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How are Changes in Temperature and Salinity Impacting Intertidal Mussels?

Casey A. Martin

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Casey Martin | Center for Life in Extreme Environments, Department of Biology, Portland State University
cfiggins@pdx.edu

Portland State UNIVERSITY

Introduction

- Temperature influences gamete development, ecological distribution, physiological performance, and behavior[1,2,3].
- Salinity is a key factor influencing species distributions, community structure, behavior, survival, and growth[4,5,6].
- Mussels are particularly vulnerable to climate changes as they are unable to move away from an area when conditions, biotic and abiotic, change.
- Mussels are important to the health of the aquatic environment and a source of nutrition for humans.

Research Question

Is the physiology of the *Mytilus* species complex (*Mytilus edulis/ M. trossulus/M. galloprovincialis*) negatively impacted by changes in temperature and salinity?

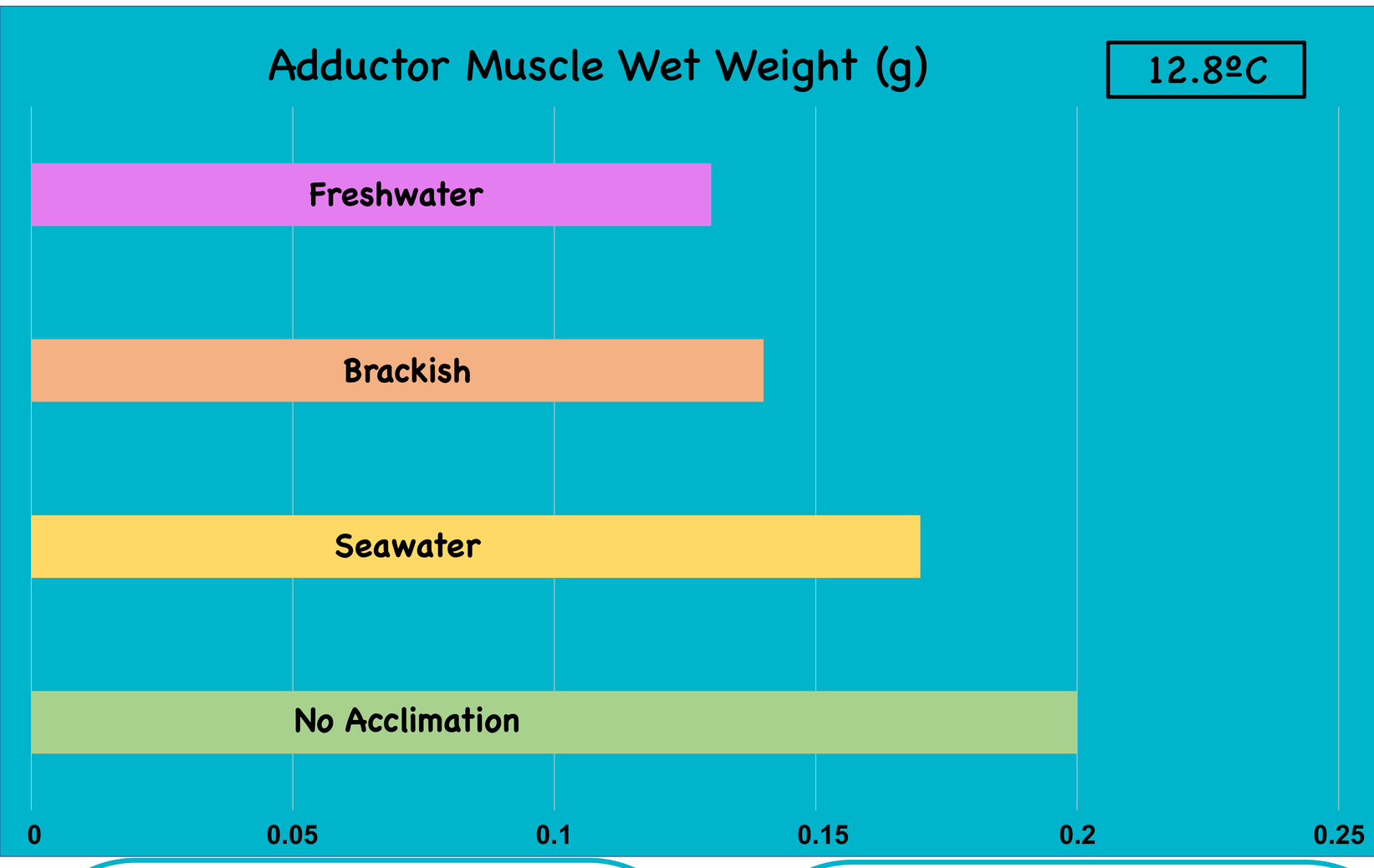
Hypotheses

H1: Mussels exposed to temperatures and salinities outside of their normal range will experience a decrease in muscle mass.

H2: Due to the impacts of changes in temperature and salinity, those mussels will be unable to hold their shells closed or anchor to a substrate.

Methods

- Collected 145 mussels from Boiler Bay, Oregon in the Fall, Winter, & Spring
- 10 mussels were weighed, measured, and dissected directly after arriving to campus.
- Remaining 135 were placed in one of a variety of treatments for 24 hours.
  - included variations in temperature and salinity, 12.8° C, 15.5°C, or 18.3°C and 0 ppt, 15 ppt, or 35 ppt.
- Following the initial exposures, 5 mussels from each were exposed to air and 5 from each were submerged underwater.



Mussels exposed to decreases in salinity experience a decrease in Muscle mass.

This likely leads to a decrease in the Mussel's ability to keep their shells closed.

Results thus far…

- Above shows the results of exposing the Mussels to their average temperature and a variety of salinities.
- When exposed to air following the initial exposure, Freshwater and Brackish water exposed mussels died simultaneously, while saltwater exposed mussels were the last to die.

Discussion

- At this point, the results lead us to believe that muscle mass is negatively impacted by decreases in salinity and increase in temperature.
- The aerial exposure results lead us to believe that decreases in muscle mass lead to a decrease in the ability of mussels to keep their shells closed, leading to death.

Still to come…

- Analysis of muscle mass and gamete mass across other temperature and salinity exposures throughout all seasons.
- Use of Flow cytometry to see if the changes in temperature and salinity are impacting cellular integrity.

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