

A Brief Research Proposal: *Alpheus heterochaelis*

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Variations in Snapping Shrimp Brain Transcriptomes

Analysis of model organism *Alpheus heterochaelis*, a species of snapping shrimp, will be centered around reaching the goal of complete transcriptomic analysis (barring any additional analysis request from Dr. Kingston). The *Alpheus heterochaelis* brain is where Dr. Kingston retrieved transcriptomic data. The brains of snapping shrimp are a particularly interesting body part of snapping shrimp, as snapping shrimp are known for withstanding significant blows to their heads. *Alpheus heterochaelis* have large claws and helmet-like structures on their heads, which makes them well-adapted for fighting.

The specific transcriptomic data Dr. Kingston has collected pertains to the brain transcriptome of snapping shrimp with helmets that have been snapped at, those with helmets that have not been snapped at, and those who have not been snapped at. These categories from which data has been collected leads to the primary research question: What are the differences in the brain transcriptome of snapping shrimp with helmets who have been snapped at, snapping shrimp with helmets who have not been snapped at (control), and snapping shrimp with no helmet that have been snapped at? The secondary, more specific question is: what genes/proteins are being up-regulated and down-regulated when comparing the data.

In analyzing this data, the first step will be generating a de novo assembly. This can be done by running SPAdes on the OSCER supercomputer. After running the job SPAdes, that information can be downloaded to a local computer. Using IGV, comparison between files containing assemblies of shrimp with an orbital hood exposed to shock, without an orbital hood exposed to shock, and the control and will display if there's a difference in gene/protein expression. Specifically, when using IGV the up or down regulating of gene/protein expression will be the main focus.

Overall, I believe the results will reflect that both snapping shrimps with helmet-like structures, snapped at or not, contain transcriptomes in the brain that show genes oriented toward protecting the shrimp's head. In contrast, those with no helmet-like structure will have a transcriptome showing genes that are less focused on protecting their heads (and potentially more emphasis on other features such as larger claws).