The Distribution of Orcokinin Peptides in the Stomatogastric Nervous System of *Cancer borealis*

Nastasha Horvath  
Biology Department, Bowdoin College

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**Introduction**

My research focused on orcokinin family peptides, which are a group of similar proteins found in crustaceans and insects. Neuropeptides, such as orcokinin, can modulate the activity of the nervous system. This allows for flexibility of rhythmic patterns generated by groups of neurons. Examples of rhythmic motor patterns include walking, chewing, and breathing. The stomatogastric nervous system (STNS) of crustaceans generates several different rhythmic patterns.

Crustaceans are well studied and understood, but the exact phylogeny of species is not known clearly. The location and identity of peptides in the nervous systems of crustaceans differ between species. Thus, differences or similarities in peptide identity and distribution can help show evolutionary relationships.

By determining the location of orcokinins in the STNS, we can begin to study their role in modulating neuronal activity and better understand crustacean phylogeny.

**Experimental Question:**

Are orcokinins present in the STNS of *Cancer borealis*, and which cells, axons and ganglia are they located in?

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**Methods**

- STNS is isolated from the animal, fixed and rinsed with detergent.
- STNS is incubated in a primary antibody solution. (rabbit antibodies specific to orcokinin, ordered from another lab)
- Prep is rinsed again
- STNS is incubated with fluorescently linked secondary antibody
- Final rinse
- Prep is mounted and viewed with a fluorescence microscope

**Results and Conclusions**

- Orcokinins are present in the stomatogastric nervous system of *C. borealis* and *C. irroratus*
- The distribution is similar in the two species, with comparable numbers of axons and cell bodies containing orcokinin.
- However, *C. borealis* has many (5-11) nerves branching off the superior oesophageal nerve (son), while *C. irroratus* has very few.
- Orcokinin also appears to be located in the pericardial organs and sinus glands of *C. borealis* (*C. irroratus* results pending).

**Future Directions**

- Continue orcokinin immunocytochemistry of *C. irroratus* in order to clarify peptide distribution.
- Better map the location of orcokinin in sinus glands and pericardial organs in both *C. borealis* and *C. irroratus*.
- Conduct physiology experiments with heart and gut muscles, using orcokinin.

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The Orcokinin Distribution

These images show the fluorescence of secondary antibodies under the microscope. Green areas indicate axons and cell bodies containing orcokinin.

- *C. borealis* OG cell bodies and axons
- *C. irroratus* OG cell bodies and axons
- *C. borealis* commissural ganglion
- *C. irroratus* commissural ganglion
- *C. borealis* STG neuropil
- *C. borealis* son branch
- *C. borealis* pericardial organ

This illustration shows the distribution of orcokinin in the whole STNS. The numbers of axons and cell bodies listed represent the ranges found across 11 *C. borealis* specimens.