Previous Research Experience

I have a broad background in research due to unique opportunities that have exposed me to a variety of scientific methods and model systems. My experience spans beyond simply participating in an investigator's project; I have created and completed novel research. Additionally, I have taken the initiative to gain research experience in multiple labs in order to enter graduate school with a solid foundation in various techniques and scientific methods.

Undergraduate: My exposure to research began during the summer after my sophomore year in college at XXX University. During this time, I was preparing to be a high school teacher, and XXX biology majors were encouraged to complete a research project on campus. In anticipation of this work, I joined the XXX Summer Scholars after my sophomore year to gain advanced experience doing research. During that summer, I worked with *C. elegans* to identify attractants and repellants for a chemotaxis assay that I planned to use in my thesis research. Through this experience, my training with a powerful model system prepared me to help my peers in their work the next year. Additionally, I became the biology consultant for a collaborative team of computer science students developing an automated digitized system for assessing the *C. elegans* movement. The work also aided biology students by providing a tool for obtaining quantitative and reproducible results, remedying a problem with the previously-used chemotaxis assay.

At the end of my junior year, my advisor told me that the Biology Department was adding zebrafish as a model system to expand the department's research tools. I was immediately interested in using this model for my thesis work, and I volunteered to set up the water system and lead the team of students doing work with the fish. Utilizing a new model system with no established research paradigms enabled me to develop a project that joined my dual interests in biological function and learning. Previous publications concluded that short term nicotine exposure increased learning in zebrafish[1]; however, I was curious if long-term nicotine exposure did the same, as this was most physiologically relevant to smokers. Performing a tank side-preference assay, similar to those done previously to assess learning, I concluded that although acute nicotine exposure increased learning in zebrafish, long-term exposure did not. These results generated future questions for other students to pursue as how zebrafish develop nicotine tolerance. In addition to multiple on-campus presentations, I presented my findings orally at the regional Tennessee Academy of Sciences meeting, winning first place in the Neuroscience division. I also participated in a poster presentation at the regional SYNAPSE neurobiology meeting in South Carolina. Thus, my undergraduate research provided me the unique opportunity to explore two model systems and to develop my own project; I found an interesting question, developed techniques to answer it, and presented my findings to various audiences.

INTERNSHIP: In my last undergraduate semester, my newly-discovered passion for research let me to consider academic research rather than secondary education as a career goal. Although I had significant undergraduate research, I wanted to explore research at a biomedical institution. I took the initiative to seek out a position as a research assistant at MMM University. I sent my resume to all faculty doing biological research and I received interviews and offers from several laboratories. Unsure of my specific interests, I sought a lab that would give me exposure to a wide variety of techniques. This goal led me to join YYY's lab. Dr. YYY is a leader in studying integrin (cell adhesion molecules) function during development. His lab uses the mouse model system and cell culture to address cellular responses to loss of integrin function in kidney development. Dr. YYY provided me with the opportunity to develop a project that focused on developmental functions of the Rho GTPases, downstream effectors of the integrin signaling cascade. As Rho GTPases are not the main focus of the lab, I was responsible for

reviewing and understanding the literature for my project. My work provided Dr. YYY with initial results that the Rho GTPases Cdc42 and Rac1 are essential for post-natal kidney development, and that these proteins are involved in tubuleogenesis of kidney cells. In this lab, I learned new technology and trained others, including graduate students and post-docs. I additionally contributed to the lab by troubleshooting and improving protocols and by amplifying lab stocks of a virus essential for the entire lab. My experience in Dr. YYY's lab was invaluable in confirming my passion for research. I additionally learned the importance of receiving graduate education to increase the depth of my training to and reach my long-term career goals.

GRADUATE: MMM's Umbrella Program was very attractive to me as the program's goal is to provide broad training and expose students to various fields of study. MMM's Umbrella Program allows me the opportunity to explore all of the departments in the biological sciences to identify my true interest. After my acceptance into the program, I decided to pursue the optional summer rotation in to gain even more research experience before classes began. An interview at another institution perked my interest in the nuclear pore complex (NPC), and based on this interest, I joined Dr. ZZZ's lab for a rotation. Though the lab is topically diverse, her major focus is nucleocytoplasmic transport.

During my rotation in Dr. ZZZ's lab, I used various techniques (yeast genetics, electromobility gel-shift assays, and fluorescence microscopy) to assess ribosomal translocation across the nuclear pore complex in *Saccharomyces cerevisiae*. The fully-assembled 40S and 60S ribosomal subunits are among the largest cargoes transported across the NPC, and previous research suggests that these complexes utilize multiple transport factors to traverse the nuclear membrane. Using *in situ* hybridization, I concluded that Gle2, a nucleoporin (NPC protein) that had previously been identified as involved in 40S transport, was not essential for this transport.

During my time in Dr. ZZZ's lab, I became interested in the mechanism of the selectivity of the NPC barrier provided by the FG nucleoporins. In discussing this project with Dr. ZZZ, I have developed various strategies to address this question (elaborated in the research proposal). Although I still have three more rotations during my first year in the Umbrella Program, I plan to join the ZZZ lab, and my proposed project will become my thesis work. As mentioned in my personal statement, Dr. ZZZ is an excellent role model for women in science, and the work done in her lab answers important questions that are broadly related to cellular regulation.

Because of my interest in nuclear cell biology, my current rotation is with AAA, who studies telomerase in yeast. I am using yeast genetics, immunoblotting, and chromatin immunoprecipitation to address mechanisms by which the telomerase subunit Est2 regulates telomere length. Thus, I am learning a new aspect of nuclear cell biology.

I have a broad and unique background in performing scientific research, and I have taken the initiative to gain significant research experience and learn various techniques to best answer important scientific questions. In addition to becoming an expert in the field of nuclear cell biology, my work in Dr. ZZZ's lab will prepare me to tackle any scientific question, as I will develop my skills in posing hypotheses and utilizing multiple disciplines to test them.

Presentations: BBB (maiden name) and CCC. (2008) Effects of acute and chronic nicotine exposure on learning in zebrafish. Oral presentation in neuroscience division of Tennessee Academy of Sciences, Nashville, TN.

BBB and CCC. (2008) Long term exposure to nicotine does not increase learning in zebrafish. Poster presentation at SYNAPSE (Society for Young Neuroscientists and Professors, South East), Charleston, SC.

1. E. D. Levin, et al. Psychopharmacology. 184, 547-552 (2005).