

Personal Statement

Since the elementary school days when it meant sticking litmus paper into lemon juice, I have loved science, but not correctly, not in the way that I adore it now. Perhaps due to the combined effects of my parents' bitter divorce, my series of displacements from the Midwest to southern Tennessee to metropolitan Pennsylvania, and several excruciating years of heavy bullying, my early school years were marked by ever-worsening social anxiety. By middle school, I was incapable of speaking up in my classes (of roughly twelve students) with anything other than a terrified squeak so unintelligible that I was sent to speech therapy to correct it. Science, as it was taught at that level, provided a retreat, a field in which my mind, isolated, could reign supreme without such humiliating losses of composure. By being impartial, it could also be impersonal, just as I wanted.

Time passed, and I found my voice. I forced myself, visibly trembling, to participate in my classes until the shaking finally stopped. During my first week of college, in the most Richard Feynman-esque of my life choices, I joined the marching band, beating a set of four pink flamingo lawn ornaments like drums ("trash percussion") in the center of a football field.

As I evolved, science demanded more from me. At Princeton, lectures and seminars in cell biology, population genetics, molecular biology, and virology opened floodgates of new ideas, but the best among them raised questions beyond their capability to answer. This was the nascent form of the knowledge presented in my textbooks with such blunt authority—an intellectual void filled through projects engendered by passionate curiosity. When I tentatively ventured into independent research in the yeast genetics laboratory of Dr. Mark Rose, I thrillingly uncovered an unnoticed organizational pattern to the directional transport of vesicles during cell fusion in budding yeast, a pattern also adopted in filamentous fungi and even in immunological synapses.

My time in the Rose lab also disabused me of the notion that science is a solitary pursuit; our group was at its strongest when hypotheses, stray thoughts, and mere dreams were exposed to the unique selective pressures of each individual's experience and insight. I designed and executed all of my experiments autonomously for this project, with my live-cell imaging and inevitable bouts of troubleshooting regularly extending into absurd hours of the morning, but my ability to communicate my findings afterwards was equally important. The subject in which I once sought isolation and dispassion pushed me into the role of an advocate, engaging with an audience when I presented my work in group meetings, when I delivered a conference talk this summer, and now as I prepare a manuscript for publication.

My talk at the Yeast Genetics and Molecular Biology Meeting this August threatened to bring back old demons. As I approached the lectern, the feeling of the stage lights on my skin was momentarily paralyzing. Yet once I started speaking, nothing else mattered. Invigorated by the story that I needed to share, by the contingents of scientists from countless cities, states, and nations with equally engaging discoveries of their own, and by the curiosities that unified us, I had no capacity for fear. This is why I study biology—because it is complex, because the ability to see into a cell, literally or otherwise, is addictive, and because the fundamental nature of the field, the process by which research becomes communal knowledge resonating across disciplines, forces me to think outward and to share the product of that thinking in a way that makes me a better person than I am alone.

Graduate school in molecular and cellular biology at Harvard has been daunting, but I have loved my coursework in genetics and genomics, development and neuroscience, and physical and chemical biology, particularly in their rapid-fire, discussion-based formats. My

appreciation of science as a collaborative effort that demands dogged enthusiasm—a passion that I wholeheartedly feel—has given me the ability to endure its stresses as well as its triumphs. My current rotation in Dr. Ethan Garner's lab at first required an agonizing amount of debugging on an elaborate new super-resolution microscope. It has now been repaid a hundredfold as a key stage in a project that allows me to directly observe cell wall synthesis in bacteria. Despite representing a system outside of my former comfort zone, the project allows me to integrate cutting-edge, single-molecule imaging techniques into my ongoing interest in the ways that organisms establish and maintain cell polarity.

I have loved my research experiences so far, and I know that I want to pursue biological research further. My history with severe social anxiety makes the inclusion of any and all students who might feel nervous or intimidated by this field a goal that carries profound emotional resonance for me. My summer research at Princeton occurred within the framework of a program that is designed to allow students to develop skills in presenting and critiquing scientific discoveries alongside students from backgrounds with weaker representation in the biological sciences, or who study at schools that cannot provide the same access to research facilities. I intend to advise students through the analogous Summer Research Opportunities at Harvard program. As a mentor in the Women in Science, Technology, Engineering and Mathematics Mentoring Program, I am currently guiding a female Harvard undergraduate through the stressful and competitive life of a science major.

I will disseminate my research on multiple levels: first, through a range of journals and conferences that allow for international and interdisciplinary communication, and second, to a public that may not think of science as engaging or exciting. I am thrilled to work with the Harvard Life Sciences HHMI Outreach Program to develop simple laboratory modules for use in high school science curricula. Both my undergraduate and graduate projects, with the use of highly tractable model organisms and highly visual outputs, will serve as ideal bases for experiments within this program. Harvard's popular Science and Cooking public lectures have also inspired me to propose a series of high-school level cooking experiments focusing on the contributions of yeast and bacteria to common and not-so-common foods (such as *S. cerevisiae* and bread, and *B. subtilis* and natto). In addition to my teaching within the Harvard community, I hope to contribute to the biology courses soon to be developed as part of edX, a massive open online course program accessible to students outside of the conventional university system.

These are the sorts of outreach that I intend to perpetuate for the entirety of my career. Beyond a Ph.D., I will continue to be directly involved in biological research, first through postdoctoral work, then, ideally, by founding a laboratory of my own. By recruiting researchers of many backgrounds to probe specific problems in cell and molecular biology of my choosing, and through the advising and teaching roles that a faculty job would permit, I hope to instill my own passion for science in a subsequent generation of students capable of advancing the field beyond my own work and even beyond my own abilities. The diversity of the current crop of biology majors still stands in stark contrast to the composition of faculty across the country. There is, for instance, a gender divide, enabled in previous generations, that now persists within higher education. It is the decision of women like me to pursue advanced degrees in the biological sciences that will eventually correct the imbalance at the highest strata, becoming leaders of laboratories and in turn assisting smart, talented young women in doing the same. Such diversity is necessary for the discoveries that allow society to become more just and, generally, to flourish. The support of the National Science Foundation to this end would be invaluable during this early but pivotal period in my scientific development.