The Role of Behavioral Diversity in Determining the Extent to Which Patterns are Modulated

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Central pattern generators are relatively simple, multi-functional networks that produce rhythmic motor outputs independent of sensory input. The pyloric circuit is one of four central pattern generators in the crustacean stomatogastric nervous system (STNS), and its outputs stimulate contractions of foregut muscles to break down food. The crustacean digestive system requires flexibility in stomach muscle movements dependent on what type of food is ingested. Signaling molecules known as neuromodulators allow for short-timescale alterations to rhythmic central pattern generator outputs, which provides a substrate for flexibility. The sensitivity of the pyloric circuit to various neuromodulators has been examined in two crab species within a single superfamily. One of these species, *Libinia emarginata,* is an opportunistic feeder, while the other, *Pugettia producta,* subsists on kelp. Since neuromodulation enables variation in the movements of pyloric muscles, without altering STNS circuitry, diversity of feeding patterns should be indicative of the degree of STNS neuromodulation. Previous data have shown that *L. emarginata* is sensitive to a wider array of neuromodulators than *P. producta.* In an attempt to further elucidate the relationships between diet, phylogeny, and stomatogastric modulation, this study examines the above theories in a member of the same superfamily that has never been the subject of nervous system study, the opportunistic-feeding snow crab (*Chionoecetes opilio*). We predicted that *C. opilio* will be sensitive to the same neuromodulators as *L. emarginata* as they are both opportunistic feeders.

Live snow crabs were obtained from a crab fishery in Nova Scotia, Canada and housed in Druckenmiller Hall. The stomatogastric nervous system was isolated and superfused with chilled physiological saline. Using extracellular recording methods, electrical impulses were measured from various nerves in the STNS. Seven neuromodulators, which have previously been tested on *P. producta* and *L. emarginata,* were applied to the nerves. Various parameters were analyzed to determine whether each neuromodulator had measurable effects on the pyloric pattern.

Initial results indicate that the STNS of the snow crab is sensitive to all seven of the neuromodulators that were tested. This is in agreement with our hypothesis, as expected given *C. opilio's* wide variety of food sources. Although these results suggest a wide range of sensitivity, this claim is based on a relatively low sample size. Further physiological experiments are needed to wholly determine the neuromodulatory capacity of *C. opilio*. In addition, more physiological recordings from *P. producta* and *L. emarginata* will be performed throughout the year to expand our understanding of stomatogastric neuromodulation within this superfamily.

Faculty Mentor: Patsy Dickinson

Funded by the: Paller Neuroscience Research Fellowship & INBRE Summer Research Fellowship Program