Student Summer Scholar Program Application Examples

A2. Student Preparation and Motivation

Example 2

a. Preparation.
The goal of this research project is to understand the contributions of *PHO13*, a gene that encodes a phosphatase, to the control of the morphology of *Candida albicans*. There are two filamentous forms of *C. albicans*: pseudohyphae and true hyphae. In a wild-type strain, overexpressing *PHO13* blocks the transition from yeast to hyphae. The regulatory relationship between the different filamentous forms is unclear. This research would aim to overexpress *PHO13* in strains that are either locked in the pseudohyphal form or strains locked in the hyphal form to observe the effects on morphology. To do this, we will manipulate several mutant strains to overexpress this gene and then grow the strains in multiple types of media to examine the effect on the growth. I became interested in this project after I took microbiology (BMS 212/213) last year. During microbiology, we grew microbes and examined how microbes take advantage of certain aspects of their environments to grow. Learning about specific microbes well enough to be assigned an unknown organism and using tests that I learned to identify the unknown was one of my favorite parts of the class. Both the concepts in this class, and the ways microorganisms affect the human body fascinated me, so I then reached out to Dr. [redacted] and expressed my interest in his research. After meeting with Dr. [redacted] and Dr. [redacted] a few times, I decided their research and lab would be a good fit for me. Throughout the fall semester, I went to the lab to observe and practice techniques. I was able to learn many new things about *C. albicans* and the way the lab works. I will continue to observe in the lab this semester and will be trained in the strainconstruction process and help prepare the overexpression construct needed to generate the strains that will be utilized in my research.

b. Motivation.
As a student greatly interested in medicine, it is important for me to understand pathogens and how they affect the human population. *C. albicans* is a fungus that is a part of the normal human microbial population, but it is also an opportunistic pathogen. This means that this pathogen takes advantage of the human body and leads to fungal infections. Invasive candidiasis infections, common in hospitalized individuals, catheter users, surgery recipients, and those with a weakened immune system, are the fourth most frequent hospital-acquired infection in the United States and are correlated with high mortality rates. Throughout my life, I have always had a love for science and helping others. I knew that I wanted to help others for a living, but it wasn't until I started working with the children of [redacted] through the [redacted] that I knew this path was meant for me. Listening to the miracle stories and interacting with the miracle children inspired me to want to be a part of those miracles. Using my scientific knowledge and problem-solving abilities, being a physician will allow me to analyze symptoms to develop a diagnosis and treatment plan that could change someone's life, just like the miracle kids. This past summer, I worked as a Certified Nursing Assistant (CNA) in a nursing home, caring for the elderly population. This population and environment are both common places where *C. albicans* infections occur. Another common infection of *C. albicans* is oral thrush, which is when the fungus accumulates in your mouth causing lesions that spread. Infants' and older adults' immune systems are weaker, making

symptoms more severe and dangerous. This is incredibly interesting to me as it directly relates to my career interests in pediatrics and my current work with the elderly. Learning how this particular microorganism adapts to different areas of the human body is crucial for me to understand now as a CNA and as a future pediatrician.

c. Learning Goals.

I expect to develop my communication, critical thinking, and research skills during this mentored research as well as deepen my understanding of infections caused by *C. albicans*. I expect to be mentored in a way that leads to more independence as time progresses. I learn best by watching someone complete a task and then practicing the task on my own until I become comfortable with it. Mentored research will allow me to do just this. I will be proactive as to take notes during the observations in order to perform my best when I am on my own. Communication is one of the most important aspects of any career, but physicians must exemplify excellent communication for adequate patient care. Throughout this research experience, I expect to develop these skills through communication with my mentors and peers, as I navigate the process of being mentored with the intent of becoming a more independent student. Keeping clear communication will allow me to become more developed in my written, interpersonal, and public speaking communication skills. These skills will allow me to succeed in the laboratory while developing my professional skills for the future. Working independently while keeping open communication during task completion will teach me to critically think about problems I face while having the comfort of the expertise of my advisors at my fingertips. It will teach me how to adapt and reassess situations when something does not go as originally planned, which will greatly benefit me in the future. Additionally, I hope to gain greater proficiency and microscopy techniques beyond the classroom to become a more well-rounded student that can be an asset to medical school in the future. I am excited to work with this infectious microorganism that affects populations that I currently work with and those I will be working with in the future. The critical thinking, research, and communication skills that this project will give me a strong foundation to develop my Honors Senior Project next year.