

## Probationary Faculty Development Grant Spring 2020 Report

### Faculty Information

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### Project Information

Research was conducted in my lab (until March 2020 – see COVID-19 section below) in the Department of Biological Sciences. One MS student Emalee Ousley and one undergraduate student Jessica Sepulveda also worked on this project titled “Investigating the Relationship Between the Gut Microbiome and Host Thermal Tolerance in the Economically Important Red Abalone *Haliotis rufescens*.” This project focuses on the potential microbial contribution to high temperature response in red abalone.

### COVID-19 Related Information

Before COVID-19 disruptions we were able to: 1) finish some unexpected experimental troubleshooting and optimization, 2) obtain live juvenile red abalone, and 3) conduct the unstressed control experiment. We also obtained the live juvenile red abalone needed for the heat stress experiment, but right as we were about to start this experiment, campus research was halted. Had research not been suspended we would have continued with the heat stress experiment, processed and sequenced all control and heat stress samples, and conducted associated metagenomics data analysis as outlined in my original proposal. (It is also worth noting that the UC Davis Genome Center that we planned to use for sequencing was also shut down during the Spring 2020 semester due to the pandemic.)

While campus research was shut down my lab group, including the students funded by this PFDG, continued to have virtual weekly lab meetings. Although we did not have any research progress to discuss, students selected pre-recorded Society for the Study of Evolution Conference talks to watch that we then discussed as a lab each week. One of my main goals as a PI is to provide my students opportunities to not only conduct research, but also present their work at conferences. Since all conferences were cancelled in the Spring and Summer 2020 semesters, I could not take students to any conferences, but this alternative of watching and discussing pre-recorded Evolution conference talks still allowed students to 1) gain a sense of what a scientific research conference is like, and 2) expand their knowledge on topics related to our research project.

Work on this project is still ongoing. My MS student Emalee and I have just recently received approval to return to campus to begin research again. However, our progress is still very limited because the next main step of this project involves a 24 day heat stress experiment. Based on current campus guidelines regarding resuming research, we are not starting this experiment yet due to the ever-evolving nature of the pandemic and the possibility that research could again be completely ramped down at any time.

**Abstract**

In California red abalone *Haliotis rufescens* supports: 1) an aquaculture industry that rears abalone as a food source; and 2) a \$44 million per year recreational fishing industry. However, recreational fishing was banned in 2018 due to declining populations in the wild. In this era of climate change, thermal research on *H. rufescens* is needed to prevent additional economic loss in aquaculture. Previous research has demonstrated a relationship between the resident microbial community (e.g. bacteria) and host thermal tolerance, yet the microbial contribution to high temperature (e.g. heat stress) response has not been studied in red abalone. We will address this gap by identifying: 1) what gut microbes are present in *H. rufescens* before and after heat stress; and 2) what metabolic pathways these microbes are actively using. Because the microbiome often affects host physiology, these findings could have practical benefit for reducing heat stress mortality in California red abalone aquaculture. Although baseline control experiments have been conducted, due to COVID-19 disruptions, this research is still in progress.

**Budget**

The funding supplied by the PFDG was used to pay underrepresented research students (1 graduate and 1 undergraduate) for their work on this project from January – March of 2020. Both students are women, and one is additionally a Hispanic first-generation college student. Without this PFDG financial support, I would not have been able to pay these students any research stipends.

**Impact**

Thanks to this funding, I was able to pay undergraduate and graduate researchers in my lab for the first time.