This summer, Sewanee granted me the opportunity to continue working in the biology research lab of Dr. Alyssa Summers, studying transcriptional regulation of cell development and cancer progression. My current project began when I started research ten months ago, and it focuses on histone deacetylase 3 (HDAC3) transcriptional regulation of a family of genes that code for GTPase of immune associated proteins (GIMAPs). In addition to my work on this project, I spent time caring for and handling the research mice, reading relevant research publications, and teaching lab techniques to my lab partner.

In order to investigate HDAC3's role in regulating the GIMAP genes, I utilized a variety of molecular biology lab techniques. Most frequently, I worked in tissue culture, where I was able to analyze multiple cell lines, specifically mouse fibroblasts and Jurkat cells (immortalized human T lymphocytes). Using a special reagent, I took isolated circular pieces of DNA, vectors, which contain my gene of interest as well as a reporter gene and inserted them into living cells. This technique, called transfection, allowed me to then treat the successfully transfected cells with HDAC3 inhibitors at varying concentrations and analyze promoter activity levels using a luminometer. From this data, we were able to get a better idea as to which histone deacetylase(s) played the most influential role in regulating the GIMAP genes, specifically GIMAP7.

This summer offered my first opportunity to work with the research mice, and it has been a unique experience. Daily care and cage cleaning consumed the majority of my time with the mice; however, genotyping provided excellent practice with some crucial research techniques. In order to genotype each mouse, I collected an ear snip that would later be

used for DNA isolation. Using previously constructed primers, I ran the isolated DNA

samples through polymerase chain reactions (PCR), which efficiently amplifies a very

specific segment of DNA to be analyzed by gel electrophoresis. After running the gel, I used

a gel imager and computer software to analyze the gel and determine the genotype of each

mouse. DNA isolation, PCR, and gel electrophoresis are entry-level lab techniques in

molecular biology; however, they serve as a necessary foundation that should be mastered

for proficiency in more advanced techniques.

In research and in life, the ability to work past and learn from failure is a valued

characteristic. Despite numerous accomplishments, this summer presented many

challenges. The most frustrating experience this summer was repeating experiments due

to careless errors or unfortunate events. I was forced to rework and redo an experiment

three times in order to obtain reliable data, and I still have work to do to better that data.

These small failures are crucial for developing the characteristics needed to understand the

benefits that can arise from challenge and failure when addressed correctly. After the

challenges and the struggles, I was able to eventually perform the correct experiments and

test to answer the questions I have addressed that will construct the scientific story

regarding HDAC-mediated transcriptional regulation of the GIMAP genes.

My career goals lie in the field of medicine, and since being introduced to research, I

have become increasingly interested in working as a research physician. The work of

physicians and surgeons change and improve the lives of patients each and every day, but

medical scientists and physicians who engage in medical research provide the cutting-edge

knowledge required for physicians to help their patients. My time working in the lab this

summer solidified my desire to continue research in the field of medicine, but it also allowed me to realize more clearly that I want to work with patients directly in addition to research behind closed doors.

I am excited to have the opportunity to continue my research for the remainder of my time at Sewanee, and I hope to contribute to the GIMAP project as much in that time as I have been able to this summer.