
CONTRIBUTIONS

Human Dimensions: Natural History as the Innate Foundation of Ecology

Seabird McKeon¹, Louise Weber², Andrea J. Adams³ , and Thomas L. Fleischner⁴

¹National Center for Integrated Coastal Research, University of Central Florida, 364 Research 14353
Scorpius Drive, Orlando, Florida 32816-2368 USA

²University of Saint Francis, 2701 Spring Street, Fort Wayne, Indiana 46808 USA

³University of California, Santa Barbara, 6832 Ellison Hall, Santa Barbara, California 93106-3060
USA

⁴Natural History Institute, 126 N. Marina St., Prescott, Arizona 86301 USA

Natural history is the parent science of ecology, the residence of innate curiosity and connection to the natural world in our species. Questions of natural history, of pattern and process, have been asked by every culture and society across the world, and the findings have been conveyed through media from engraved stone to digital journals. Natural history is the first love of elementary school students, the motivation of professionals, and the earned reward of retirees. Natural history includes both the child catching fireflies in a butterfly net and the biodiversity-tracking application on your smartphone.

Natural history serves as a critical foundation of ecological science (Tewksbury et al. 2014, Barrows et al. 2016), and it provides personal relevance and an emotional connection to nature for many ecologists. Because the practice of natural history is as old and accessible as the human senses, it is something all humans have in common; natural history is the oldest continuous human tradition (Fleischner 2011). Therefore, natural history can further unite us while also “extending the tent” of the Ecological Society of America (ESA; Pouyat et al. 2018). Here, our goals are to reintroduce our discipline, describe the history of our section, and invite collaboration as we further modernize natural history and ecology through unity and inclusion.

What *is* natural history? The term was first used in the first century AD, when Pliny the Elder entitled his encyclopedic masterwork *Historia Naturalis*, “the story of nature.” From this origin onward, natural

history had both breadth and depth, and was unfettered by disciplinary boundaries. Today, there is a wide range of definitions, some more strictly biological, for example, “the close observation of organisms; their origins, their evolution, their behavior, and their relationships with other species” (Wilcove and Eisner 2000), and some more expansive, for example, “a practice of intentional, focused attentiveness and receptivity to the more-than-human world, guided by honesty and accuracy” (Fleischner 2005). What these definitions have in common is a focus on organisms and landscape processes in the context of their occurrence, including urban settings, and a reliance on direct observation as the most trustworthy tool for learning about the “more-than-human” world. Direct observation leads to careful description, which then allows scientific comparison between species, habitats, and geographies (Fleischner 2005).

The skills, tools, and infrastructure of natural history reach beyond the boundaries of ecology to include field experiences and museum science, and the synergisms among these facets were critical to the growth of scientific understanding in the 19th and 20th centuries. Despite this importance, opportunities to hone field observation and build museum skills have declined, along with the loss of meaningful synthesis among branches of natural science, ranging from traditional knowledge to phylogenetics, and from taxonomy to archeology (Fleischner et al. 2017, Heller 2018, Rios-Saldana et al. 2018). The monumental task of naming and classifying the undescribed majority of species has great underlying importance for conservation biology (Hampton and Wheeler 2011), yet incentive structures necessary to support global work on biodiversity are waning. Lack of attention to natural history limits the scope of ecological findings and the subsequent ability to address major societal problems (Hampton and Wheeler 2011). Many ecologists have lamented a declining trend in the academic understanding and use of natural history within the natural sciences (e.g., Noss 1996, Dayton and Sala 2001, Herman 2002, Greene 2005, Cotterill and Foissner 2010, Barrows et al. 2016).

Ecological theory is only as sturdy as its foundation in empirical natural history observations. Hypothesis testing and modeling have helped to make great advances in ecology, yet these tools cannot be adequately applied without an understanding of the natural history context in which organisms and processes occur (Fleischner 2005, Able 2016). Technological advances in molecular techniques have emphasized the value of natural history collections as sources of long-term datasets to track ecological change (Holmes et al. 2016, Adams et al. 2017, DuBay and Fuldner 2017, Reiserer et al. 2018). The detailed field notes of pioneer naturalists have provided a similar critical resource, providing baseline data in the study of rapid change (Moritz et al. 2008, Socolar et al. 2017).

Natural history knowledge is essential to addressing multidisciplinary global challenges, from human epidemiology, to food security, to climate change, in addition to conservation management and recreation (Tewksbury et al. 2014). Attentive observations and local natural history knowledge of species’ interrelationships, behaviors, and anti-predator and anti-herbivore mechanisms point to unknown compounds, genes, and structures that can lead to new drugs (Beattie et al. 2011). Employing local natural history knowledge of the environment and subsequent use of local crops over nonnative, “high-yield” cultivars have led to greater food security in Africa and the Middle East (Evenson and Gollin 2003, Pretty et al. 2006). Natural history knowledge is essential to predicting how seabirds and marine mammals will respond to melting Arctic sea ice (McKeon et al. 2016).

To address the decline of natural history’s regard in ecology, Trombulak and Fleischner (2007) called for a “renaissance in natural history education.” This call coincided with the 2007 establishment of the

Natural History Network, which created a peer-reviewed, online journal (now called the *Journal of Natural History Education and Experience*). Now part of the Natural History Institute based in Prescott, Arizona,¹ the Network contributed to the organization of a session at the 2009 ESA annual meeting in Albuquerque, New Mexico entitled, *Natural History: The Basis for Ecological Understanding and a Global Sustainable Society*. While initially declined as a symposium (with the comment that “natural history is no longer the cutting edge of ecology”), as an organized oral session it was attended by an enthusiastic, standing-room-only audience. Audience members made statements such as, “this is why I became an ecologist 40 years ago, and no one has talked about it since.” An associated collaborative workshop, *Next Steps Toward a Natural History Renaissance*, was held at the same meeting and also had robust participation. These events led directly to the creation of the Natural History Section of the ESA in 2010 and to the National Science Foundation-funded *The Natural History Initiative: From Decline to Rebirth* (Hampton and Wheeler 2011). The mission of the Natural History Section is to promote the value, improve the practice, grow the community, and increase the application of natural history in ecology. In the eight years since its inception, the Natural History Section’s membership has nearly tripled.

Our vision for the Natural History Section has four key components: (1) reassert the primacy of natural history as the essential foundation of ecology; (2) democratize the practice of natural history, providing for broader accessibility of natural history information through field activities and the use of new platforms; (3) facilitate the communication of natural history information within the public sphere by supporting natural history contributions to major ecological journals; and (4) engage a larger and more diverse consortium of participants in all of these activities. In 2014, we supported the inclusion of *Natural History Notes* in the journal *Frontiers in Ecology and the Environment*, which rapidly became one of the most-read portions of the publication. In 2017, the *Notes* evolved to become *The Scientific Naturalist* published in the journal *Ecology*. Very active at annual ESA meetings, we organize mixers, host silent auctions at our informational booth, and hold silent auctions for natural history books, the proceeds of which fund participation by students and others with limited financial means. We organize symposia, host Ignite/Inspire sessions, and ensure that ESA attendees have the opportunity to get outside and explore regional landscapes through field trips and other activities. At ESA 2019, we offered a hiking and canoe field trip, *Kentucky’s Outer Bluegrass: Afoot and Afloat*, in which we explored the geology and biodiversity of a 4,000-acre portion of Louisville’s park system. We once again invited section members to volunteer at our silent auction and informational booth, hosted a mixer in which we announced the winners of the silent auction books, and offered an Inspire session titled, *Historia Naturalis: Inspiring Ecology*, in which prominent ecologists shared the importance of natural history in inspiring their work.

Understanding diversity through the lens of natural history can put local observations into global context, especially through citizen science initiatives (Chandler et al. 2017), which can bridge the gaps between scientists, communities, and the natural world. Because injustices can also impact engagement with the outdoors, bioblitzes and similar citizen science activities can be an opportunity to make natural history more inclusive. In addition, the global databases created by natural history platforms such as *iNaturalist* allow for public access to biodiversity information, an important aspect of making ecological data more equitably accessible, and providing important observations for ecological research (Palminteri 2018, Moore et al. 2019). ESA 2019 was the inaugural year of the Natural History Section’s “National Biodiversity Championships,” which used the *iNaturalist* platform to allow anyone with access to a cell phone to contribute biodiversity observations. The winning team consisted of local Louisville educators

and conservationists who connected with ESA for the first time by engagement with the competition, exemplifying the ability of these events to connect ESA meetings with the local communities that host them.

We are planning several initiatives for the future. The Collegiate Biodiversity Challenge (CBC) will be an expansion of the National Biodiversity Championships specifically for undergraduate students (underrepresented in ESA) who are interested in facets of natural history complimentary to ecology, biodiversity, and field studies. The CBC will invite undergraduate institutions to compete in the documentation of the biodiversity on their home campus, with teams invited to participate in the National Biodiversity Championships at the ESA meeting the following year. The Collegiate Biodiversity Challenge and National Biodiversity Championships will serve to highlight the importance of natural history practice as a precursor to informed ecological questions, regardless of academic “rank” or financial ability to attend the National Championships.

Herman (2002) declared that natural history “often and appropriately includes an esthetic component.” This accords with Pliny’s original multidisciplinary approach to *Historia Naturalis* as a “description of nature.” Not all observation is best communicated through written language. Ecological insights have been gained from many works of natural history art regarding the importance and distribution of species from the Lascaux and Jabiru Dreaming cave paintings onward. A plethora of excellent guides to



Photo 1. Natural history represents a practice of careful attentiveness to nature, at a diversity of scales, from minute biological detail to whole landscapes; students learn to key out plants in the immensity of Kluane National Park, Canada. Photo credit: Thomas L. Fleischner.

nature drawing and journaling (e.g., Hinchman 1997, Leslie 2003, Keller 2011, Laws 2016) have helped foster a recent surge of interest that has highlighted the unity of artistic and scientific viewpoints of natural history. Such unified, interdisciplinary approaches can act as natural tributaries into the river of ecological science and will be highlighted in exhibitions of natural history art at future Natural History Section events. Going forward, our section seeks to facilitate cooperation and communication between artistic and scientific, academic and non-academic, aspects of natural history.

As we recognize the skills and tools that natural history can lend to ecology, we must also recognize the value of other ways of knowing and the rich cultural heritages from which our discipline itself emerged. Robin Wall Kimmerer (2017) writes, “Paying deep attention changes us, takes us out of ourselves, and allows us to slip through the barriers of otherness that separate us. In attentiveness, we enter ‘the naturalist’s trance’, a state of heightened awareness in which we can see and experience the world with extraordinary acuity, all senses engaged and from which an expansive awareness emerges, an experience of connection and meaning making. Science, art, and prayer all have this in common, the practice of deep attentiveness, which changes us and then changes the world.” As the Natural History Section seeks greater inclusion and representation within our science, and positive change in our world, Kimmerer (2019) reminds us that “Innovation requires full and authentic participation.” We ask you to consider this letter an invitation.

A rebirth and rediscovery of natural history is flourishing, and optimism abounds for continued growth within the ESA. The practice of natural history is an innate human pastime with no more prerequisites than engagement of the senses in the natural world, which allows natural history to be inclusive, irrespective of career stage, education level, age, race, class, gender identity, or orientation. The Natural History Section represents the roots of ecology and embraces both the multifaceted nature of our discipline and the diversity of our membership. We are at the heart of ecology, and we would like to welcome you home.

Seabird McKeon is the Special Initiatives Coordinator, Louise Weber is the Vice-Chair, Andrea J. Adams is the Secretary, and Thomas L. Fleischner is the Chair of the ESA Natural History Section. Dr. McKeon also hosts the Naturalist Podcast, available online.²

Notes

¹ naturalhistoryinstitute.org

² <http://www.naturalistpodcast.com/>

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