

# What is Natural History?

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## Introduction

As an undeclared freshman at UCSC, I was fortunate enough to stumble into a two unit class on the natural history of upper campus my winter quarter. I was drawn to the class because I understood we would be outside exploring the hidden (and not so hidden) pieces of campus for three hours every Friday morning. However, I showed up to the class, as so often novice natural history students do, believing that I was going to be learning the history of nature. I expected lecture-style lessons on primordial goo, the tree of life, possibly even the big bang theory. In fact, my speculations of what the class might be did not excite me nearly so much as the prospect of escaping sardine rows of 200-person general education classes. Thus, on the first day of class, as we crouched in the chaparral writing observational poetry about the leaves of a flowerless monkey flower, I found myself a bit confused, yet highly engaged, and my concept of Natural History was blown apart and expanded.

I believe that all budding naturalists are likely to have a similar experience--indeed it feels almost like a rite of passage to not truly realize the life of minute observation and attention we are getting ourselves into. Despite this unexpected plunge into the world of naturalizing, we each finish this passage with hand lenses glued to our eyes and binoculars dangling around our necks. I hope this chapter will serve to aid new naturalists in grasping what the study of natural history holds.

This chapter is aimed towards beginning naturalists and/or Norris Center interns in an effort to define natural history in an accessible way, using a diversity of perspectives from various fields in which natural history plays a key role. I start by offering several definitions of natural history. I then discuss the practices that make up natural history, as well as its overall importance.

## Defining Natural History

While my freshman mind was not fully wrong in expecting to learn about the history of nature in my natural history class, as the topic certainly does cover ideas from the past, this definition was only a small fraction of all that natural history covers. Defining natural history, however, is no small task, as there are many different perspectives on how to define the term. This is caused, in part, by the fact that naturalists come in all shapes and sizes--they can be anyone; from artists to writers to scientists to children playing in the dirt. In the following section, I attempt to synthesize the definitions of a small handful of important naturalists who each bring a different perspective. I begin with a brief account of the temporal evolution, including the Latin root, as well as the lasting impacts of Charles Darwin and Carle Linnaeus.

## Temporal Evolution

The term natural history was borne from the Latin term *historia naturalis* (Gilligan 2009). It seems obvious, even for those who don't know a single Latin root, that we would translate this phrase to natural history. However, that is a mistranslation. As David Gilligan points out in his article "Natural History from the Ground Up: Developing a College-Level Natural History Program in the New Millennium," the term *historia naturalis* translates much more closely to "looking into nature" (Gilligan 2009). This is a simplistic, yet accurate, definition of what *practicing* natural history looks like. The term *historia naturalis* has been built upon and altered since the idea was first born in ancient times; Similar to how most things change over time, the term natural history has morphed through the influence of those who have practiced it.

Carle Linnaeus, who lived from 1707-1778, is known as the father of taxonomy; he is responsible for creating the system that we still use to name and identify species. His life was spent developing a classification system for life on Earth, as well as naming and categorizing as many plant and animal specimens he could collect (*UCMP: Carl Linnaeus*). Because of Linnaeus a large part of naturalizing is recognizing and naming the species you are observing, and this helps form connections between species. For example, if you are looking at a flower and can use its features to identify it as a species in the genus *Castilleja*, the next *Castilleja* you see will be easier to identify, as you will recognize the characteristics that are common to that family. Linnaeus's system of binomial nomenclature not only allows us to name an organism with a standard language, it also allows us to glimpse the connectedness of our surroundings.

While Linnaeus unveiled many of the connections of living things, he did not yet grasp the idea of their evolution over time--an idea that came half a century later from the scientific thinking of Charles Darwin. Through detailed journaling and observation of both living species and fossils during his journey on *The Beagle*, Darwin constructed the theory that species evolve over time based on their interactions with each other and the surrounding environment (Darwin 1859). As this theory was proven and took root in science, an individual species was no longer simply identified in a way that connected it back to its living relatives, but also categorized according to when that specific species evolved, who its ancestors were, and which traits evolved when. Thus, the lense through which people looked at the natural world once again became more detailed and complex as human understanding grew. While traditional methods of plant identification for foods and herbal purposes were and are still used throughout all cultures, as well the practices of careful observation and wonder, Darwin and Linnaeus simply added a deeper scientific perspective to the classification and understanding of these species. The concepts of binomial nomenclature and evolution provided a broad system of organization with which we could better understand the diversity of our planet.

While Carle Linnaeus and Charles Darwin are two influential contributors to the evolution of the study and practice of natural history, there have been many others before and after them that have left their mark. Today, there are myriad voices defining natural history that come from all walks of life.

### Modern Definitions

Writing is an inherent part of being a naturalist, and many people have published their observations and/or nature journaling. Take Robin Wall Kimmerer, writer of Native American heritage and author of *Gathering Moss*. In her book, which artistically informs people about the lives of moss through a combination of her naturalist notes and reflections, she recounts a childhood memory of snow falling and her first spark of a naturalists' curiosity. "For the first time, but not the last, I had the sense that there was more to the world than immediately met the eye. I looked out at the snow falling softly on the branches and rooftops with a new understanding, that every drift was made up of a universe of starry crystals" (Kimmerer 2003). Naturalist or not, every person should be able to relate to this memory, and be able to recall some memory from childhood or adulthood where some nuance of their world caught them by surprise.

For Kimmerer, natural history goes beyond just information about species. She explains that, "in indigenous ways of knowing, we say that a living thing cannot be understood until it is known by all four aspects of our being: mind, body, emotion, and spirit" (Kimmerer 2003). Kimmerer's definition makes it apparent that natural history is not a subject that can be taken out of context--if you expect to understand a plant with all parts of your being, you'd best visit it in a forest, not in a lab.

This sentiment is widespread and is echoed by writer Annie Dillard, who describes the world she immersed herself in with such love and attention that the reader becomes a naturalist too, each time they flip the page. From her book *Pilgrim at Tinker Creek*, Dillard describes how a naturalists' eyes begin to pick up on what used to be mundane details, and this attention to detail brings a richness to life. "The world is fairly studded and strewn with pennies cast broadside by a generous hand. But- and this is the point- who gets excited by a mere penny? But if you cultivate a healthy poverty and simplicity, so that finding a penny will literally make your day, then, since the world is in fact planted in pennies, you have with your poverty bought a lifetime of days" (Dillard 1974). Thus, for Dillard, natural history is deeply rooted in appreciation and careful attention.

Edward Abbey was a writer, as well as an environmental activist, who radiates passionate naturalist instincts through all of his writing. His writing, which focuses on his own interactions with the raw nature he encounters as a ranger, is an effort to convince American citizens why it must be protected. In his book *Desert Solitaire*, he explains "a man could be a lover and a

defender of the wilderness without ever in his lifetime leaving the boundaries of asphalt, powerlines, and right-angled surfaces. We need a wilderness whether or not we ever set foot in it...we need the possibility of escape as surely as we need hope..." (Abbey 1968). Thus, for Abbey, natural history, and the role of a naturalist, are a means of humbling oneself and protecting wild places from human development.

A similarly rugged character, Tom Brown, offers a different and much older perspective on natural history, as a master tracker taught by an Apache Elder. In his book *Nature Observation and Tracking*, he explains that, "nature observation is the most important of the survival skills. A survivalist cannot build a fire without knowing where to find the necessary materials. He cannot travel safely in a wilderness environment without being alert to the constant changes around him. And he cannot find sustenance without an appreciation for the plant and animal life that dwell in a given area" (Brown 1983). Brown's definition of natural history was woven by his education by Stalking Wolf, an apache elder who taught Tom Brown the "old ways" of nature observation starting when Tom was seven years old. Thus, he has the incredible perspective of a white American who has learned some of the immense wealth of nature skills of the Native American people. Because these people lived in more direct connection with the land for so many centuries, Brown's definition of natural history focuses on it as a survival skill and twines mankind and the natural world in an inseparable fashion. Thus, natural history is not *us* and *them* (those mosses and trees and animals that live in reserves), but rather *us and them* and how we interact. A holistic view of nature cannot exclude humankind and all of its disturbances, especially in an age where no piece of land is unaffected by nature.

Some people view natural history more through the lens of science, such as Harry Greene, a scientific researcher, naturalist, and biology professor at Cornell University. While his practice is also centered around careful observation and attention to detail, his publications are different from those of a nature writer. Abbey or Dillard may use poetic prose to describe a trend they have observed in nature; In contrast, Greene describes such observations using the jargon of a hard scientist and tests his observations and hypotheses with lab experiments. In describing his work, he explains his "focus on how morphology and behavior interact in the origins of evolutionary novelties, and on the reasons for geographic variation in the structure of ecological communities; I seek to understand those topics within an historical evolutionary context, and work primarily with lizards and snakes" (Greene n.d.). While Harry Greene's specific focus is different than the definition presented by Tom Brown, it is an equally important and widespread view of natural history<sup>1</sup>.

Each of these definitions is a piece of a much greater whole: passion and engagement through direct interaction with the natural world. People practice natural history in different

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<sup>1</sup> See the final section of this paper, the importance of natural history, for an elaboration on how natural history informs science.

ways, and yet these different perspectives create a broad understanding of natural history that we can use to inform our practice. Natural history is the careful observation and inquiry into each piece of an ecosystem; it is the interconnectedness of species and habitat in both space and time. Natural history is an artist’s eye carefully combing over a piece of moss and seeing all the variation and vibrancy there, as it is also the words that come to a poet’s mind at the glimpse of a coyote. Natural history is learning Latin names and evolutionary pathways, while at the same time it is careful attention to detail, patient curiosity, and unstructured inquiry and wonder. And it is also so, so much more.

Table 1.1 Natural History Definitions

Name	Occupation	Definition/ Perspective
Robin Wall Kimmerer (2003)	Naturalist	“a living thing cannot be understood until it is known by all four aspects of our being: mind, body, emotion, and spirit”.
Tom Brown (1983)	Master Tracker	“Nature observation is the most important of the survival skills. A survivalist cannot build a fire without knowing where to find the necessary materials. He cannot travel safely in a wilderness environment without being alert to the constant changes around him. And he cannot find sustenance without an appreciation for the plant and animal life that dwell in a given area”.
Annie Dillard (1974)	Writer	“The world is fairly studded and strewn with pennies cast broadside by a generous hand. But- and this is the point- who gets excited by a mere penny? But if you cultivate a healthy poverty and simplicity, so that finding a penny will literally make your day, then, since the world is in fact planted in pennies, you have with your poverty bought a lifetime of days”
Edward Abbey (1968)	Environmental Activist	“a man could be a lover and a defender of the wilderness without ever in his lifetime leaving the boundaries of asphalt, powerlines, and right-angled surfaces. We need a wilderness whether or not we ever set foot in it...we need the possibility of escape as surely as we need hope”
Harry Greene (2018)	Biologist	Observation and data collection for scientific research.

Gilligan (2009)	Teacher	<i>Historia naturalis</i> : “looking into nature”
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## The Practice of Natural History

*“I say that at first there is no real difference between what I do and that a little child playing in the same stream bottom would do. The child and I take in the scene the same way--wordlessly--and before long we both know what is right about this bit of nature.”- Ken Norris, Mountain Time*

Not only are there a broad range of definitions of natural history, every naturalist practices in a different way. Despite this difference in manifestation, there are a few broad practices that each naturalist connects to in some way. Crucial methods of natural history include observation, interpretation, and inquiry.

### Observation and Interpretation

*“Love can be defined as sustained, compassionate attention. Paying sincere attention to another person--a child, partner, student, or stranger--helps us to build understanding and kindness. Similarly, I feel understanding, care, and compassion when I journal and turn deep attention to nature.” -John Muir Laws, The Laws Guide to Nature Drawing and Journaling*

Direct observation while paying careful attention to detail is one of the crucial building blocks of a naturalists’ practice. While budding naturalists often get swept up in the importance of learning the name of what they are looking at, it takes much longer to develop the patience and deep thought processes that truly allow one to notice and draw meaning from the details of nature. John Muir Laws, in his book *The Laws Guide to Nature Drawing and Journaling*, explains that, “in any moment, it is possible to learn about your surroundings through observation. It is also easy to walk through the world caught up in your own thoughts and worries, looking without truly seeing. The difference between these two experiences is conscious, focused attention” (Laws 3).

While we all use our senses in every waking moment of our lives, observation is a learned skill--the more you practice, the better you will get. At first, it can be challenging to break through you own observational threshold. For example, while looking at a tree, you might see its bark, leaves, size, shape, and color. What else is there to see? The longer you stand and look, however, the more you will notice. *Ah, there is more light coming through the leaves of this tree than the maple tree outside my house! I see a small bird flitting about in the upper canopy. The bark feels rougher than I expected. I notice a lot of small holes in one of the branches and the leaves look dead there.* It goes on and on.

As you make observations, you are also interpreting what you see: connecting what you are learning with what you already know. For example, you might have studied an invasive bark beetle that harms pine trees, and you connect this to the small holes you see on the branch of the tree. As we all carry different life experience and knowledge, each of us may interpret our observations differently. It is important to remember that our initial interpretations may be wrong, or not fully informed, as none of us carry the full knowledge of the world's ecosystems in our minds.

In fact, it is because of this same limited human brain capacity that all naturalists carry journals wherever they go. In order to best practice observation and interpretation, you must write down all of your thinking. This not only helps to organize your thoughts, but also allows you to return to past entries and connect your observations over time. Furthermore, the act of journaling serves to ground you in whatever space you are in and can help inspire deeper observation. As Jon Young explains in his book *Coyote's Guide to Connecting with Nature*, "The very act of writing the heading calls for orienting, for settling down and looking around. Then enter whatever captures your attention in the moment of journaling, in words or drawing, or both...Consistent journaling is a straight path to a career as a naturalist" (Young 65).

However, naturalists should not just be writing observations and interpretation down in their journals--this is just a slice of the thought process that a naturalist travels through before making a discovery, big or small. Method and inquiry are also crucial practices for a naturalist.

### Inquiry

It could be easily argued that inquiry is the driving force of natural history. Would Darwin have written the theory of evolution if he had simply observed patterns in nature, but never stopped to ask why? Of course not! Curiosity about the natural world is what drives discovery, and naturalists must train themselves to constantly be asking questions. As John Muir Laws puts it, "you can train yourself to be curious. Be active, bold, intentional, and playful in your questioning. Seek out mysteries and the world opens itself up to you" (Laws 8). Nature is the most patient teacher--you can ask it a thousand questions in a minute and, if you are lucky, it will help you answer one.

Ken Norris referred to this process of inquiry as "spinning the wheel" (Norris 1998). With each observation comes a question, followed by more observations to try to answer that question. Each question becomes a 'tiny hypothesis' used to stimulate further observation to test its validity. Each complete spin of the wheel gets closer to the truth of the matter. Norris explains that, "for some questions...you can spin the wheel over and over again in a morning, asking and refining. But for other questions, it may take years to get a few iterations. Or you may get none at all" (Norris 1998). Spinning the wheel can be used in any moment of observation, whether its a



child playing in the grass trying to figure out where the roots go, or a scientist running tests in a lab.

During my third year in college, I dove head first into the world of natural history by taking UC Santa Cruz's Natural History Field Quarter, a full ten weeks of observation, inquiry, journaling, and growing new eyes and a new mind. A specific, memorable, experience I had with "spinning the wheel" occurred on our second trip, as I watched Acorn Woodpeckers come and go from a large oak tree in the Los Padres National Forest of Big Sur.. The rest of my naturalizing clan shuffled on ahead, minds deep in the Jepson and plant identification or excitedly murmuring about the rattlesnake that had just been spotted in the trail. I came to a full stop and watched as one woodpecker after the next flew in and out of the massive tree. I noticed holes up and down the trunk and branches that were the tell tale sign of a granary tree. Besides these few small seeds of knowledge, I knew nothing about the life cycle of the Acorn Woodpecker.

As I watched, I compared these birds to others I had seen and began to wonder if they fought at all over their territory, as I had seen ravens and hawks doing so often. How could so many woodpeckers be in the same tree? Do they each have a branch that they claim? Do they have a single mate, and fight with other pairs for their granary space? I watched and watched, and saw no sign of fighting. Birds flew away and came back, and the others seemed unconcerned. I asked question after question in my notebook and began formulating a tiny hypothesis that I was watching a clan of Acorn Woodpeckers. I wondered if they were working together--the idea didn't seem too far fetched. If they all invest so much energy packing the same tree full of acorns, they must work together to protect it, right? Are some of them protectors and others collectors? I spun the wheel and observed, and then eventually walked off to go look for rattlesnakes, questions still ringing in my mind.

Later that evening, as I reflected on my time with the Woodpeckers, I flipped open a field guide to birds in a search for professional insight. Low and behold, the description of the Acorn Woodpecker told the story I had partially collected through my observations: these birds live communally, all working for the greater good of their family. Only some of the females reproduce, yet all of the woodpeckers take care of the offspring. They choose one tree as their granary and return to it each year. Of course, there was so much information and amazing facts in the bird book than I hadn't pondered in my journal, and yet in the space of an afternoon, the process of observation to discovery had been revealed to me for the first time.

If natural history is defined as the careful observation and inquiry into each piece of an ecosystem, and the interconnectedness of species and habitat in both space and time, then the roles of a naturalist are to practice careful observation and to radiate curiosity, through methods such as spinning the wheel, journaling, and deeply observing all that he or she can.

## The Importance of Natural History

*“Wilderness is not a luxury but a necessity of the human spirit, and as vital to our lives as water and good bread. A civilization which destroys what little remains of the wild, the spare, the original, is cutting itself off from its origins and betraying the principle of civilization itself.”*

-Edward Abbey, *Desert Solitaire*

Because natural history is such a vital piece of so many fields: science, history, art, education; its impact can be seen throughout human infrastructure. Observation and inquiry into nature has created museums, herbaria, artwork, music, taxidermy and specimen collections, books, photographs, personal field journals, scientific research and discovery. However, natural history’s greatest impact stretches far outside the borders of cities to the preservation and restoration of natural spaces.

Meaningful human interaction with the natural world is a vital component of effective natural resource conservation. In fact, “evidence shows that loss of interactions with nature changes people’s attitudes toward nature, including the values they place on it, their beliefs concerning the environment, their perceived norms of environmental protection” (Gaston and Soga 2016). People who have spent time in nature--whether on their belly peering at a small flower, watching a fledgling bird take flight, or simply appreciating the color of sunlit leaves--are much more likely to advocate for the protection of their environment than those who have never benefited from positive direct interactions with the natural world. People will not protect what they do not love; as John Muir Laws puts it, “love of the natural world is the spring that waters commitment to stewardship: protecting and being responsible for something--in this case, wildness and biodiversity everywhere” (Laws 2016). All people, especially children, need to continue to be directly exposed to nature, so that human societies can hold onto their wonder of nature and fight against its development and depletion.

Unfortunately, the focus on natural history in academia has declined in the past few decades. In a study on this modern shift in natural history, Barrows et al. found that “early-career scientists surveyed agreed that natural history is relevant to science (93%), and approximately 70% believed it “essential” for conducting field-based research; however, 54% felt inadequately trained to teach a natural-history course and would benefit from additional training in natural history (more than 80%)” (2014). In the past, primary and secondary school curricula had more robust roots in traditional natural history practices; today there is a greater focus on theory and modeling in the classroom and in the research lab (Barrows 2014). This shift from practice to theory has raised concerns among many scientists.,as a 2014 editorial in the scientific journal *Nature* states “as natural history has been de-emphasized, molecular biology, genetics, experimental biology and ecological modelling have flourished. But here is the problem: many of those fields ultimately rely on data and specimens from natural history” (*Nature* editorial

board 2014). Failing to equip students and researchers with natural history skills is pulling the rug out from under science; without field work, herbarium specimens, observation-based field notes, whimsical speculations and observations, and that driving sense of wonder, there will be no data with which to run theoretical models (Dayton and Sala 2001). Ecological science needs natural history practices to fill in the missing pieces of research with observations and inquiry into the interconnectedness of life; pieces of an ecosystem cannot be studied or saved without a full understanding of all the pieces of that system. Thus, it is critical that scientists have skills in natural history.

Natural history also has an important impact in other fields, such as medicine and agriculture. For example, almost three quarters of human diseases are associated with other animals (Tewksbury et al. 2014); the practices of natural history are critical in understanding these diseases. As Tewksbury et al. explain, “Many of the strategies currently used to control these diseases rely on an understanding of the distribution and behavior of species and communities that influence their transmission, spread, and prevalence” (2014). For example, in 2016 a group of researchers studying vector-borne diseases, specifically West Nile Virus, were in desperate need of support in surveillance activities (in-field observation specialists), as “geographically patchy surveillance [was limiting] their ability to draw conclusions on trends or correlations with factors that may affect disease prevalence” (Stuchin et al. 2016). Furthermore, in this call for observational support, they stated that west-nile virus “is far from the only vector-borne disease for which lapses in testing and reporting leaves gaps in our understanding of pathogen dynamics” (2016). Who could possibly help these researchers in their plight? Naturalists, of course! Deep understanding of a species requires careful fieldwork and observation. The same runs true in the fields of food security and agriculture: we must understand both cultivated and native species and the impact that agricultural practices have on the land to ensure that we are managing our land in such a way that we will be able to grow food in the future (Tewksbury et al. 2014). And these are just a few of so many examples of the incredible impact this subject has on humankind’s well-being. Natural history is the study of the web that connects all life; it is fitting that it should be a foundational requirement in most, if not all, aspects of human research.

Because of this, it is important to understand the practice of natural history need not happen in what most people define as “nature,” such as a national park or far away land reserve. The Bird School Project<sup>2</sup>, a local Santa Cruz experiential education organization, weaves this idea into their curriculum beautifully; rather than seeking funding to whisk kids off to Yosemite or a local state park, they work with what nature they can find right outside any classroom: birds. Birds can be found in any school courtyard or green space, whether it’s in the middle of LA or in a redwood forest; teaching kids how to naturalize within their normal sphere, and with a consistently available resource, is teaching them how to truly naturalize anywhere. Most

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<sup>2</sup> <http://www.birdschoolproject.org/>

importantly, they will appreciate that nature is everywhere. Treating nature like a separate entity from human spaces goes against the ideals of a true naturalist in seeing the full spectrum of interconnectivity; humans play a huge role in every environment, urban or wild, and a good naturalist understands this better than anyone. Thus, I will conclude this chapter on *What is Natural History?* with a quote from “The Trouble with Wilderness; or, Getting back To the Wrong Nature,” by William Cronon

Wilderness gets us into trouble only if we imagine that this experience of wonder and otherness is limited to the remote corners of the planet, or that it somehow depends on pristine landscapes we ourselves do not inhabit. Nothing could be more misleading. The tree in the garden is in reality no less other, no less worthy of our wonder and respect, than the tree in an ancient forest that has never known an ax or a saw—even though the tree in the forest reflects a more intricate web of ecological relationships. The tree in the garden could easily have sprung from the same seed as the tree in the forest, and we can claim only its location and perhaps its form as our own. Both trees stand apart from us; both share our common world. The special power of the tree in the wilderness is to remind us of this fact. It can teach us to recognize the wildness we did not see in the tree we planted in our own backyard. By seeing the otherness in that which is most unfamiliar, we can learn to see it too in that which at first seemed merely ordinary. If wilderness can do this—if it can help us perceive and respect a nature we had forgotten to recognize as natural—then it will become part of the solution to our environmental dilemmas rather than part of the problem.

-William Cronon

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