Feeding Preferences and Nutrition in *I. balthica* Under Heat Stress

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Climate change is altering ecosystems, the Gulf of Maine (GOM) in particular. In the past fifteen years, the gulf has warmed at seven times the global average.[1] In the past forty years, the GOM has warmed 1.5ºC and is expected to warm at least 2.0ºC more in the next thirty.[2] Eelgrass (*Zostera marina*) creates a critical coastal ecosystem for fisheries, protects from coastal erosion, and provides carbon sequestration.[3] The health of eelgrass beds is enhanced by the grazing of *Idotea balthica*, a consumer of epiphytic algae. Microalgae that grow on eelgrass, or epiphytic algae, prevents the plant from photosynthesizing by blocking light from reaching the grass. *I. balthica*, in consuming microalgae, helps in the plant's absorption of light. To understand how eelgrass will react to climate change, we also must understand how *I. balthica* responds to warming temperatures.

My planned experiment this summer was to investigate local adaptation of *I. balthica* to temperature. Local adaptation occurs when populations of a species adapt to their specific environment.[4] I had planned to compare a northern population of *I. balthica* to a population found near Schiller Coastal Studies Center (SCSC). However, I was unable to find a northern population for my experiment during several trips to the field. As such, I was forced to change my experiment.

I moved, instead, to investigate the feeding preferences of *I. balthica*. When grazing on epiphytic algae, *I. balthica* has the option to consume algae off eelgrass or *Ascophyllum nodosum*, a brown alga that also photosynthesizes and provides habitat for epiphytic algae. *A. nodosum* is found near eelgrass beds. Unlike eelgrass, *Ascophyllum* is exposed during low tide. This exposure to air, rain, and variable temperature is stressful to *I. balthica*, which live underwater their entire lives. This stress causes *I. balthica* to only be found on eelgrass though it has the option to live on *A. nodosum* so long as the organism moves from the habitat during the low tide.[5] My goal in this experiment was to understand the effects of both eelgrass and *A. nodosum* diets on *I. balthica* and the preference of *I. balthica* when exposed to both in a controlled environment.

I looked at the growth of juvenile *I. balthica* under present and future temperature conditions when given either *A. nodosum,* eelgrass, or both. The result was six experimental groups with ten replicates in each group. The last ten days of my experiment were run as a feeding assay. This assay gave me an understanding of how much food *I. balthica* consume daily. The amount of food eaten during the assay correlates to the amount required for the species to get the nutrients it needs. During the assay, each organism was given two pieces of either *A. nodosum,* eelgrass, or a choice totaling 0.01 g.

The early results from my experiment show that the growth and consumption of *I. balthica* depends upon the type of food it consumes rather than the temperature at which it was raised. *I. balthica* raised on only eelgrass had less overall growth and a lower growth rate than those raised only on *Ascophyllum* or on a choice of the two. In the feeding assay, *I. balthica* consumed more *Ascophyllum* than eelgrass when given a choice between the two but did not consume more *Ascophyllum* in the no-choice assays. In both parts of the experiment, the feeding trial and the overall growth of the organisms, temperature was shown to not have a statistically significant impact on *I. balthica*. Due to confounding variables in my data, it is possible that temperature affects growth rate and consumption of *I. balthica*. As I continue to go through my data, a relationship between the factors may become clearer. Future research should look into both variables again, to better explore the effect of food on growth, and to insure the null effect of temperature. As I consider an honors project in the biology department, the continuation of this research, both reinvestigating the questions asked this summer and exploring other variables on *I. balthica* growth present themselves as possible avenues.

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