doi.org/10.1177/0013124594026002004.

Zwinger, Ann. "A World of Infinite Variety." In *On Nature: Nature, Landscape, and Natural History*, edited by Daniel Halpern. North Point Press, 1987.