Personal, Relevant Information and Future Goals

I find myself beaming with a smile whenever I ponder my dream of becoming a research professor. As I approach the end of my studies, in which I will graduate with a Bachelor of Science in Biochemistry from Arizona State University (ASU), it becomes clearer to me that my dream of professorship may not be a dream for much longer. My long term goals include running a laboratory that does biophysical research on Transient Receptor of Potential (TRP) ion channels and mentoring underrepresented youth who are interested in pursuing careers in STEM. In the short term, I want to attend graduate school and obtain my Ph.D. in biochemistry, get more engaged in the scientific community and continue my efforts of mentoring underrepresented youth. To accomplish these dreams the Graduate Research Fellowship Program is a critical step toward my success.

One of the most impactful childhood experiences happened when I visited my older brother in juvenile detention. I was 9 years old and he was 16. He had been institutionalized for a spree of bad behavior attributed to drug abuse. While he was in detention, he was diagnosed with severe drug-induced psychosis, almost completely disrupting his connection with reality. Even at the age of 9, I was fascinated by his condition; I wanted to understand what he was feeling and be able to explain the phenomenon through physical means. Not many science related ideas were clear to me then, but this one incident regarding my brother intrigued me. Although I didn't really understand what it entailed or how to go about it, I wanted to understand the physical mechanisms of consciousness and perception.

My upbringing was not traditional and brands me with a Hispanic minority status. I spoke Spanish to my father who is a Mexican National who was immigrated by my mother, an American, who I spoke to in English. I was born in Tucson, Arizona, but I lived my first two years of life in Nogales, Sonora, Mexico; with much of my early childhood traveling there on the weekends. The exposure to Mexican and North American cultures helped me to learn from and adapt to both at a young age. As a result, I am bilingual, but the most important thing I learned from those early childhood experiences was the ability to appreciate and interact well with different cultures.

In my second year of college, I began volunteering in a biochemistry research lab under Wade Van Horn, Ph.D. The scope of his lab was to use Nuclear Magnetic Resonance (NMR) spectroscopy to analyze the structures of transmembrane proteins. Before I knew it, I fell in love with the bench work and the spectrometers. This marked a big turning point in my life; as the hours I spent in the lab increased, it had a direct correlation to my GPA. My grades improved from a 2.8 cumulative as a freshman to a 3.3 as a senior, with a major GPA of 3.7. I have been an undergraduate researcher in his lab for 2 ½ years now and still wake up excited to go to the lab every day to get my daily results. Overall, the two most diverse attributes I honed in the Van Horn lab are a strong sense of patience and devotion; both which have cemented my desire to attend and excel in graduate school.

The Van Horn lab focuses on structural and functional analysis of integral membrane proteins; specifically, Transient Receptor of Potential (TRP) channels and their modulators. The

most interesting point about these channels to me is that they are modulated by various stimuli which results in polymodal gating (activation by multiple stimuli)[1]. Much of my work was done on Transient Receptor of Potential Melastatin 8 (TRPM8), which is expressed in Dorsal Root Ganglia (DRG) neurons throughout the body and is thought to be a cold sensing protein[2]. I have also worked on the Transient Receptor of Potential Vallinoid 1 (TRPV1) channel, which is known as the hot sensing protein[3, 4]. For both of those projects, I worked under a post-doctoral fellow or a graduate student; however, I have also had solo projects in the lab. My most recent solo project is working on a transmembrane protein name Transmembrane Protein 100 (TMEM100), which we are investigating as a regulator of the previously mentioned TRP channel activities. In order to probe the various protein structures and behaviors, I have used biophysical techniques such as NMR spectroscopy and Circular Dichroism (CD) spectroscopy. The concepts studied in the lab resonated strongly with my interest in perception and sensation, and have developed an undying enthusiasm for lab research.

Since my work in the Van Horn lab began, I have worked consistently during the Fall, Spring and Summer semesters. Summer 2015 was the first semester that I didn't work in the lab and that was because I was accepted by the Biophysical Society (BPS) to partake in the *Biophysical Society Summer Research Program* hosted at the University of North Carolina (UNC) at Chapel Hill. As one of thirteen undergraduate students, the internship gave me an opportunity to branch out from my current research interests and test my ability to cooperate with new a principle investigator and lab partners. The PI that I worked under at UNC was Matthew Redinbo, Ph.D., whose lab focuses in X-ray crystallography and chemical biology of various types of proteins. During my time in the Redinbo lab, I was able to assist a graduate student with the crystallization and X-ray diffraction of a bacterial enzyme called the Pantocin A Biosynthesis Protein A (PaaA), which has been shown to begin the post-translational modifications of the commercially relevant peptide antibiotic Pantocin A[5]. The overall scope of the Redinbo lab's research was captivating both conceptually and in practice, as I was learning new ideas and techniques. The time invested paid off not only by the results I attained in the lab, but also by teaching me that I can adapt to and thrive in new laboratory environments with new people and different overall scientific interests.

Broader Impacts:

My most significant contribution to the *broader impacts* of science so far is my mentoring of younger students. During my junior year of college, I was invited to join a program at ASU called the *Leadership in Life Sciences Program*. The program was hosted by my cell biology professor, David Capco, Ph.D., and the scope of it was to be an approachable mentor for 1st year students in the ASU School of Life Sciences (SOLS). This program was my first exposure to a situation where I was able to help hone students' potentials and direct them towards rewarding decisions. Even after completion of the program, the experience encouraged me to continue that type of work for middle and high school students who are curious about STEM. It is incredibly satisfying to know that the work I am doing with these children today will influence their decisions to become the future scientists, who might help solve the problems of

the world. This type of work with the community has helped drive me to excel in my studies and improve the efficiency of my time management skills.

At the same time I was a SOLS mentor, it was also my first semester as an undergraduate laboratory teaching assistant (TA) for general chemistry for engineers (CHM114). It is a freshman course, that not only teaches chemistry to non-chemistry majors, but it gives me the responsibility of making sure that the students understand university learning styles and develop the skills to succeed. I make every effort to help my students by giving them as much extracurricular help possible, with classwork and/or career advice. This year marks my second year as a teaching assistant for this course and I can say that teaching not only brings me great joy, but based on the grades and feedback from prior students, success for my future. The teaching experience has not only helped me understand chemistry better than I ever have, but has also helped me gain skills in teaching students information that may be outside of their scope of interest.

The Graduate Research Fellowship would give me the means necessary to accomplish what I love to study, leading to a career of my dreams. Few things in my world are more resilient to time and stress than that feeling. It is out of a love of science that I chose to major in biochemistry, spent so much time doing research as an undergraduate, and have put a lot of effort into my teaching and mentoring skills. I am very happy with the direction I have chosen in life and will continue to put forth 110% effort towards my career. I am excited to see what the future holds in biochemistry and having an integral role in it as mysteries are unlocked.

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