Heart Function in *Homarus americanus:* the Effect of Pressure and Stretch
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When a heart contracts

heart

In the Johnson Lab, Pietro et al. (2017) investigated the effects of preload stretch, or the mechanical stretch on the wall of the heart prior to contraction, and afterload pressure, or the back pressure in the arteries that the heart must pump against, on the cardiac system of the American lobster. They found that heart rate often decreased in response to increased afterload (i.e. arterial) pressures, which is similar to the mammalian baroreceptor reflex for maintaining blood pressure homeostasis. As crustaceans, this reflex has only been reported in the crab Carcinus maenas (Wilkens & McMahon, 1994).

This summer, I continued to investigate lobster baroreceptor-like responses by systematically changing preload stretches and afterload pressures of the heart to determine their combined effects on cardiac output (volume per time of blood exiting the heart), diastolic and systolic arterial pressure, frequency and amplitude of the heart beat, and the passive and active forces exerted by the heart. I found that arterial diastolic (relaxation) pressures were independent of preload stretches, but increased with increasing imposed afterload pressure (Fig. 1). These results are consistent with the hypothesis that the posterior artery valve isolates arterial pressure from heart pressure by preventing hemolymph backflow into the heart.

Frequency was also affected by imposed changes in afterload pressure, however, this response varied between lobsters and preload stretches. For example, in one case,