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## Crayfish Worms

I have spent the past semester studying the behavior of branchiobdellids, worms that live symbiotically on crayfish, for Animal Behavior. These worms can be observed with the naked eye on freshwater crayfish, which can be collected easily on campus and in the surrounding area. Despite the simplicity of observation, little research has been done on these annelids. Basic mechanisms of food consumption and reproduction are known, but growth, development, and behavior remain largely undocumented.

I plan to collect crayfish from a number of bodies of water in the area to see if all of the branchiobdellids in this area are the same (and if they are not, to see if they all develop and behave the same way.) Crayfish from different sources will initially be isolated to prevent confusion and possible collection of inaccurate data. I will need to find some way of classifying the worms that I am working with, as different species may not behave or develop in exactly the same manner. A small classification chart is available in a book in the library, and I will be searching for more in-depth charts. I may need to send a sample in to a branchiobdellid expert, and will likely be attempting to contact this person in any case.

My observations last semester created more questions than they answered. I plan to use these questions as a general guideline for where I'd like my research this year to go. Branchiobdellids reproduce in a similar fashion to earthworms, their closest relatives. However, only one branchiobdellid develops in each cocoon, and cocoons are produced frequently. In fact, multiple empty cocoons are often found near cocoons that contain developing worms. Other reports document that fertilization occurs before the cocoon is deposited, which is also how earthworm reproduction works, so I am very curious about the purpose that these empty cocoons serve, and plan to try to look into it.



Additionally, the cocoons have a long development period of approximately 20 days before hatching. I would like to follow worms through this period and into adulthood, identifying different stages of development and collecting photographic documentation. I believe I can accomplish this using a microscope and histological techniques learned in cell biology lab. Others have found ways to successfully clear all worms and eggs off a crayfish. I can do this, and then introduce new worms and carefully watch for and keep track of eggs. In this manner, I should be able to collect fertilized eggs in different stages of development. Eggs can be opened and the developing worm dyed and observed under a microscope, and eggs can be preserved in wax, sectioned, and dyed to allow for detailed images of organs and cells.

First, I will collect crayfish, which will allow the branchiobdellids time to reproduce in warmer water. Then, I will research oligochaete and hirudinean embryology. I will spend time observing the branchiobdellids and begin tracking the placement of their eggs. As I begin to figure out how old eggs are, I will remove some from the crayfish and attempt to preserve and section them, photographing the final results. Data collected will attempt to cover the embryological development of branchiobdellids, in addition to looking for changes in the hatched worms which signify maturity. I will compare branchiobdellid development to oligochaete and hirudinea development, and see if my findings support the current decision that branchiobdellids are more closely related to oligochaetes. Finally, my write-up will describe my methods, findings, and display the pictures that I have taken.