Natural History from the Ground Up: Developing a College-Level Natural History Program in the New Millennium

David Gilligan

David Gilligan (dgilligan@sterlingcollege.edu) is Faculty in Natural History and Ecology at Sterling College/The Center for Northern Studies, P.O. Box 72 Craftsbury Common, VT 05827, U.S.A.

College-level natural history programs have become increasingly rare over the last several decades, and the opportunity to create a new academic program in natural history is almost unheard of. This paper chronicles the trials and tribulations of the establishment and development of such a program at Sterling College.

Citation.—Gilligan, D. 2009. Natural history from the ground up: developing a college-level natural history program in the new millennium. The Journal of Natural History Education 3: 24-29.

In their Autumn 2001 issue, *Orion* magazine listed a scant nine institutions of higher education with programs in natural history. That same year I had recently completed my graduate work in Natural History and Ecology and was teaching field courses for Prescott College in Arizona, one of the listed institutions. Around this time, I began my own search for college-level programs with roots in natural history, convinced that there had to be more than had made the pages of *Orion*. It was a tricky search because, as many of us know, at most colleges and universities natural history lies hidden at the foundation of a variety of disciplines, mostly in the natural sciences, but seldom manifests as a degree track, a professorial position, or even in a course title.

Eventually my search led me to a remote corner of the Northeastern U.S., where Sterling College, long known as a two-year program in Natural Resource Management, had recently matured to a four-year Liberal Arts program and merged with the Center for Northern Studies in Wolcott, Vermont. Between Sterling College and the Center for Northern Studies I found course offerings such as *Vertebrate Natural History*, *Field Ornithology*, *Polar Flora and Fauna*, *A Sense of Place*, *Nature Writing* and others. I also found professors such as Dr. Steven B. Young, who, although his academic pedigree reads "botany and evolutionary biology," considers himself foremost a naturalist; K. Jeffrey Bickart, naturalist and avian paleontologist who is notorious for coming to class wielding high-end spotting scopes, dressed in brain-tanned buckskin pants and hand-knit sweaters; Dave Linck, known to peel beaver carcasses off the highway for classroom dissections; and resident naturalist Dick Smyth, born with his boots on, who over the last forty years in the area has watched half the trees grow from sprouts and knows them all on an individual basis.

However, although natural history peeked out of Sterling and the Center's programs here and there, it was mostly still a means to the end of the larger program in conservation and natural resource management. Convinced that the seed of natural history had already germinated at Sterling and needed only to be nurtured to fruition, I secured leave from my faculty position at Prescott College and was invited to Sterling College and the Center for Northern Studies as a visiting scholar for the 2005-2006 academic year. During that year I worked with the Dean of the College on formalizing a natural history curriculum and expanding natural history course offerings both in the classroom and in the field.

Definitions

Our first order of business was to divine a definition for natural history. No simple task in light of the fact that few sources offer a straightforward definition; most approach natural history obliquely, as I will here.

At the end of most of the natural history courses I teach I ask my students if they knew what natural history was before they took the class. Almost without exception they admit that they had no idea. Then I ask them if they knew what a naturalist was. They all say yes, a naturalist is someone who knows about nature, and as often as not teaches about it. If they know what a naturalist is, why don't they know what natural history is? It's the word "history" that throws them off. In creating the modern English term "natural history," much was lost in translation. The term comes to us from the Latin *historia naturalis*, meaning "inquiry into nature," which has a different feel altogether than "natural history." *Historia naturalis* could also be translated as "looking into nature" or "knowledge of nature." I ask my students if this sounds like what we've done. They all nod and smile, patting the comprehensive field journals they are about to turn in. They are initiates now. They know.

As an inquiry into nature, natural history is as much a practice, or method, as a body of knowledge. In fact, these days when the body of knowledge that is natural history has been partitioned and re-named as increasingly sophisticated disciplines and sub-disciplines of the study of the natural world, it is the *method* of natural history that makes it distinct. Simply put, while other scientific studies of the natural world rely predominantly (or solely) on the practice of the scientific method as pioneered by physicists in the 15th and 16th centuries, natural history relies on the million-year-old process of observation and interpretation. Observation is direct and personal, and interpretation occurs through documentation, which involves description, comparison, classification, and in some cases reflection and contemplation. Although it may often share bodies of knowledge with other sciences and humanities, it is the practice of this method of inquiry that makes natural history distinct. Upon this foundational practice may be built a variety of edifices, including ecology, evolutionary biology, botany, conservation biology, natural history education and interpretation, historical and philosophical perspectives on nature, and arts such as photography, illustration, prose, and poetry.

Eventually my colleagues at Sterling College and I came to define natural history as "a field-based science employing descriptive and comparative methods for understanding and interpreting the biotic and abiotic components of the natural world, the relationships among them, and their evolution through time." And further, "Natural history methodologies emphasize hands-on observation and interpretation of organisms in their natural habitat, and include identification and classification skills, and understanding the interplay between physical factors such as weather and climate, geology, and soil formations and the life histories of organisms. Natural history also stems from a rich tradition of interbraiding the natural sciences and nature-based humanities such as visual and literary arts, and many naturalists use their training to become liaisons between the scientific community and non-scientists."

I personally would prefer to simplify this; definitions that are mutually agreeable to varied faculty members often become long-winded! These days I'm tempted to define natural history simply as "nature study," but my colleagues seem to wince at such simplistic wording (especially the word nature!). In the end we found it necessary to include in the definition (1) the body of knowledge, (2) the specific methodology of the discipline, and (3) the interdisciplinary nature of interpretation as integral to the practice of naturalists.

Developing the Program

Developing a college curriculum is a firsthand experience of evolution. Every subsequent edition of the curriculum modifies the last, and although punctuations in the equilibrium certainly occur, much of the development is gradual. One of the exciting things about Sterling College is that it is small and somewhat isolated, which means it's like a proverbial tiny, far-flung island with high levels of endemism, quick speciation, and strange irruptions of introductions. When I arrived here, two of the three primary naturalists on the faculty were preparing to retire and a third was teaching less than part-time. It was like an extinction event waiting to be followed by an adaptive radiation. I was fortunate to have at least some overlap with all three people, and they were all (fortunately) supportive of rejuvenation and revision of the curriculum. The Dean of the College suggested developing a concentration course of study in natural history, and we went from there.

Also worthy of note is the fact that classes at Sterling are small, usually between six to twelve students, all of whom fit easily into one van for frequent field trips. Because the entire student body is only around one hundred, students tend to move through classes in cohorts, developing long-term relationships with their peers, which, if cultivated, can be wonderfully supportive and productive when it comes to establishing and maintaining a culture of naturalists. Also, most students who take natural history courses beyond the first year tend to take as many as they can. This means that the opportunity to introduce knowledge and skills and predictably build upon them with a group of students is quite unusual, and chances are that if you have a student in more than

one class you will have them in many. Ours is a small program serving a couple dozen students. All told there are only a few of us teaching in the program (though the circle widens considerably with the related humanities course offerings), and as a result of this students tend to develop mentor relationships with their professors.

Our overall vision for developing a program focused on natural history follows the philosophical underpinnings of our definition of the discipline. Our goal is to expose students to a broad-based body of knowledge of the natural world, provide training and repeated practice in the methods of natural history, and emphasize throughout the curriculum the interdisciplinary nature of interpretation. These three goals weave their way through every course, such that even in courses centered on what is traditionally considered scientific information students are practicing description, illustration, and grappling with hard historical and philosophical questions, while in a photography or drawing course there are likely to be discussions about such topics as the evolution of sexual dimorphism or the dynamic of light diffusion in forest communities. This pedagogical philosophy, more than any listing of courses, is what makes the program *historia naturalis* from beginning to end.

Sterling College has two existing core courses (which every student takes) that form the base from which the natural history curriculum developed. These include *A Sense of Place*, an interdisciplinary introduction to Northern Vermont and the Craftsbury community, and *Ecology*, which introduces students to concepts such as ecosystem energetics, nutrient cycling, biomes and natural communities, ecological succession, population dynamics, and evolution. In addition to *A Sense of Place* and *Ecology*, all students choose from one of three courses, such as *Humans in the Environment*, which serve as an introduction to human ecology, and one of two courses, such as *Critical Science and Math*, which immerse students in practice of the scientific method (see Appendix 1). While foundational coursework is designed to give students broad, general knowledge and widely applicable skills, intermediate coursework gets into the details of the discipline. Here, as students develop increasing competence in both theory and practice, they mature into more sophisticated, rigorous, and critical treatment of the curriculum. Challenging assumptions and the added responsibility of co-creating their own education emerge as students moves into their second and third year. From the four abovementioned foundational courses (usually taken in the first year) students work with advisors to develop personalized degree programs in Conservation Ecology, Circumpolar Studies, Sustainable Agriculture, Outdoor Education and Leadership, and Self-Designed Studies. Within any of these areas students can nest a concentration in Natural History, and there is an established track for students to self-design their major in Natural History as well.

A natural history course focusing on the greater Northern New England region did not exist at Sterling, though elements of such a curriculum could be found in courses such as *Forestry* and *Wildlife Management*. At the time of my arrival, although students were introduced to journaling in a variety of courses, nowhere were they trained in refined field journaling techniques, such as the Grinnell method, or the keeping of systematic species lists and species accounts, along with associated cladograms and illustrations. The first new course we created was *Natural History of the North Woods*, specifically designed to serve the dual purpose of an intermediate-level exploration of the flora, vegetation, and ecology of the region and to train students in the tried and true techniques of the field naturalist. This course, usually taken at the beginning of the second year, quickly became the staple natural history course at the college, wherein students learned the skills necessary for subsequent natural history courses. It also became the preferred stand-alone natural history course for students in other fields of study who could only take one natural history course. This course is required for students pursuing a Natural History concentration or self-designed major.

A natural history course that focused on vertebrates already existed at Sterling, and was easily modified to become a logical continuation of *Natural History of the North Woods* and a furthering of the practice of natural history field techniques. This course also includes a heavy evolutionary biology component, including a substantial amount of systematics and cladistics, building on evolutionary principles first introduced in *Ecology* and further developed in *Natural History of the North Woods*, among other classes. The course follows the progression of late winter into spring, focusing first on the early evolution of vertebrates and radiations of fishes, amphibians, and reptiles (February), and then moves on to more in depth treatment of mammals during the prime tracking season (March) and birds during the start of spring migration (April-May).

Sterling had an existing geology course that in the past included a substantial amount of mineralogy and lab work and has since been modified to serve as a stand-alone earth science course serving students going into Natural History and/or Conservation Ecology. As such, the class curriculum now includes material on rock types, degradational forces, glacial

geology, geomorphology, plate tectonics, and geologic evolution. Most (but not all) of the lab time has been traded for field time, and subsequent natural history courses are designed to build on this geologic foundation.

Intermediate and advanced-level courses build on existing knowledge and skills and encourage students to explore new territory, both literally and figuratively. *Spring Flora* was developed as a field-based botany course focusing on field identification, life histories, and systematics of angiosperms. An existing course in *Field Ornithology* was expanded to include additional material on the physiology of flight and migration. We actively encourage students to explore natural places outside of New England and the Northeast in order to broaden their knowledge of the natural world, and ultimately deepen their knowledge and appreciation of home. Such courses include *Tundra and Taiga Ecology* (taught alternately in Alaska and Newfoundland and Labrador), *Marine Natural History of the North Atlantic*, *Research in Tropical Ecosystems: Belize*, and *Natural History of the Sierra Nevada*. In their second, third, and fourth years, students also refine research techniques through campus-based courses such as *Watershed Ecosystem Analysis*, *Field Ecology*, and *Winter Ecology*. Half of these courses were already in place at the college prior to formal development of natural history programming. These were for the most part focused on research techniques, with the place-based natural history courses being more recent additions.

All students who formally pursue a Natural History concentration or self-designed major take one or two relevant humanities courses. As emphasized above, these courses are integral to the interdisciplinary mission of the program and are essential for students to develop well-rounded interpretation skills, as well as develop an understanding of the philosophical and historical aspects of the field. *Nature Writing*, *Drawing from Nature*, *Outdoor Photography*, *Ecology and World Religions*, and *Philosophies of Nature* are all appropriate, among others. While these courses are designated humanities offerings, elements of humanities are found in all Natural History course offerings. Ideally, as students mature the traditional academic definitions of natural sciences, social sciences, and humanities are challenged and recognized as human categorical constructs, each representing a different approach to interpreting our experience of the natural world, useful to a point, but often unnecessarily divisive.

The capstone of a student's program at Sterling consists of a Senior Project (ranging in scope from six to fifteen credits) and a senior seminar. *The Senior Seminar in Natural History* is an interdisciplinary synthesis and celebration of all the knowledge and skills the student has thus far learned. As a seminar, the course is modified each time it is offered based on the instructor and students but typically involves a treatment of the history and philosophy of natural history, the development of evolutionary thinking, and a series of student-led presentations based on personal projects. These projects are usually designed around a species and involve a literature review and presentation as well as an artistic interpretive piece. The course also includes hosting visiting naturalists to campus and facilitating panel discussions, and a retreat of some sort, which may be group attendance at the Northeast Natural History Conference.

Continuing Evolution

Where to from here? Now that the natural history program is formally established and thriving at Sterling, we are developing a wilderness-based field program in the mountains of the American West and in Alaska. I was blessed to learn my foundational Natural History in wild, elemental places and I am convinced that the perspectives on nature afforded by such experiences are paramount to an in-depth understanding of the natural world. For students learning natural history in New England, where even the largest protected areas are but pieces of fabric in a patchwork quilt of fragmented landscape, time in big wilderness allows for an understanding of nature that a strictly regional perspective just doesn't offer. Wilderness field programs also allow students to immerse themselves in the essence of the landscape they are studying in a way that is impossible in a town-based setting, no matter how rural it may be. We awaken on granite slabs, bouquets of tundra wildflowers just feet from our faces, experience regular interactions with wild animals in their natural context, and patiently observe the moon go through its phases. With attention, every experience is natural history, which is to say *historia naturalis*, an inquiry into nature.

In light of the current national and global economic situation, it is especially thrilling for Sterling College to be in the process of hiring an additional faculty member in Conservation Ecology and Natural History. But a good naturalist is hard to find, and this is easily revealed by a stack of seventy cover letters and C.V.'s in which applicants either don't have a sense of what natural history is or clearly regard it as antiquated, updated by more useful disciplines such as appear in the most sophisticated graduate school catalogs. But what could be more useful today than inquiry into nature? In light of increasing disciplinary specialization over recent decades (perhaps centuries), it is rare to find someone with

breadth of knowledge and experience enough to teach about both plants and animals, for example, or plants and rocks, let alone a humanities course. But there are a few naturalists in the stack, and that is heartening.

Today, as the disciplines of science and academia continue to diverge and specialize and modern human cultures continue to expand their material infrastructure at the expense of elemental nature, the need for well-trained naturalists is arguably more pressing than ever before. 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 perhaps more quickly than we can know. The modern naturalist is a generalist in the sense that he or she necessarily keeps track of a variety of fields, often rubbing shoulders with the best scientists, social critics, and artists of the times, but a specialist in the methods of direct observation and interpretive synthesis. These naturalists will be biological technicians, geologists, park rangers, educators, conservationists, activists, journalists, poets, artists, all of which hold in common that they bear witness to the natural world through direct personal experience of it. If diamonds are valuable and considered precious because they are rare, a good naturalist is far more priceless and much more useful. From the perspective of higher education, the program described here offers a refreshing interdisciplinary antidote to increasingly specialized programs and may well be an ideal model of Liberal Arts education in an age of environmental calamity. But the most compelling reasons for being a naturalist may be less academic and politically correct. For me, the practice of natural history is a rich and worthy end unto itself, an experiential celebration of the beauty of nature.

When I think of Robert Michael Pyle's *Orion* article entitled "The Rise and Fall of Natural History" (2001), my heart falters. But when I think of Trombulak and Fleischner's article "Natural History Renaissance" (2007), my heart lifts, and growing a college-level natural history program in the new millennium and having it flourish is undoubtedly testimony to such a renaissance. Add one more to the list of institutions of higher learning offering programs in natural history. I foresee that more are soon to come.

References

Pyle, M.R. 2001. The rise and fall of natural history. Orion Autumn 2001: 17-23.

Trombulak, S.C., and T.L.Fleischner. 2007. Natural history renaissance. Journal of Natural History Education 1: 1-4.

Appendix 1. Courses of study in natural history at Sterling College.

NATURAL HISTORY CONCENTRATION: 18 credits/5 course minimum
SELF-DESIGNED MAJOR (SDM) IN NATURAL HISTORY: 34 credits/11 course minimum

Contributing core/general education courses:	***credits***
NS/SS/HU 100: A Sense of Place	3
NS/SS 105: Humans in the Environment	3
or Introduction to the North	
or Writing and Speaking to the Issues	
NS 107: Ecology	3
NS 145: Critical Science and Math	3
or Environmental Science	

Natural Sciences:

Required courses for all concentrations and SDM's:

NS 235: Natural History of the North Woods	4
NS 228: Vertebrate Natural History of the North	4
NS 415: Senior Seminar in Natural History	3

Earth Sciences: Concentrations choose one; SDM's choose two of the following

NS 260: Geology	4
NS 245: Soil Science	4
NS 310: Quaternary Studies	4

Life Sciences: SDM's choose four of the following

NS 360: Winter Ecology	3
NS 315: Field Ornithology	3
NS 317: Spring Flora	3
NS 333: Tundra and Taiga Ecology	3
NS 362: Research in Tropical Ecosystems (Belize)	3
NS 367: Marine Natural History of the North Atlantic	3
NS 366: Natural History of the Sierra Nevada	3

Humanities:

Concentrations choose one; SDM's choose two of the following

HM 221: Outdoor Photography	3
HM 222: Drawing from Nature	3
HM 224: Black River Sketches	3
HM 267: Ecology and World Religions	3
HM 326: Nature Writing	3
HM 355: Philosophies of Nature	3