

Visit Narrative:

In my laboratory visit, I explored the emerging model system *Hydroides elegans*. I entered the Hadfield Lab at the Kewalo Marine Laboratory at an exciting time; they had just received the sequencing results of three transcriptomes from pre-competent larvae, competent larvae, and metamorphosed juveniles. After annotation and assembly we were able to begin this project with a series of different genes and different pathways to potentially investigate. With Dr. Brian Nedved, an extremely capable postdoctoral fellow of Dr. Michael Hadfield, we were able to identify two distinct topics to work on.

One area was investigating biomineralization genes, identified from other shell-secreting invertebrates, which were present in the *Hydroides* transcriptomes including calmodulin, galaxin, carbonic anhydrase, perlucin and engrailed. The other topic was the looking at the potential pathways and receptors involved in bacterial communication with *Hydroides*, including peptidoglycan receptor proteins, Toll-receptors, and the nuclear factor- κ B (NfKb) pathway.

When I first arrived at the lab I worked side by side with Dr. Nedved learn the techniques necessary to run successful experiments while also fostering an ability to ask good, relevant questions of the system. We worked together on a series of preliminary studies looking at a few genes from both the biomineralization and bacterial reception pathways. These experiments were quite successful and were included in part of Dr. Hadfield's presentation to Office of Naval Research.

In the second half of the summer I took on a full project while also having the opportunity to help mentor another undergraduate student in the lab. I assisted him in a similar way Dr. Nedved helped me, and was better able understand the protocols I was using by having to teach them to someone else. I chose to investigate the question of bacterial-reception and focused in on Toll and Toll-like receptors as well as the NfKb pathway in *Hydrooides*. These receptors are a part of invertebrate innate immunity and microorganism-associated molecular patterns, which can initiate signaling cascades through NfKb or related pathways. This has ultimately led me to contemplating the importance of differentially expressed innate immunity genes, how they communicate with marine bacteria, and pathways and the role these genes play in the metamorphosis.

I would say on the whole this lab visit was an incredibly positive and productive experience. I was able to learn, investigate, and teach throughout my stay. The experiments, while at times stubborn and challenging, yielded interesting results that continue to challenge my thinking. I have found the questions I am getting to ask so intriguing that I have decided to delve deeper and continue this work as part of my Senior Honors Project. Also, this work has made me very passionate in regards to the questions of the how bacteria influence the world around us, particularly in terms of development. While communicating this work in academic settings, I will also have the opportunity to speak at a TEDx event in Honolulu on this very topic.