

[Author's note: With the benefit of hindsight, this personal statement has come to seem a little embarrassing.]

My first field experience was in the E. S. George Reserve in Pinckney, Michigan, where I had volunteered to help the Ostling Lab at University of Michigan sample and measure leaves. Our field site was muddy and so fly-infested that someone handed me a bottle of 100% DEET to spray on my shoes. The forest canopy provided shelter from the sun, but the physical labor of hoisting giant clippers to cut branches off trees made us hot and itchy. As we clambered back toward the car, I stepped by accident into a giant anthill, covering my shoe with mud. The moment we arrived back at the lab, I ran to a sink and washed it off.

This was not an auspicious start to my ecological career, but when given the opportunity the next week to once again leave the monotony of the lab and go to the forest, I decided to go. And the more I went, the more the harshness faded in my mind, throwing the beauty into relief. The light filtering through the canopy turned the forest into a green cathedral; unknown birds chattered in the canopy above branches whose leaves smelled pungent when you crushed them. I was willing to tolerate the mosquitoes for that. My parents raised me and my sister in the suburbs, first of Toronto, then of Detroit. (They thought I would become a doctor, and so did I.) For years, we hardly even ventured into national parks. So when I had my first taste of wilderness, I was captivated by it.

I was already interested in ecology before volunteering on that project, but my experiences in that lab sealed my commitment to do ecological research as a career. One of the questions we addressed was how different species of trees were able to coexist. Did competition force them to simply partition available resources, such as nutrients and sunlight? If so, we should expect the distributions of traits relevant to gathering those resources not to overlap very much between species. Instead, we saw very high degrees of overlap, which meant that that couldn't be the whole story. This new territory of wild concepts – niches, traits, competition, symbioses, habitat filtering – drew me in closer. Here was a field in which all explanations were complex, and in which even basic questions could cause heated disputes.

Yet another quality that drew me to ecology was my growing recognition that the state of natural environments is a mess. Climate change, invasive species, habitat destruction – all these things terrified me, and still do. The unprecedented loss of biodiversity to which we stand witness leaves me angry and, at times, helpless. But I am attracted by the promise of making discoveries that could make a real difference in peoples' lives by preserving the ecological processes that sustain us.

This is ultimately what drew me to community ecology and to trying to understand the mechanisms that structure ecological communities. If we are to understand what climate change and habitat destruction will do to the complex webs of interactions that sustain healthy ecosystems, we will have to understand how species are distributed, how they come together to form communities, and what these mechanisms imply about their responses to environmental threats. This is an enormous task, but I hope that I will be able to push the boundaries of our knowledge with the aid of a NSF Graduate Fellowship.

I am pursuing a graduate degree because I am utterly fascinated by these fundamental issues in ecology. I hope to continue in this line of research as a career, and draw it closer to strategies to restore degraded environments and respond to global environmental change, and to policy changes that can be made in favor of conservation. I still have so much to learn about ecology, but I am confident that graduate school will help me grapple with some of the immense

complexity of the natural environments around us. Ultimately, I hope that by promoting conservation, I will also be working to improve the welfare of real people around the world.

I feel more confident about the potential for conducting this kind of research due to the skills, curiosity, and work ethic I have developed from the research I have already done. A list of publications and presentations is given in the “Education and Work Experience” section of my application. Here is a selection of research experiences that give me confidence that I will succeed in graduate school:

**REU Internship: Dr. Charles Halpern’s Field Crew, HJ Andrews Experimental Forest**

During the summer of 2013, I was selected as an REU intern and fieldworker at the H.J. Andrews Experimental Forest in the Oregon Cascades. Our crew, headed by Dr. Charles Halpern, worked on a large-scale restoration experiment in which coniferous trees that had encroached upon a montane meadow were cut in six experimental 1-ha plots. In half of the experimental plots, the resulting woody slash was broadcast burned; in the other half, it was not. The crew sampled along transects in each plot to quantify the cover of each plant species therein.

As the sole REU intern on the crew, I had the opportunity to develop my own research questions. I chose to focus on how burning, and the severity of burning in different areas, affected the cover, richness, and composition of meadow species in the experimental plots compared to nearby reference meadows which had never been invaded by trees. I found that broadcast burning brought the composition of the plant community closer to the reference meadows, but that it also left the burned area susceptible to the formation of monocultures of plants such as the sedge *Carex pensylvanica*.

Through this research experience, I became confident in my ability to perform arduous fieldwork in varied weather, and to work well with other members of a field crew. Although I had little experience in plant identification beforehand, I quickly absorbed the names and features of most plants we encountered. I also learned a number of new statistical techniques for analyzing community-level ecological data, such as ordination. With the aid of Dr. Halpern, I am now working on preparing a report on my findings to help guide future experimentation and restoration efforts of montane meadows.

**Undergraduate Research: Dr. Nathan Swenson’s Lab, Michigan State University**

Since spring semester of 2011, I have worked in the lab of Dr. Nate Swenson at Michigan State University, with the help of a Professorial Assistantship grant from the MSU Honors College. I have been taking part in a simulation-based research project to determine whether phylogenetic signal and spatial patterns of phylogenetic diversity can be used to determine the parameters of community assembly that resulted in those patterns. Though a collaborator designed the simulation, from the start I took a central role in defining the research questions of the study, and I conducted much of the work of crunching enormous quantities of data in the statistical programming language R. At many points, Dr. Swenson and I worked out complex ecological relationships together on his whiteboard, and I would try to convince him that a particular line of enquiry was or was not worth pursuing. I have presented preliminary results from this project at an undergraduate conference.

**Undergraduate Research: Dr. Natalie Phillips’s Lab, Michigan State University**

Since fall of 2012, I have been working in the Digital Humanities and Literary Cognition (DHLC) Lab at Michigan State University under Dr. Natalie Phillips. Although this research project is not in my primary field of study, it illustrates my capacity for managing diverse streams of data in interdisciplinary projects. The same types of skills may be used, for example, in projects which integrate ecological data about the services provided by ecosystems, and economic data about stakeholder preferences regarding land use.

Our current main project is analyzing data from an experiment in which English PhD students were asked to read a chapter from Jane Austen's *Mansfield Park* from the inside of an fMRI scanner, with varying degrees of attention to literary detail. I am the co-leader of a research team in charge of tagging literary elements of Austen's narrative, which is full of irony, layered meanings, and class consciousness. Because of this complexity, tagging requires subtlety and good judgment, as well as the ability to come to firm conclusions without being reductionist.

I am also part of a research team involved in reconstructing brain images for each subject and analyzing their changes over time, which we hope to correlate with aspects of the literary text. In this brain data team, I play a central role as an advisor on statistics, which play a large role in responsibly interpreting the brain scans. Although this project is very much a work in progress, we hope to explore how neurological activity reflects the narrative techniques Austen used to modulate the attention of the reader.

One of the chief difficulties of this project is merging and relating some very varied streams of data – neurological, literary, statistical, and otherwise. As the only crossover member between the narrative-centered and brain-centered research teams, I play a crucial role in this confluence. As a leader of a research team, I have to coordinate the efforts of others to get things done quickly. To support my participation in this project, I was awarded an Undergraduate Research Initiative grant from the MSU College of Arts and Letters. I have joined other members of our lab in presenting preliminary results at conferences, including the Michigan chapter of the Society for Neuroscience.

Aside from these research projects, my interest in ecology and environmental science has been kindled by volunteer work I have done for environmental causes that mean a lot to me. For example, I have participated in a number of benthic macroinvertebrate surveys to gauge the health of the polluted but recovering Rouge River, near my home in southeast Michigan. I even drag my parents and sister out to Rouge River clean-up events. As an avid bird-watcher, I will also be helping the Michigan Audubon Society in studying the flight paths of sandhill cranes to aid in conservation.

I also enjoy outreach among school-age children to help them understand the importance of science and mathematics. I am a regular volunteer at Michigan's state-level Science Olympiad competition, where I have helped to run some of the biology-focused events that middle school and high school kids participate in. With Dr. Aklilu Zeleke and a handful of other Michigan State students, I went to a local elementary school with a high immigrant population to present simple mathematical puzzles to children. I loved to see to excitement in their voices as they figured out the trick behind a particular puzzle. In my graduate program, I plan to continue this kind of outreach to schools, and I hope to also speak to religious organizations and other groups about the importance of preserving the environment.