1.) Reflectively describe your literature research process. Tell us how you used library resources or services of any kind (from ILL to online databases to archives/collections to meeting with your liaison librarian).

I began my summer research proposal by attending a presentation by research librarian Eli Gandour-Rood as part of my Biology 392 class. Although I have been taught many times how to use Google Scholar and the library resources to search for relevant literature, this presentation portrayed the information in a new, more effective way and taught me helpful things I had forgotten or wasn’t familiar with. I learned many features of Google Scholar that I wasn’t aware of, such as limiting the search to literature written in a certain time period. This presentation also informed me that after finding one helpful paper it was easy to find other related literature by looking at the sources cited by that paper. Learning these simple yet crucial research tools allowed me to delve deeper into research and build a strong proposal that I was able to thoroughly comprehend.

After my research proposal was accepted, I continued to use these tools to expand my knowledge and modify my research questions. Before this project I had never used resources such as the microfiche in the library, or the Inter Library Loan System. Both the microfiche and ILL system allowed me to expand the realm of my research and have access to many new interesting articles. In a presentation in Ecology class by Eli Gandour-Rood I was introduced to Zotero, which has saved me hours of time on citation formatting.

I have learned a great deal about scientific research this summer, but even more than that I have learned how to thoroughly research and understand relevant literature. Before this experience with summer research I dreaded the research process and had only skimmed the surface of the knowledge available to me. Without the help of the ILL system, the research librarian Eli Gandour–
Rood, and the knowledge of programs like Zotero and Google Scholar I would not have been as successful with my research project, and would not feel as confident as I do now with finding and understanding literature.

2.) Tell us about a challenge you faced while doing literature research and how you overcame it. *

My research project this summer focused on the lizard species Sceloporus virgatus and the presence of microorganisms on eggshells. To my knowledge there is no published research regarding the microbiota found on the eggs of S. virgatus or any closely related lizard. The lack of literature on the subject was an obstacle to my research because I was exploring a new frontier and articles relating to the topic were difficult to find. When I decided to image some of the eggshells with scanning electron microscopy (SEM) in the middle of my project, I had to quickly collect literature to help me image the eggshells and identify morphological features. Fortunately I was able to request a helpful book on eggshell SEM and other relevant articles using the Inter Library Loan system. By taking advantage of the library resources I was able to expand the realm of my project and develop a new skill with scanning electron microscopy.

I also faced a dramatic change to my project when 18 of the 24 lizards that I was planning to study laid their eggs too early. With only 6 lizards left I had to completely change the focus of my project and was not able to obtain the data I had intended to. The central questions of my project had to be restructured, and I turned to the library and scientific papers to refocus my questions.

3.) How does your research contribute to the scholarly conversation in your field? What is the significance of your research, in layperson’s terms? *

Since there is very limited research on eggshell bacteria in lizards, my project will add to the field of ecology by identifying the microbial species present on S. virgatus eggshells. Microorganisms are under-researched as a whole since the technology to understand them has existed only recently. My project points to the idea that much of the bacteria on eggshells may be beneficial for the survival of the egg. My results indicated that the eggs that passed through the cloaca, the end of the digestive and reproductive tracts in S. virgatus lizards, had limited fungal growth as opposed to the eggs that were dissected out of the females. This data supports the idea that female lizards may coat their eggs with protective bacteria to withstand pathogenic fungi. I was
able to grow many of the species of eggshell bacteria in the lab, allowing me to attempt to address this idea and identify species of bacteria and fungi. I will also send samples to another lab for Next Generation Sequencing, to more accurately identify species of microorganisms. This project has also focused on attaining SEM images of the eggshells, which allow the study of the eggshell morphology and unidentified structures. I was able to find calcite spheres, pores in the eggshell surface, and different types of bacteria using SEM imaging. My summer project is only a glimpse of what can be explored on the eggshells of lizards and other organisms. Eggshells can give us insight into the protective properties of microorganisms, which interact with all organisms including humans. This project explored a little known subject and will lead to other research questions in the future.