Modeling the effects of neuropeptide C-type allatostatin (AST-C) on the cardiac ganglion of lobsters using conductance based models in xoltol

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Central pattern generators (CPGs) consist of networks of neurons that produce patterned outputs, allowing living organisms to perform essential daily tasks, such as breathing, eating, and maintaining rhythmic heart beats (Dickinson, 2006; Dickinson et al., 2018; Wiwatpanit et al., 2012). Researchers have found that CPGs are flexible and can generate motor responses without sensory input (Marder and Bucher, 2001; Cooke, 2002). The American lobster (*Homarus americanus*) contains the cardiac ganglion (CG) a simple neuronal network that serves as a useful model of CPGs. The CG typically consists of 9 neurons including small pacemaker cells as well as large motor neurons, each contributing to heart contractions (Cooke, 2002).

While CPGs generate rhythmic bursts without sensory input, neuromodulators are required for the alteration of CPG output in response to environmental variability. These molecules oftentimes neuropeptides increase the specificity of motor outputs that CPGs generate (Marder and Bucher, 2001). The American lobster has been found to contain over 250 neuropeptides, which have many structural differences potentially affecting contraction outputs (Christie et al., 2010). Among the numerous neuropeptides in *H. americanus*, the allatostatins have been identified to have significant effects on contraction amplitude and frequency (Dickinson et al., 2014; Dickinson et al., 2018; Wiwatpanit et al., 2012). The C-type allatostatin (AST-C) has been shown to affect the cardiac system of

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