This summer I received funding for a research position within the Biology Department at the University of the South in Sewanee, Tennessee. Within my internship, I was actively involved in the conduction of histological research where I investigated the biomechanical properties of collagen, elastin and regional musculature within the Phallus of the American alligator (*Alligator mississippiensis*).

Throughout the 8 weeks of my internship, my laboratory skills and my skills as an independent researcher, were challenged in a manner that produced growth and development. This summer research differed greatly from my research experience during the school year. The primarily contrasting feature between my two research experiences was the independent nature of my work. During the school year, I was, for the most part, learning basic research techniques and histological processes. This summer, however, I was operating in the lab as a scientist capable of conducting my own work and asking my own research questions. I now possess the ability to analyze scientific data, draw legitimate scientific conclusions, and design my own experimental procedures that can further the search for information within the study of interest. Researching on an independent level has given me a completely well-rounded skill set required to conduct scientific research in the pursuit of a hypothesis or scientific question.

The responsibilities of my summer internship included the organization of data, safely handling lab equipment, communicating with peers and faculty, maintaining a regular work schedule, keeping lab spaces clean, processing scientific samples, and analyzing raw data. My primary objective was to create and stain microscope slides with
tissue samples collected from the phallus of the American Alligator. Within this tissue, I was most interested in the analysis of the dense collagen, elastin monomers and muscle fibers. Staining sections of this tissue allowed me to directly analyze the biomechanical properties of these tissue types present within the sections, which provided me with information that lead to a deeper understanding of functional reproductive anatomy.

I created the microscope slides by impregnated tissue samples with paraffin wax, sectioning the tissue, mounting the tissue onto blank microscope slides, and staining the tissues with one of four different molecular staining techniques (each of the four stains chosen for this study contained specificity to certain tissue types - allowing for different types of analysis). Once the sides were stained, I performed analyses that either assayed for the different collagen types present throughout the phallus, quantified a regional trend in the concentration of elastin monomers, or used three-dimensional reconstruction software on regions containing high levels of musculature to visualize a mechanism for the contractions behind the conduction of semen through the sulcus.

During my internship, I created and stained more than seven hundred microscope slides including sets of Milligan’s trichrome, Pircrosirius red, silver staining with a gold chloride enhancement, Nuclear fast red, and elastin verification slides that used enzymes to digest elastin in order to create controls. From the creation of these slides, my research advisor (and laboratory superstar), Dr. Brandon Moore, can continue to analyze these slides and further the research into the biomechanical properties of the alligator phallus. The work that I have competed this summer will contribute to a published manuscript that will be completed in the next few years.
This research has brought me to understand scientific research in an entirely new manner than what I originally believed it to be. For example, I have learned that research is not magic. Great hypotheses and research questions do not appear out of thin air as some textbooks may depict. Procedures for certain experimental protocols are not always on a bookshelf, finding what is necessary to begin an experiment requires a significant amount of searching through previous experiments and scientific literature. This is something that classroom lab work never taught me. For example, when I conducted laboratory work for classes, all of the solutions and pieces of lab equipment necessary to perform a reaction were already prepared for me. The lab instructors knew what was supposed to happen and I never had to ask questions, draw inferences, or properly dispose of the chemical waste produced by the reactions. All I really had to do was follow a step-by-step procedure. This summer, the “behind the scenes” work of scientific research was revealed to me. I made my own solutions, disposed of chemical waste in accordance with chemical waste protocols, and pursued my own experimental questions through active research. I now know that the answers to scientific research do not simply exist on a sheet of paper that lists all the steps necessary to take you where you need to go. Research requires effort, critical thinking, and determination - there are no shortcuts.

I have aspirations to pursue dentistry as a career. This research experience will directly translate into success with the research and laboratory work that I will see in dental school. Also, the work that I have done with three-dimensional reconstruction has helped me conceptualize biological structures in a more efficient manner. This will help me in taking the DAT (Dental Admissions Test), which contains a section that tests for
the perception of complex, three-dimensional objects. My skills with general chemistry
have been enhanced due to the great deal of practice I’ve received this summer while
running reactions and creating staining solutions. This research has also given me a more
general understanding of how laboratories operate as a workspace. I can better interpret
general lab practices and how budgets and grants govern research practices and
opportunities. I could not have asked for a better work experience and am truly
appreciative of the opportunity I received to conduct this research.