

STEM Student
GRAD 496A
Fall 2019

As a first-generation college student, it is difficult for my parents to understand my aspirations of achieving a career in academia and research. However, that is not to say that my parents do not understand what it means to work hard and be successful. My mother never finished her college degree, and my father never received his high school diploma. Yet together they have provided a secure and amazingly supportive life for their six children, of which I am the second youngest. It is thanks to my parents' hard work and unconditional support that I can pursue a college education. I knew from the moment I started school that I wanted to receive a bachelor's degree, but it was not until my second year of college that I realized a doctoral degree was also in my future. Academia has been the constant in my life that never ceases to provide a challenge; it is this challenge that drives my motivation and desire to excel at everything I set my mind to. My decision to pursue graduate education not only stems from my motivation and interest in biomedical research, but also from the desire to become as successful as my parents in order to give back to my family, my community, and future generations of students like me.

In the summer of 2016, I began working with Dr. Ross Buchan in Molecular and Cellular Biology at the University of Arizona as a participant in the Undergraduate Research Opportunities Consortium's (UROC) PREP/STAR program. The Buchan Lab has two main focuses: determining connections between nuclear and cytoplasmic mRNA events and understanding the mechanism of granulophagy. My project focuses on the mechanism of granulophagy and seeks to elucidate the mechanism by which

Cdc48, a protein in yeast cells, contributes to granulophagy. Stress granule accumulation is a phenotype of ALS and other neurodegenerative diseases, therefore understanding the mechanism of granulophagy is important for developing treatments for these diseases. My project consists of an analysis of point mutations in Cdc48, including growth assays as well as fluorescence microscopy. As a part of this, I determined my research question based on the lab's current research and wrote a full research report. Additionally, I gave an oral presentation summarizing my project at the UROC Summer Colloquia and presented a poster at the 21st Annual UROC Research Conference. I will also be presenting my project at the Annual Biomedical Research Conference for Minority Students in Tampa, Florida this November. The results of my project indicate that the N-terminal domain of Cdc48 may have implications in stress specific responses during cell survival as well as the clearance of Pab-1 and/or stress granules. Additionally, the D1 domain may be important for P-body to stress granule transition. To confirm these results and further my understanding of Cdc48 and its functional domains, I will analyze additional Cdc48 point mutations as well as Cdc48/Atg15 double mutants. This will be achieved using PCR and protein interaction studies. Working on this project has introduced me to the joy I find in conducting research and has further solidified my research interests in cellular and molecular pathology.

My primary research interest is the cellular and molecular basis for human disease. More specifically, I am interested in genetic mechanisms and their regulation. Regulation occurs at a variety of stages within the central dogma of molecular biology, including transcription, alternative splicing, translation, and post-translational

modifications. My research interests revolve around these processes and the ways in which mutations may alter their functional mechanisms and thus lead to disease. I am not only interested in genetic mutation that leads to altered protein products, but also the various factors which regularly contribute to gene expression including organization of the genome, gene silencing, and gene editing. Since my research interests at present are quite varied and not very specific, I am interested in interdisciplinary programs where I can be exposed to a wide variety of research in order to find my niche.

Northwestern University attracts me as a potential PhD student due to the caliber of training that students obtain within the Interdisciplinary Biological Sciences Program and the amount of research that matches with my interests. I am interested in working with Dr. E. Andersen as his research on the genetic basis of varying disease susceptibility correlates directly with my interests in genetics and human disease. Particularly, his recent review of CRISPR/Cas9 genome editing technology is of great interest to me. Furthermore, I am interested in working with Dr. W. Klein on his groundbreaking research involving the molecular basis for Alzheimer's disease. The fact that Dr. Klein's research involves molecular biology as well as therapeutics makes it particularly intriguing to me as I am interested in the direct, medicinal benefits of biomedical research. Finally, I am interested in the work of Dr. J. Brickner as his work on the spatial organization of the genome and how it contributes to gene expression perfectly aligns with my interest in genetics. Dr. Brickner's work is a great example of the complexity of gene expression and the variety of factors which contribute to it. I believe that his work on gene expression will have broad implications in the study and treatment of human disease.

Upon completion of my PhD at Northwestern, I would like to pursue a career in academia as a tenure track professor at a research-intensive university. Ideally, I would like to work in the medical school and further my research into the cellular and molecular mechanisms of disease. As a professor, I believe I will be able to keep myself engaged with current biomedical research, while also teaching and mentoring future generations of underrepresented students. My experience in UROC has vividly exposed me to the importance of diversity in higher education and research. In order to provide a stable foundation for the future, we must diversify higher education through the implementation of diversity-seeking programs that encourage and inspire young researchers to pursue a graduate degree. My goal as a professor is to continue to participate in these programs and motivate underrepresented students to fully realize their aspirations and achieve their educational goals.