

# ENVIRONMENTAL SCIENCE RESEARCH

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*A Genomic Perspective*

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School of Aquatic and Fishery Sciences

[robertslab.info](http://robertslab.info)

# PLAN

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- Give you a personal perspective in terms of careers including the students I interact with
- Provide some little vignettes into the type of research our lab is involved in, with an emphasis on the ‘environmental science’
- Ask me anything...



## ALL ABOUT ME

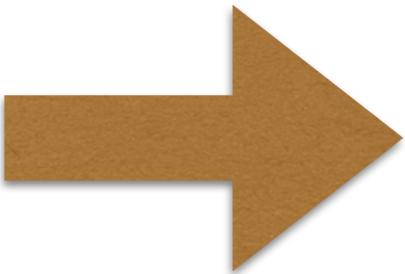
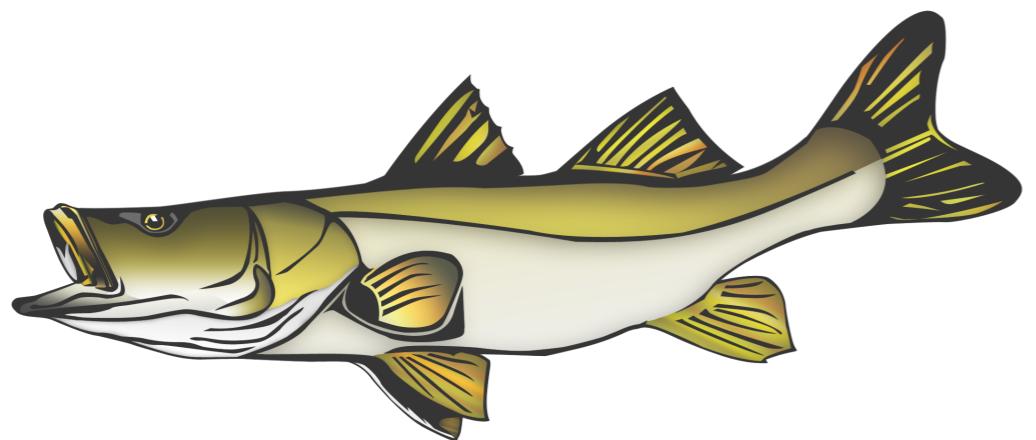
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- Always appreciated being outside and fish
- Undergraduate work-study in lab studied fish reproduction
- Undergraduate summers: field work- Fish Trawls, counting fish
- Year gill netting in NC
- Graduate School - Fish and molecular biology
- Now...

# Background

## Physiology

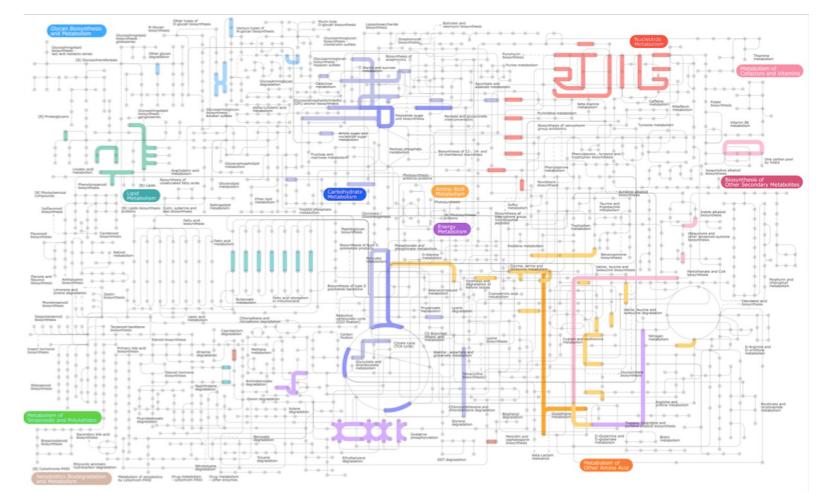
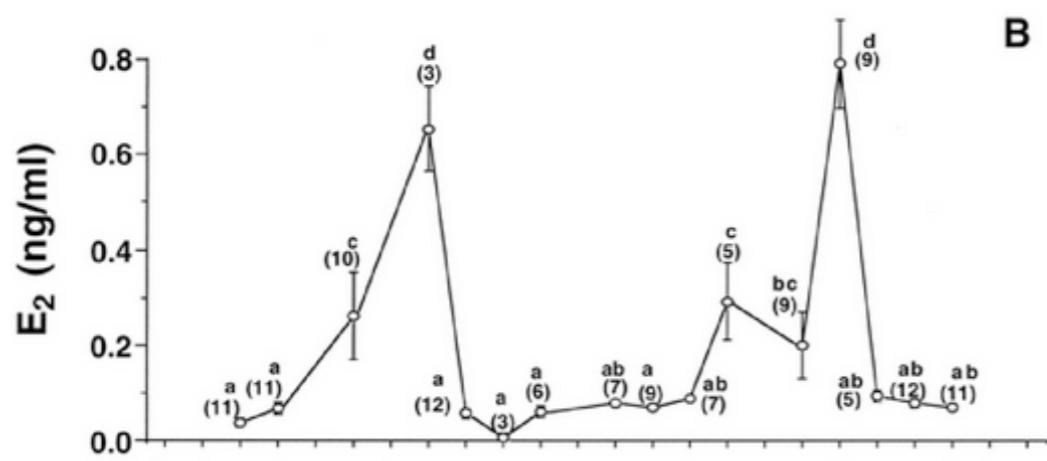
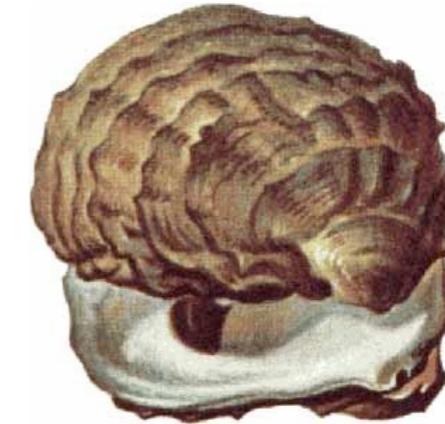
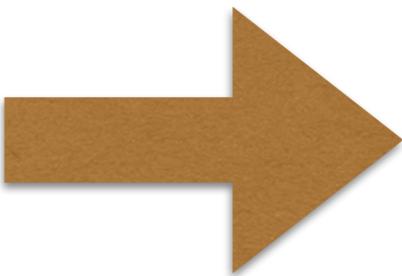
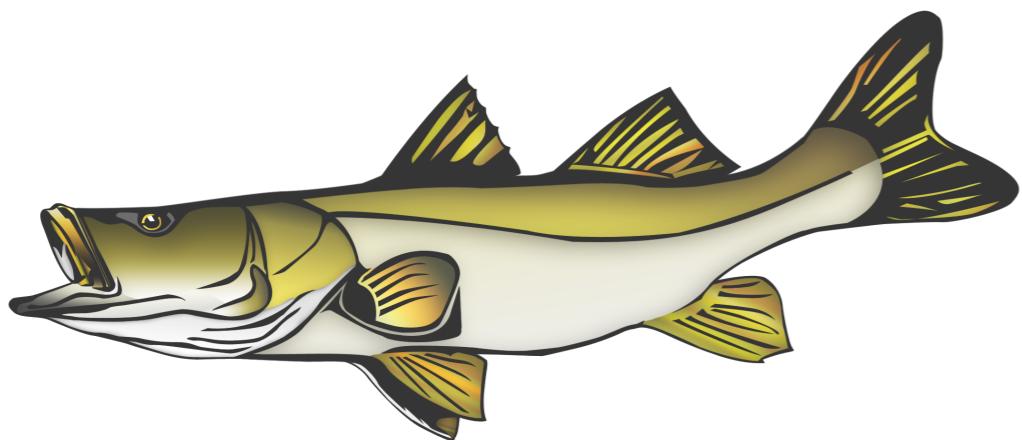
*How fundamental processes work in aquatic species*



# Background

## Physiology

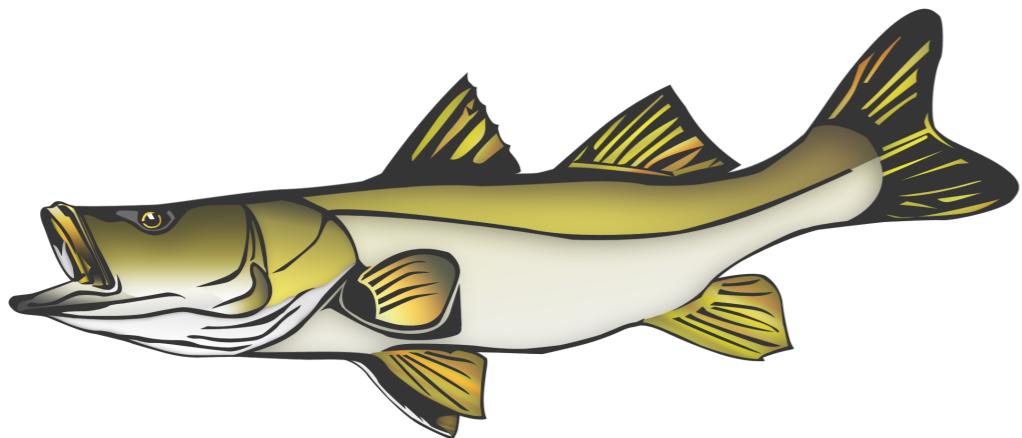
*How fundamental processes work in aquatic species*



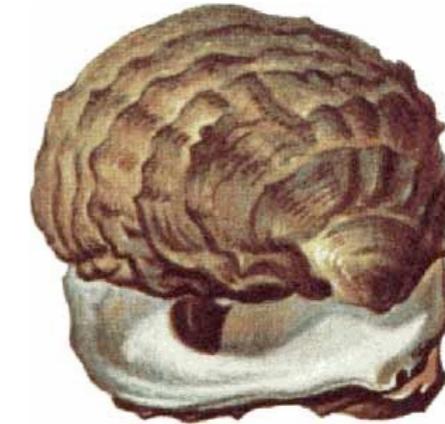
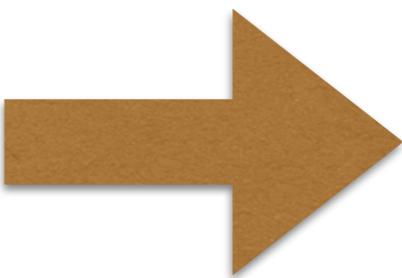
# Background

## Physiology

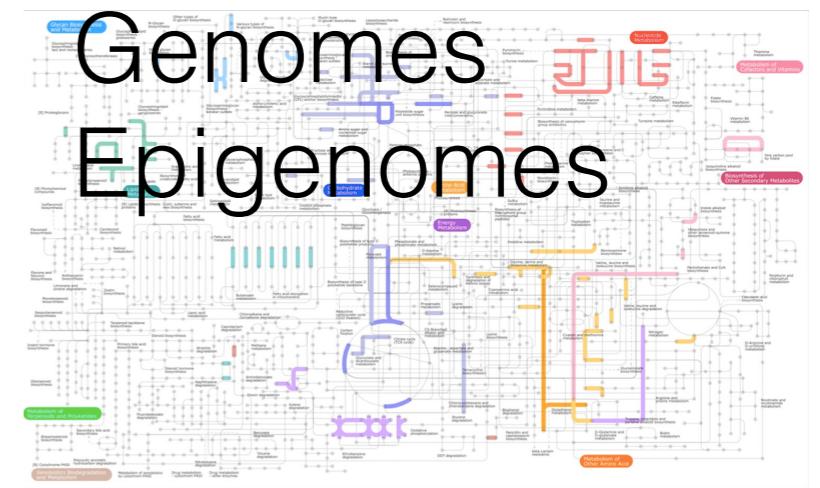
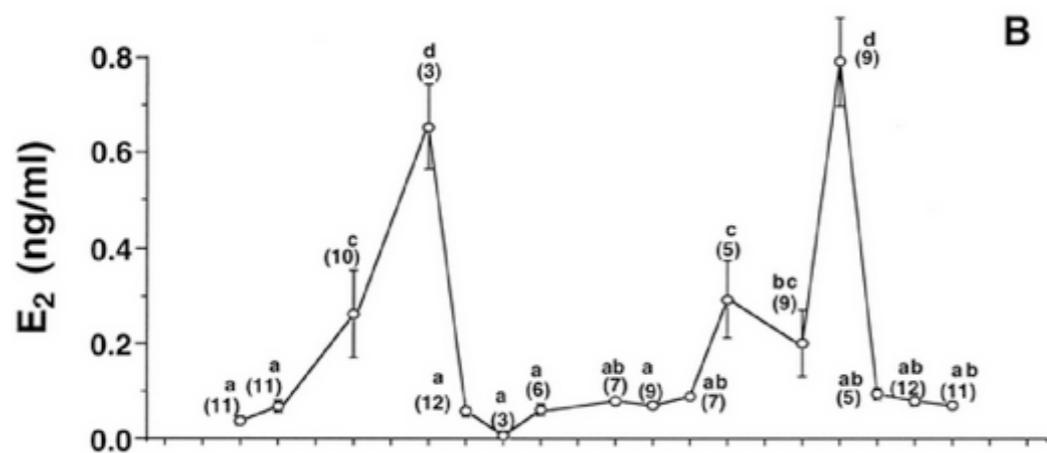
*How fundamental processes work in aquatic species*



Hormones  
Proteins



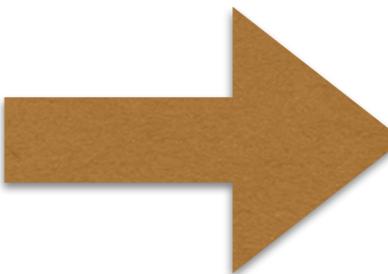
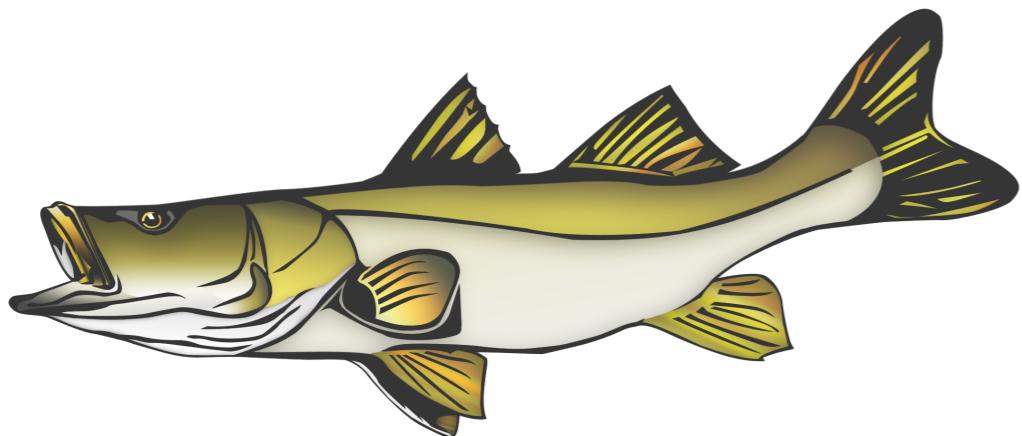
Transcriptomes  
Proteomes  
Genomes  
Epigenomes



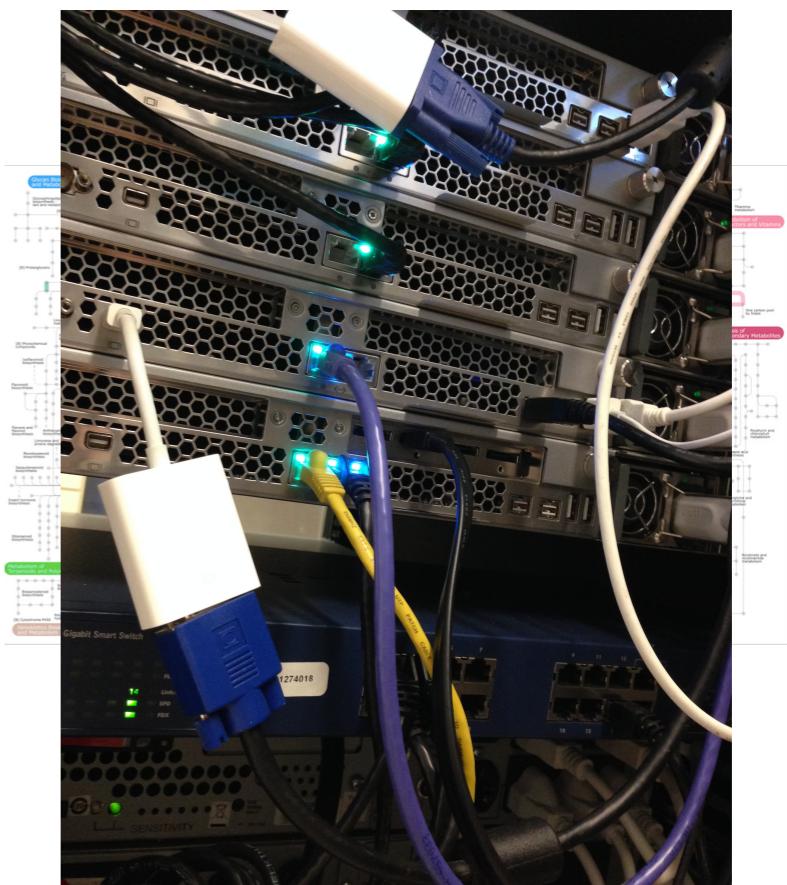
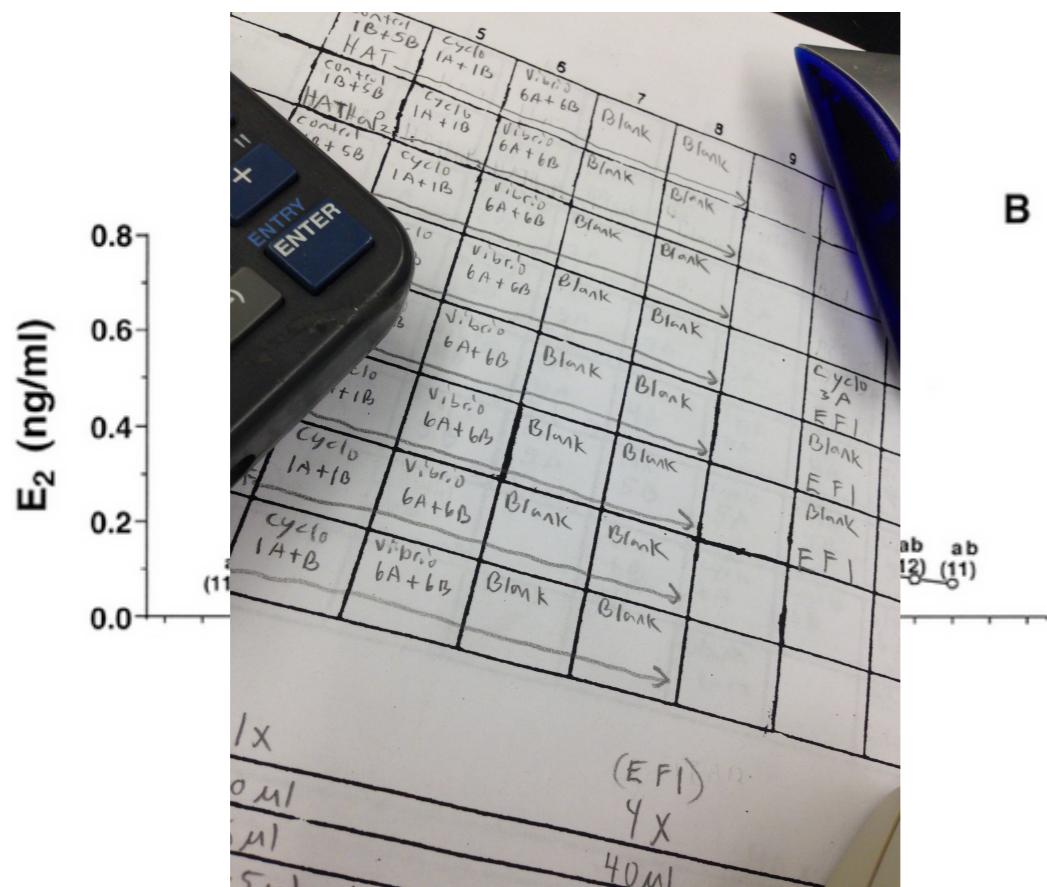
# Background

## Physiology

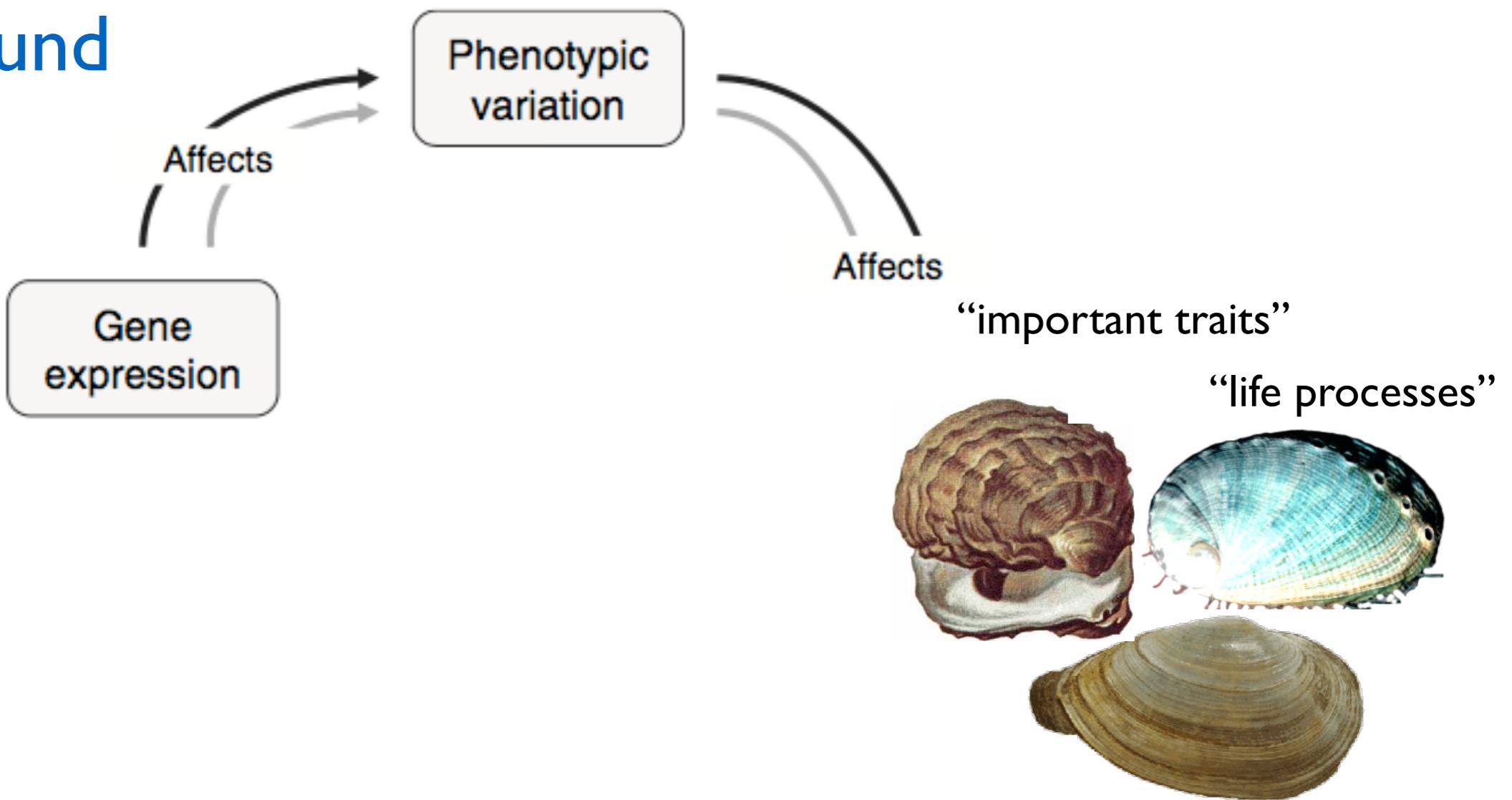
*How fundamental processes work in aquatic species*

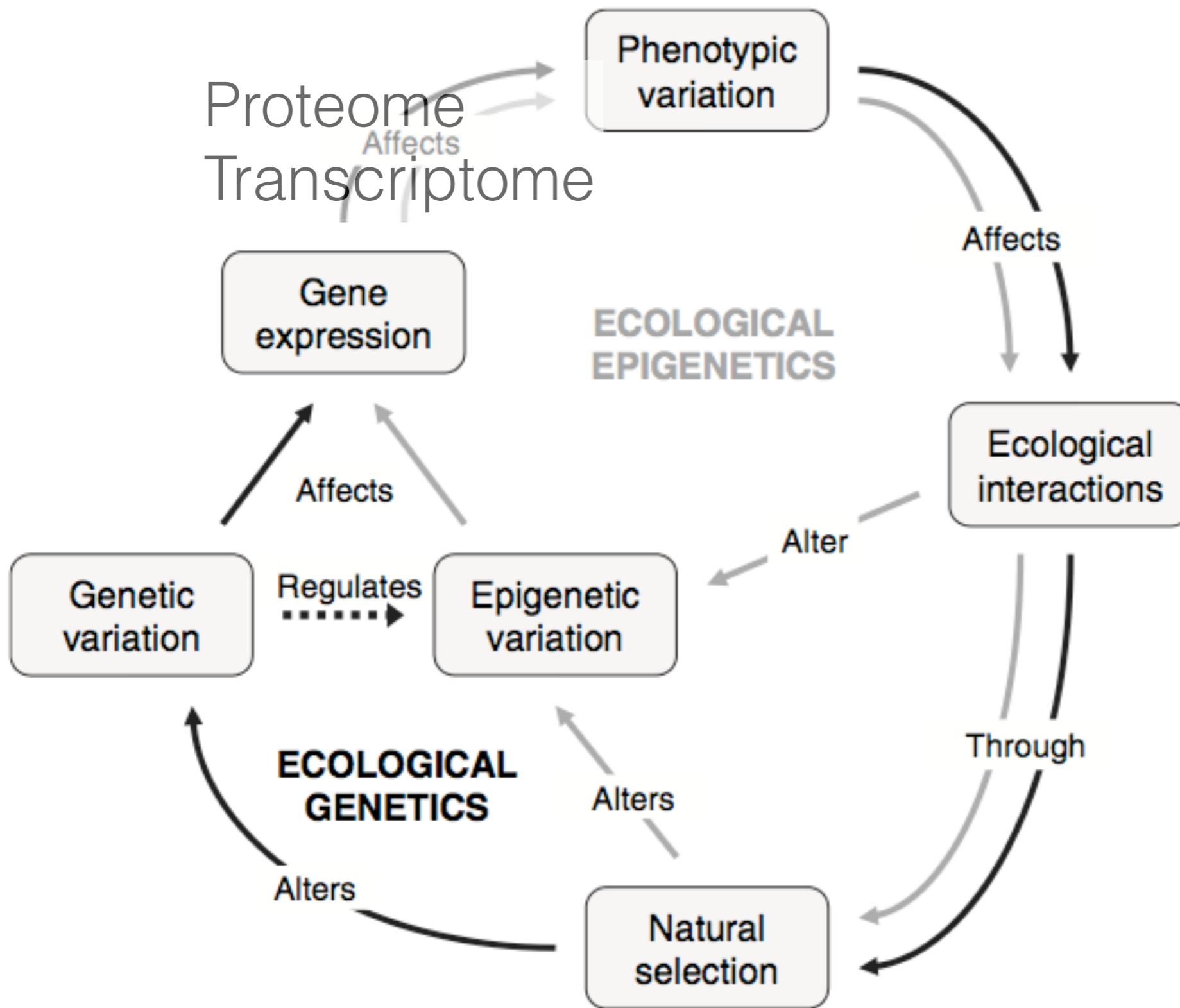


B



# Background







## GRADUATE STUDENTS

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- Variety of trajectories...
- Traditional - right from school
- From biomedical
  - Go to biomedical
- Environmental Policy
- Commercial Hatcheries
- Lab technicians
- Agency (NOAA)

# UNDERGRADUATES

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- Resource agencies
- USGS, NOAA, EPA
- Conservation, NGOs
- Stay in school
- Research labs
- Change fields



# CONTEXT - THE LAB MAKEUP

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- Three Research Scientists
- Five Graduate Students
- One Post-Doc
- Visiting Professor



# COLLABORATORS

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- NOAA
- DNR
- Washington Department Fish and Game
- UW Genome Sciences
- Collaborators at other Universities
- Puget Sound Restoration Fund
- Commercial Fisherpersons

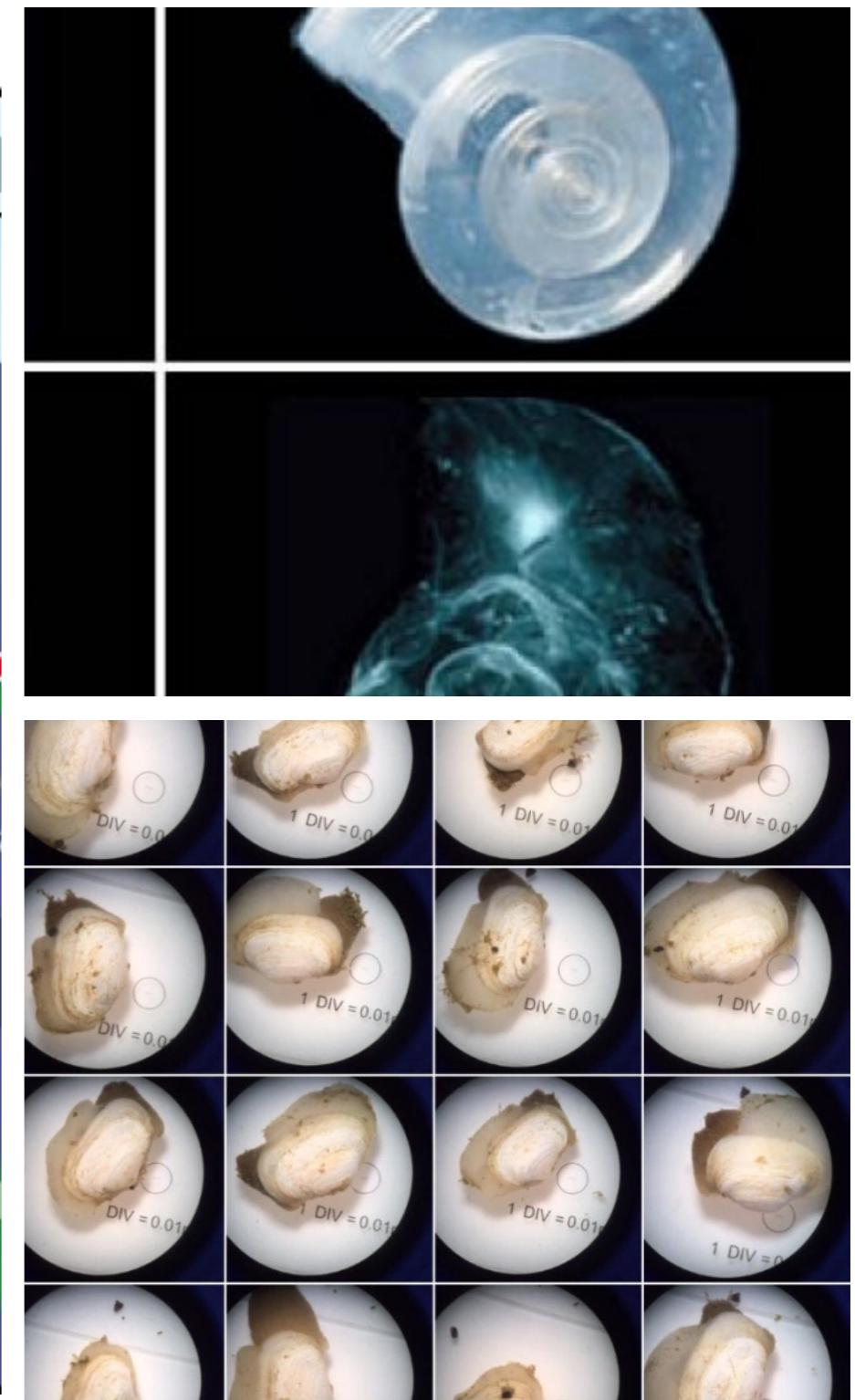
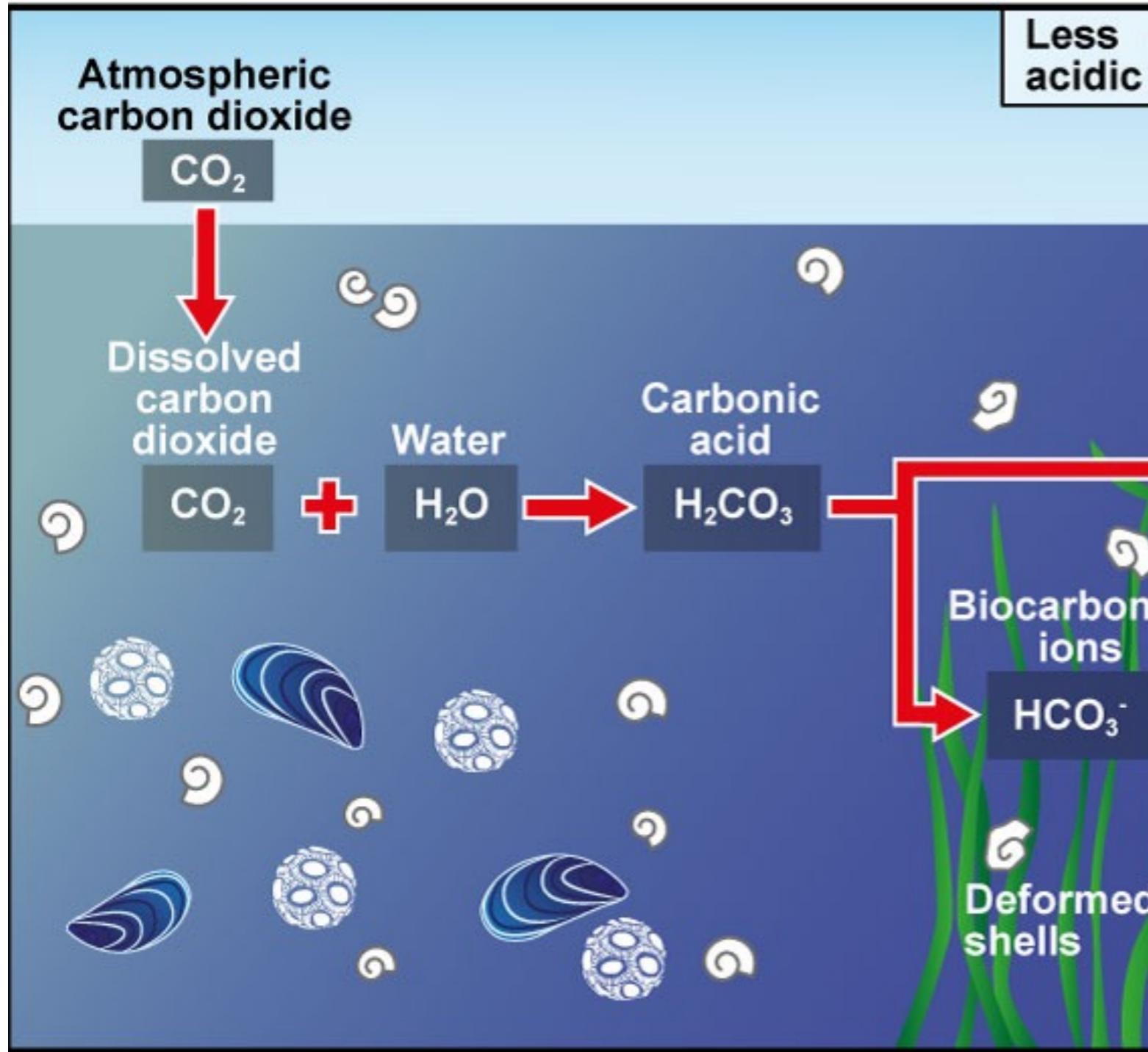


# SOME CURRENT RESEARCH

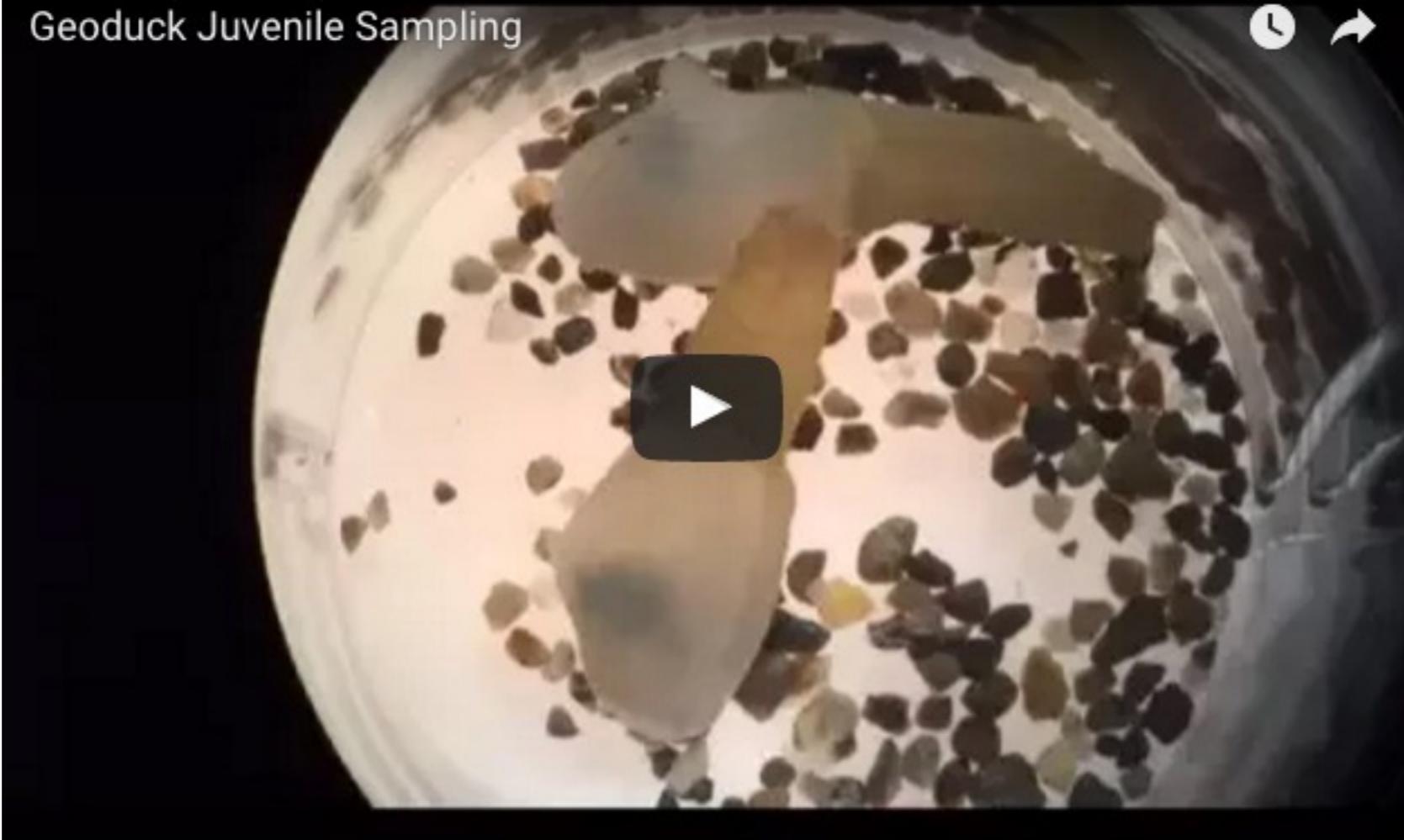
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- Geoduck clams and ocean acidification
- Environmental impacts on clams and oysters in Puget Sound
- Tracking sablefish using satellite tags
- Olympia oyster population differences in Puget Sound

## OCEAN ACIDIFICATION



*Geoduck Clam Studies at Chew Hatchery*



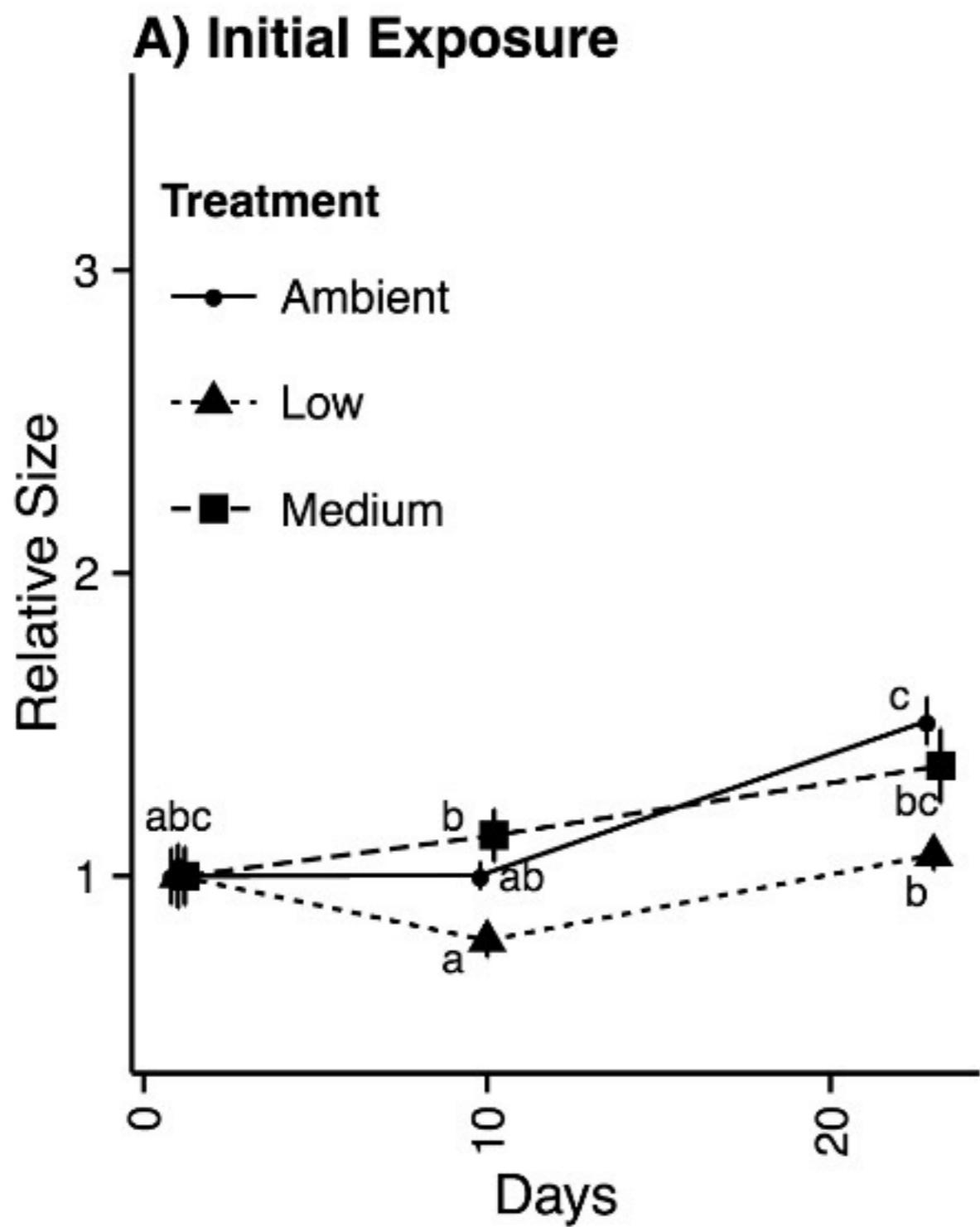
The ducks looked good today. They were partly buried in the sand with siphons out. Collections and visual examination showed them moving in all treatments.



[https://youtu.be/vUsBBmXQn\\_I](https://youtu.be/vUsBBmXQn_I)

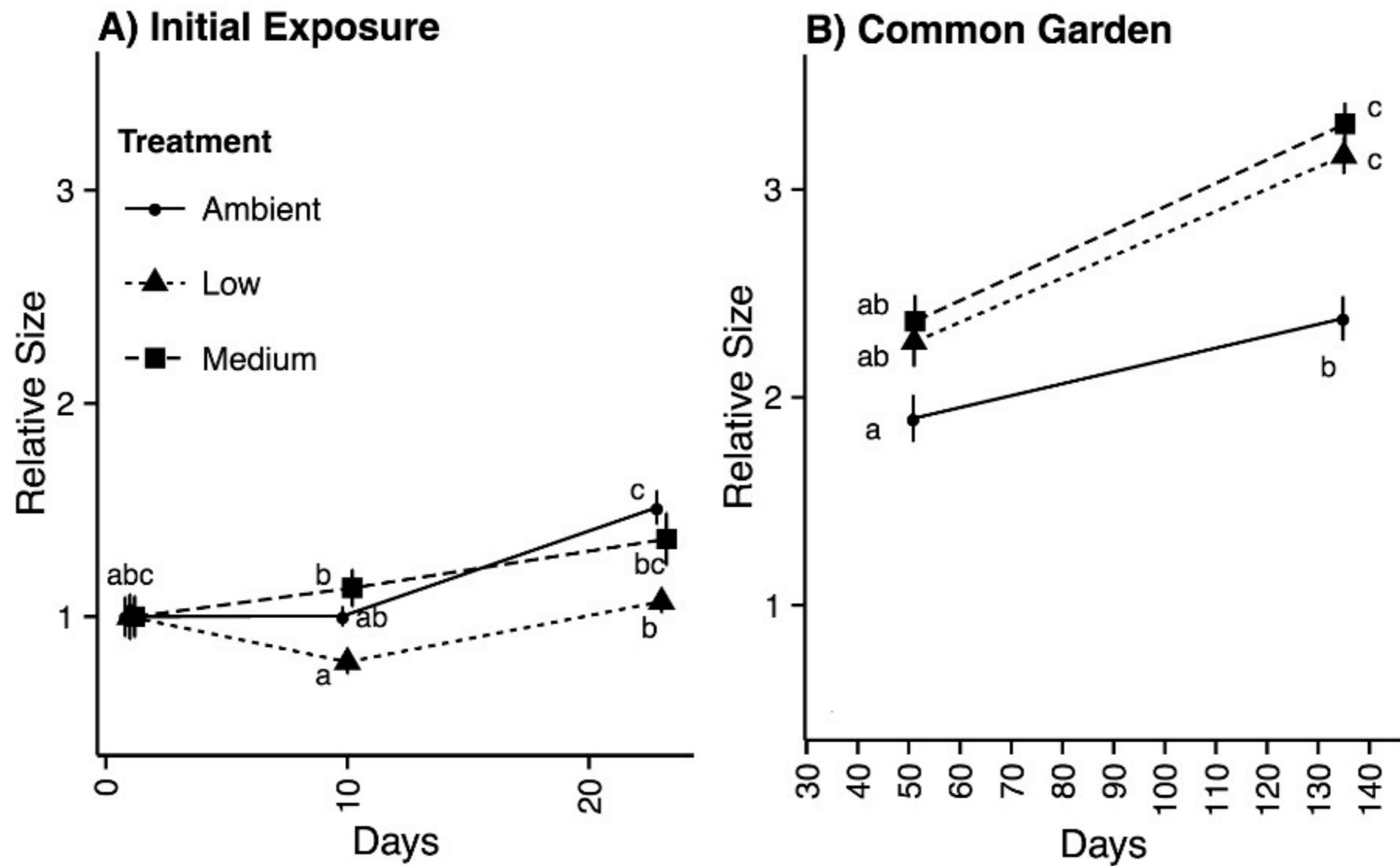
# DATA

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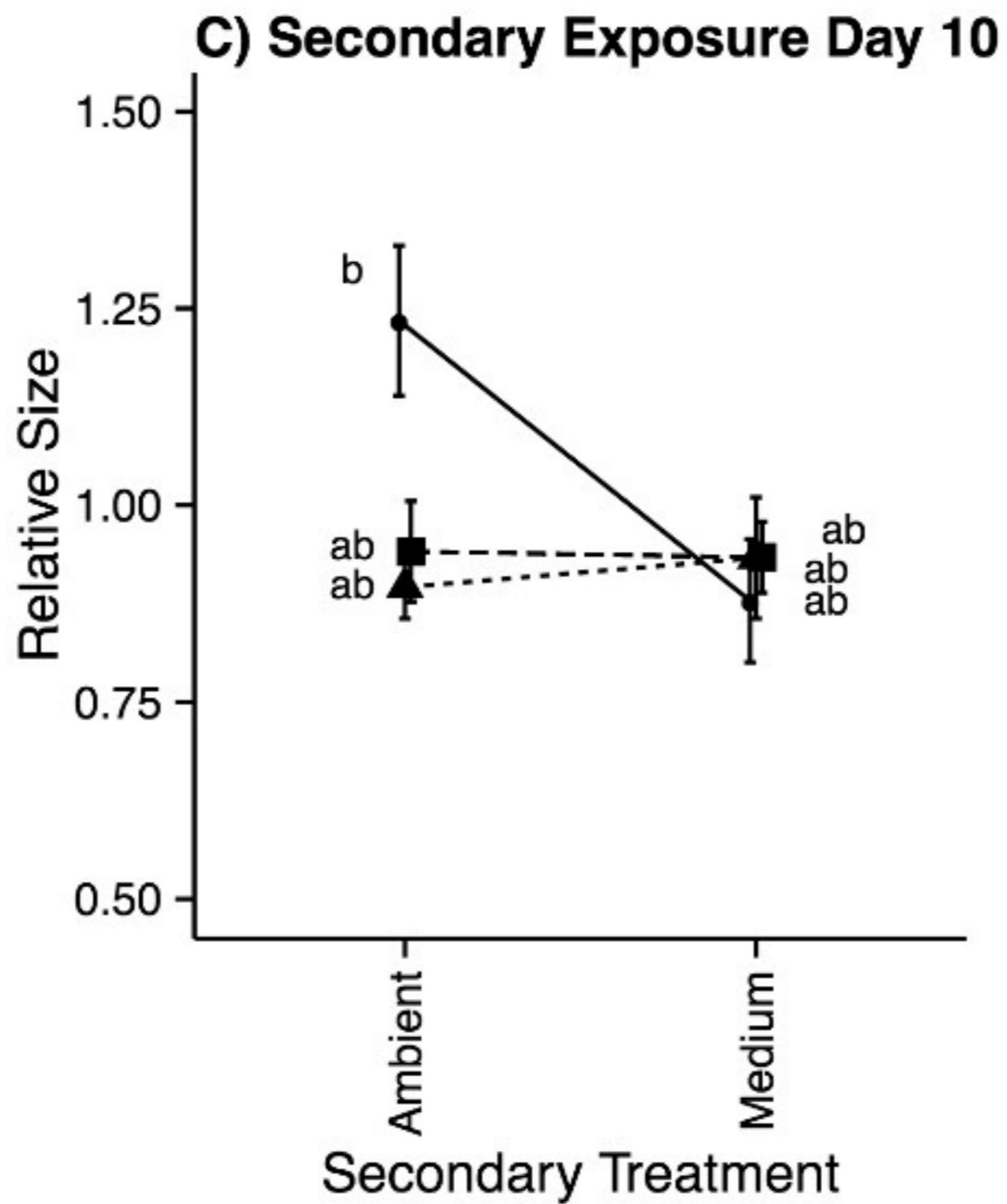
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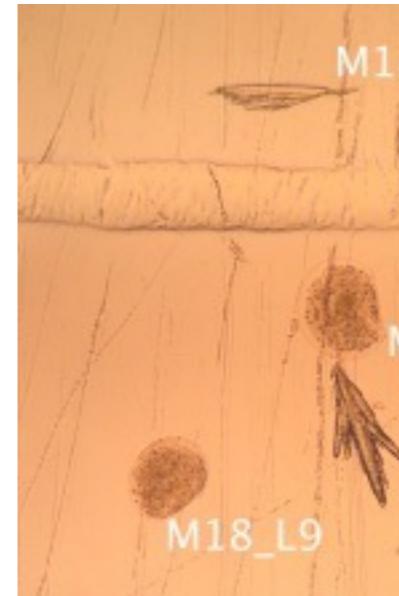
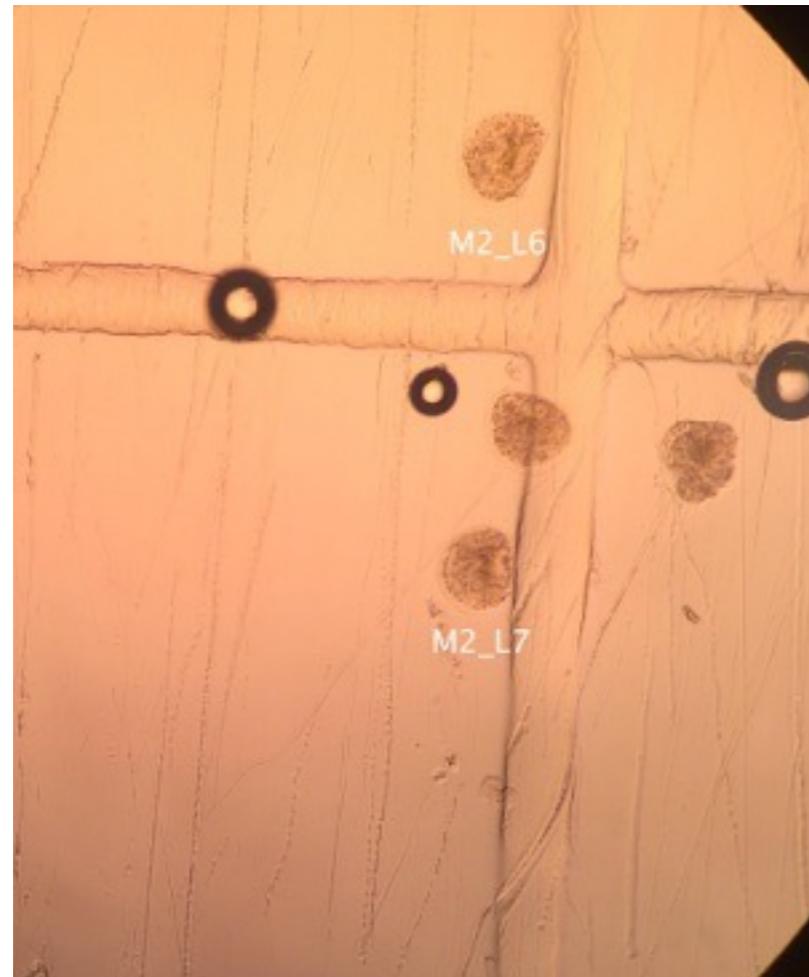
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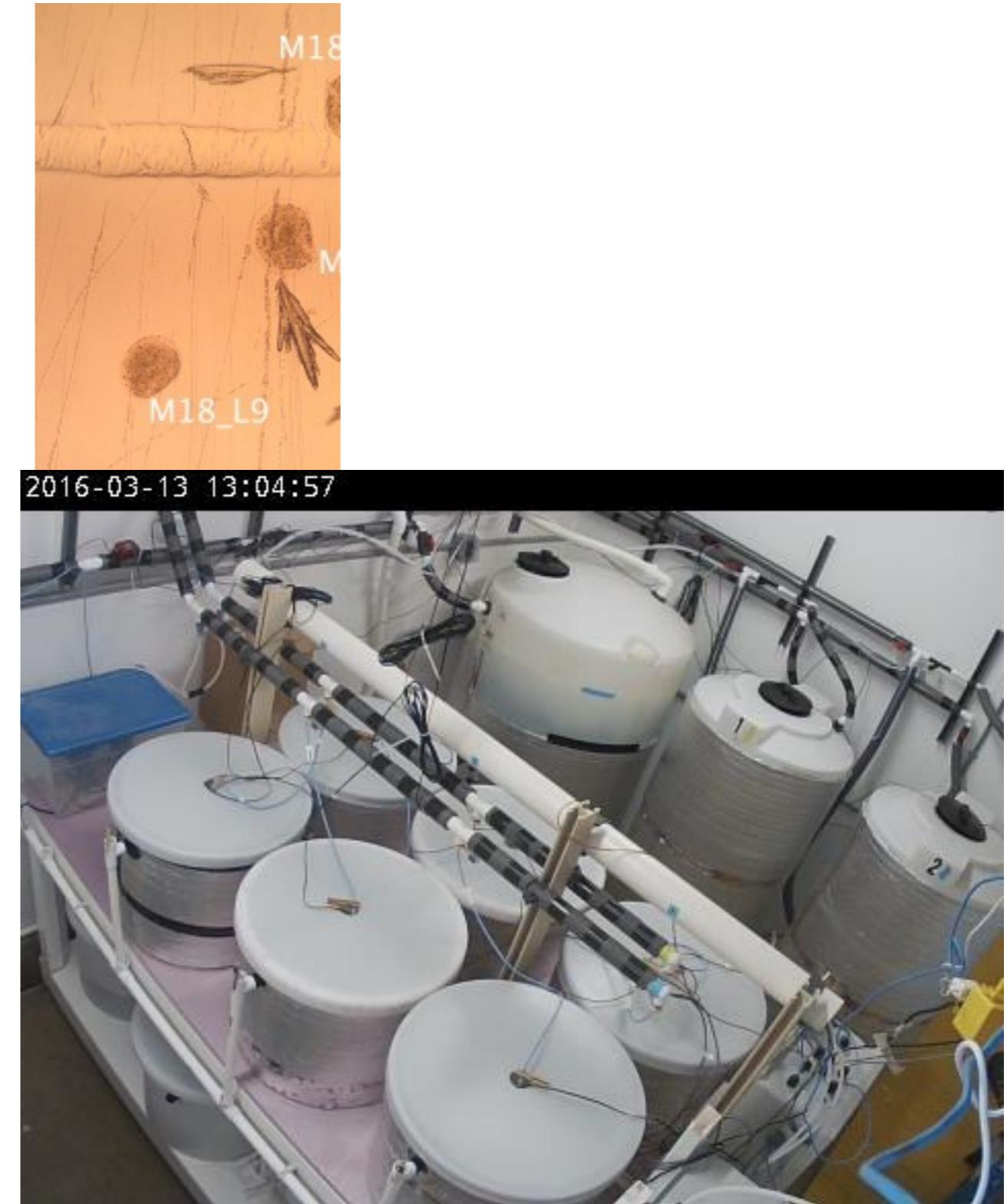
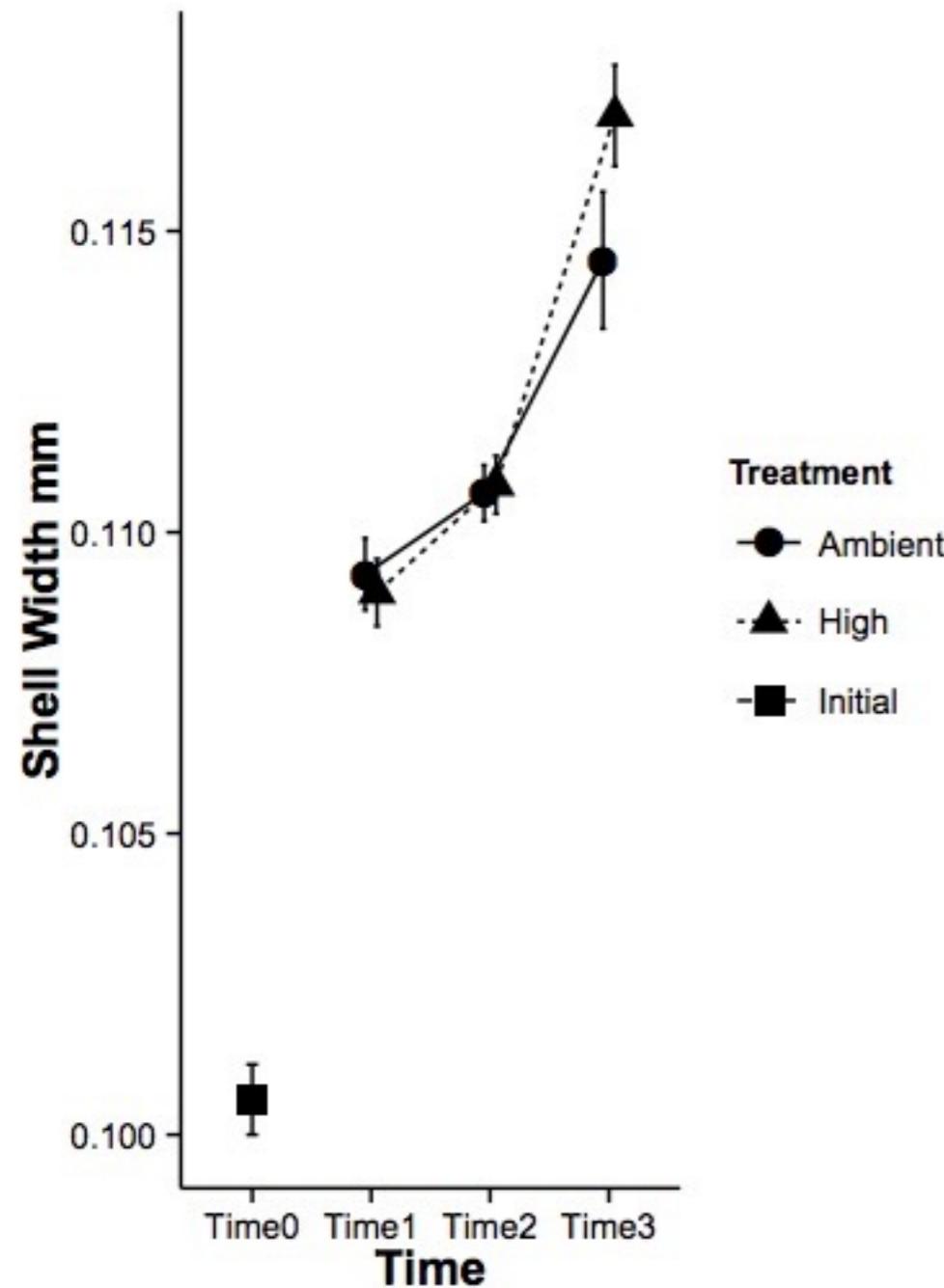
# ALSO LOOKING AT LARVAL GROWTH AND MORTALITY

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# ALSO LOOKING AT LARVAL GROWTH AND MORTALITY

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# CURRENTLY...

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<https://www.youtube.com/watch?v=-t25yQTSpwI>

# Pacific Oyster Sampling Sites and Eelgrass Monitoring Regions



0 12.5 25 50 Kilometers

1:1,500,000

Made by Yaamini Venkataraman  
10/4/2016

Coordinate System: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Projection: Lambert Conformal Conic

Datum: North American 1983 HARN

False Easting: 1,640,416.6667

False Northing: 0.0000

Central Meridian: -120.5000

Standard Parallel 1: 45.8333

Standard Parallel 2: 47.3333

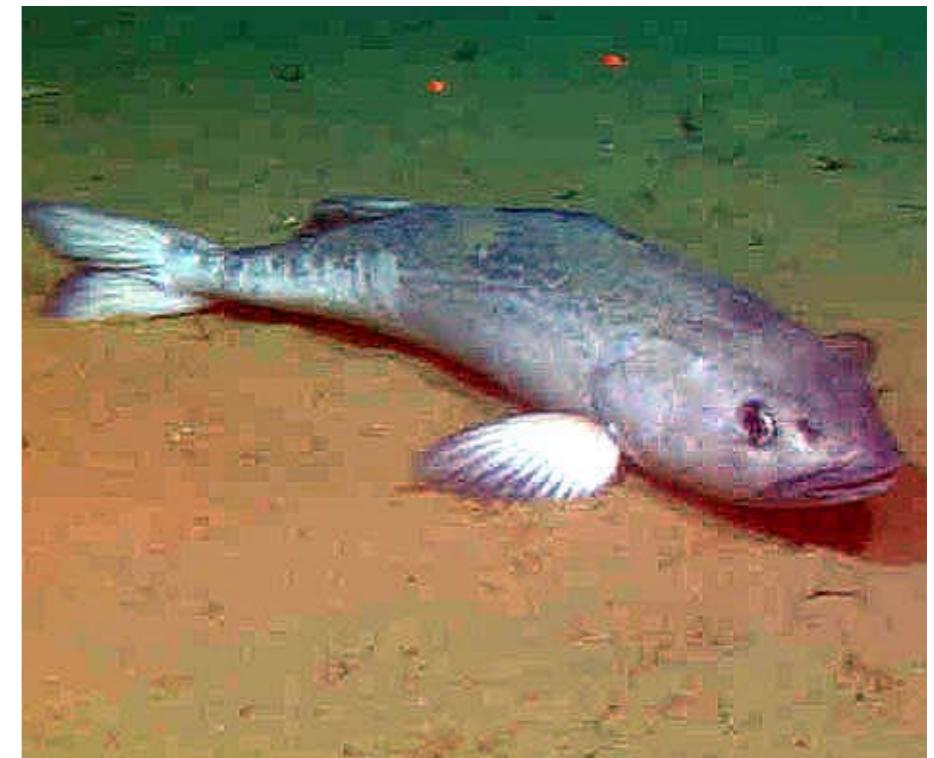
Latitude Of Origin: 45.3333

Units: Foot US

# CURRENTLY ...

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- Getting ready to extract proteins
- Use protein expression patterns to understand how different local environmental conditions influence physiology (sub-lethal impacts)
- Why?
  - Help us predict status of future populations and consider the larger ecosystem impact..



*Tracking Sablefish movement...*

<https://robertslab.github.io/project-sablefish/>

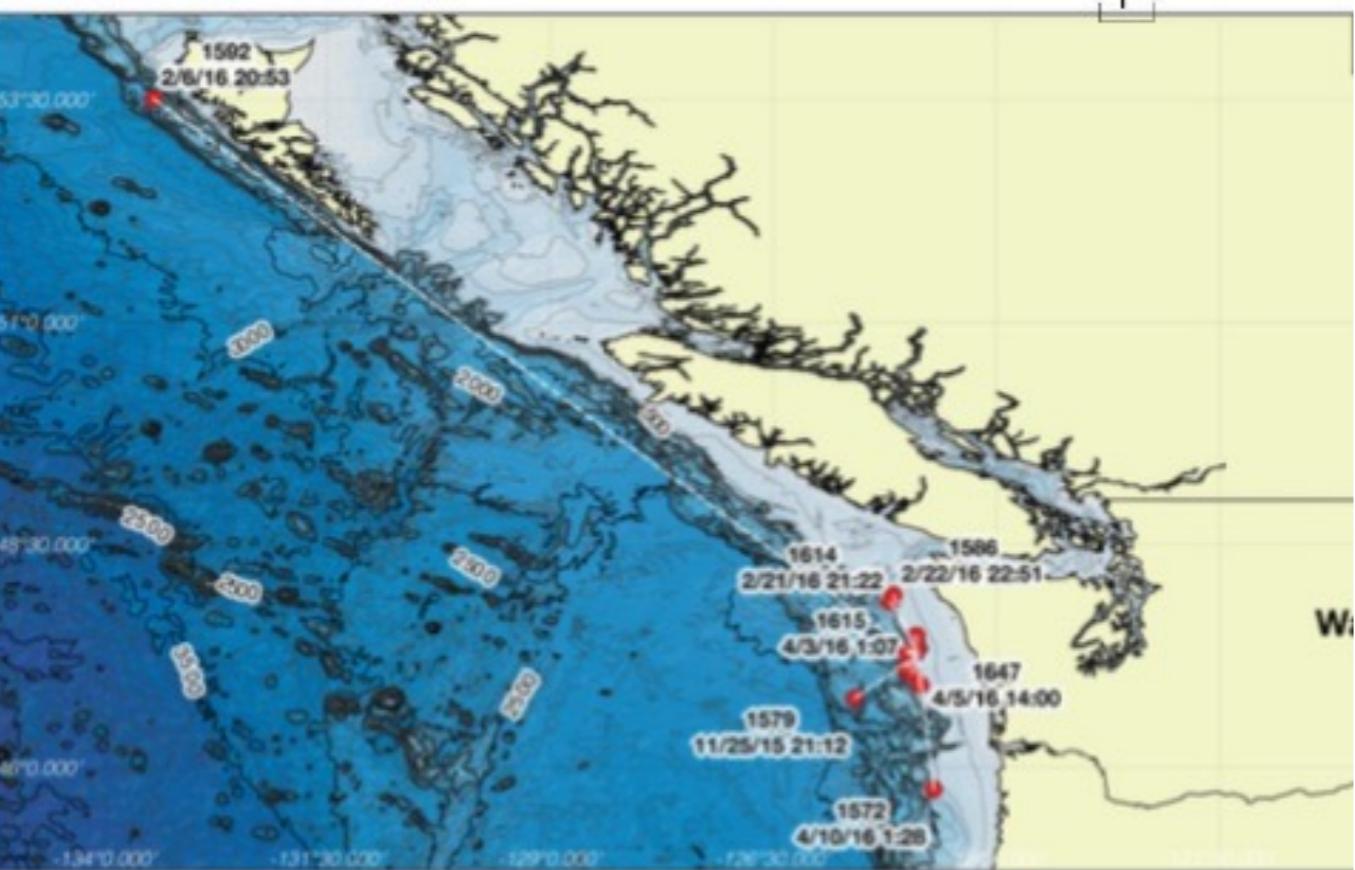


Figure 1: Sites at which satellite tags surfaced in the Pacific Ocean. North - Graham island, Canada to South Tillamook Oregon.

## LOTS AND LOTS OF DATA

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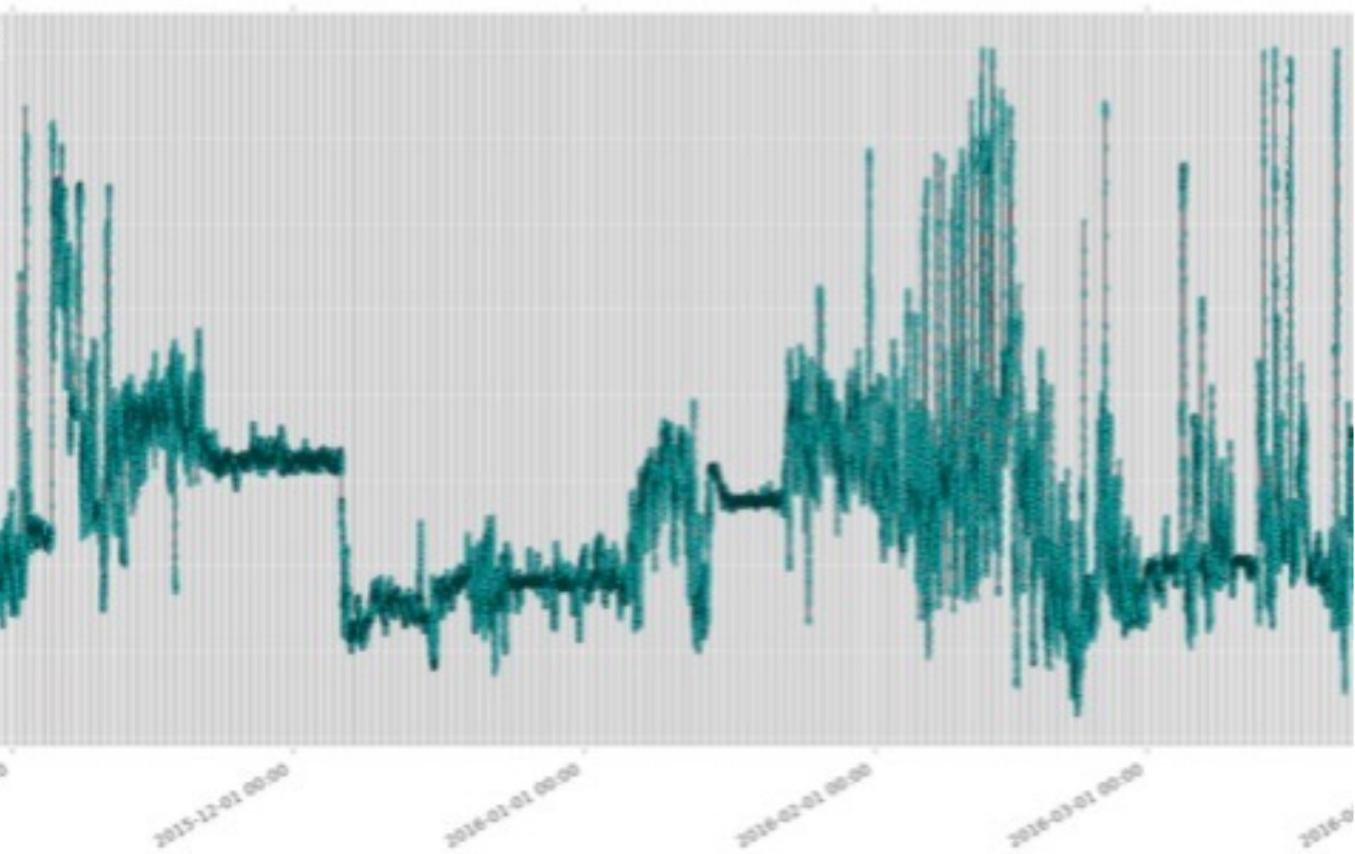


Figure 2: Depth trace for a satellite tag deployed on a sablefish for 6 months from November, 2015 to April, 2016. Sampling at 4 minute intervals

# OLYMPIA OYSTERS

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Very new data  
Heritability  
Plasticity  
Local Adaptation

*Genetics  
versus  
Epigenetics*

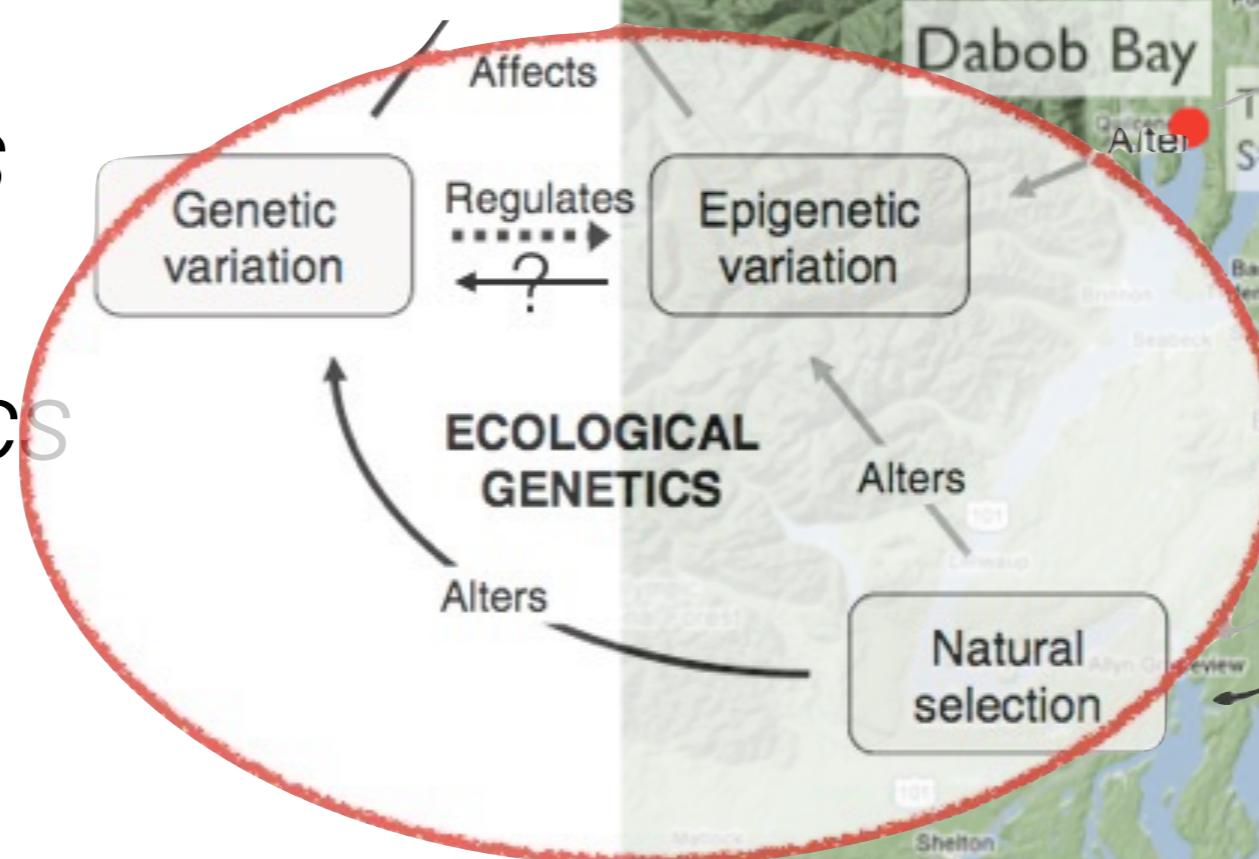


## Reciprocal Transplant Experiment

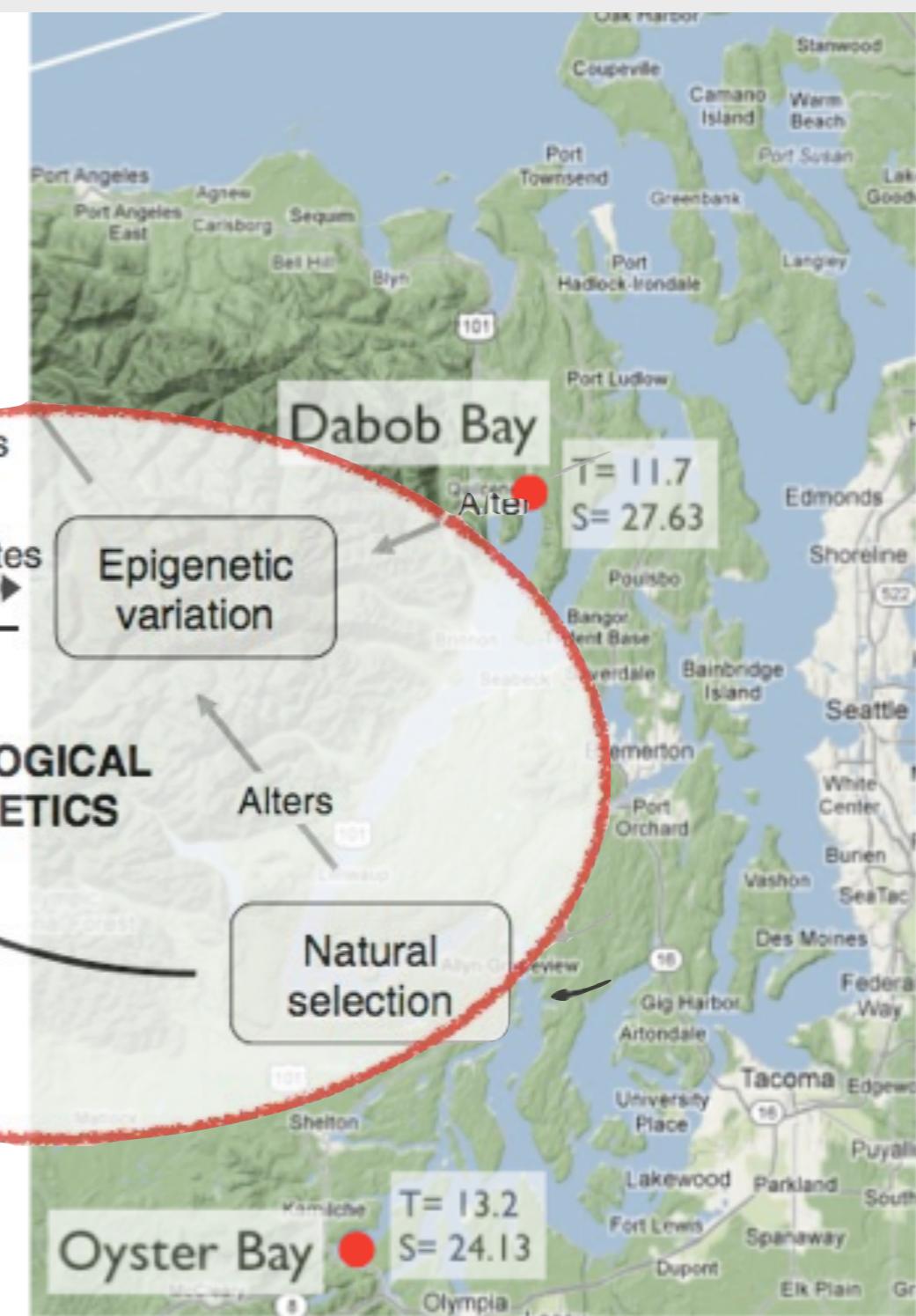


Very new data  
Heritability  
Plasticity  
Local Adaptation

Genetics  
versus  
*Epigenetics*



## Reciprocal Transplant Experiment



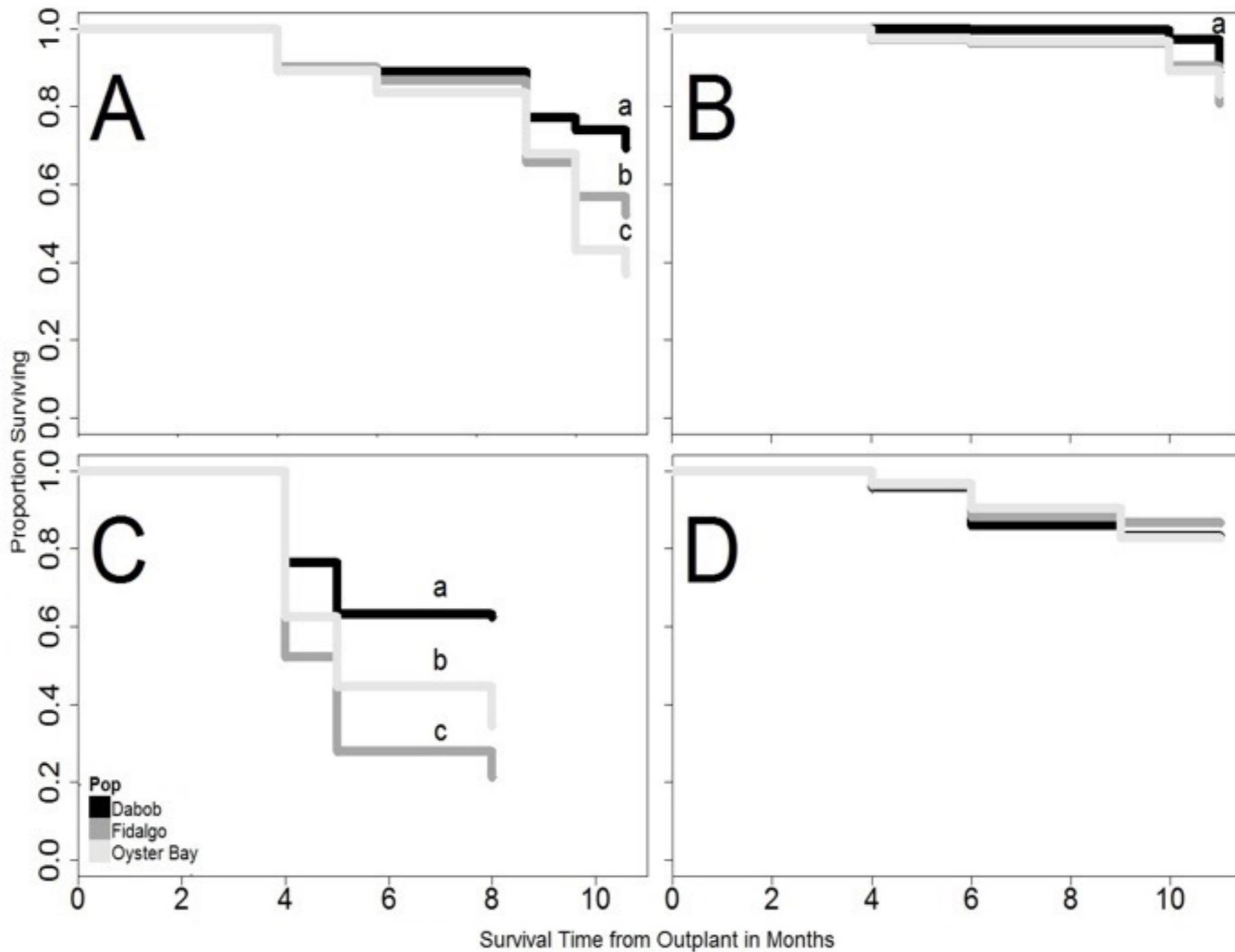
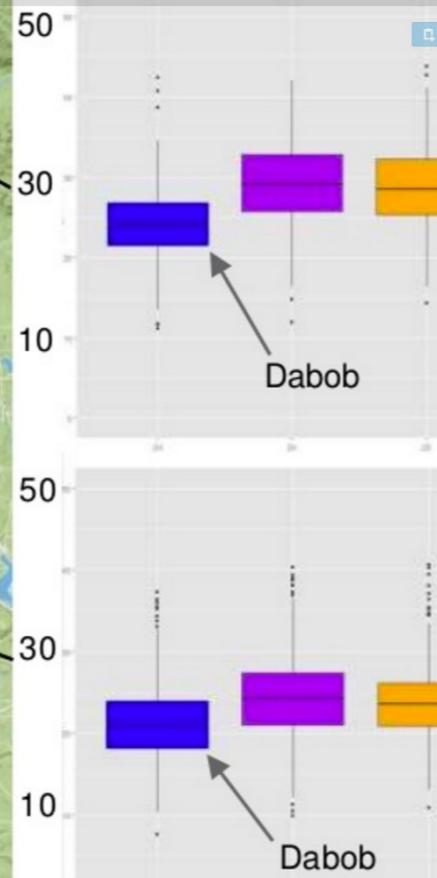
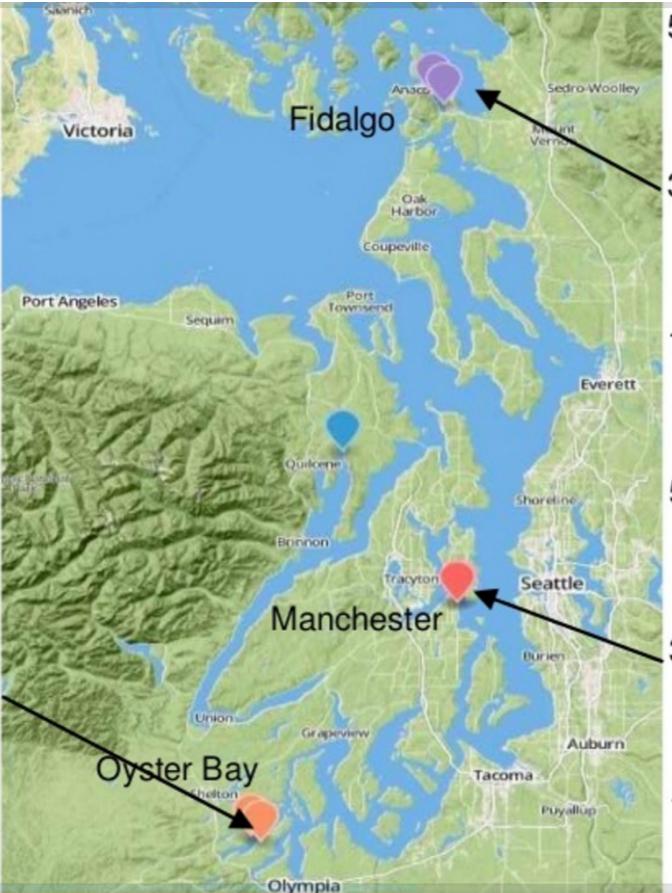
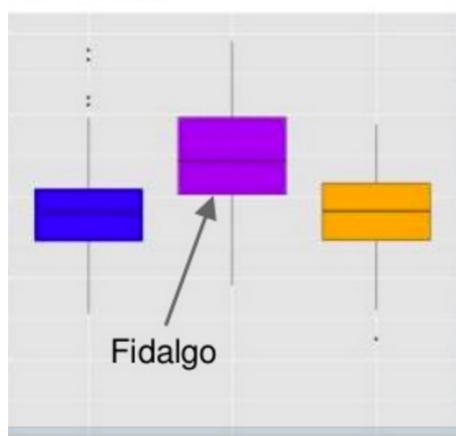


Figure 4. Proportion survival for three *Ostrea lurida* populations at four locations; Southern site (A), Central site (B), Hood Canal site (C), and Northern site (D). Lowercase letters (a, b, c) are significant differences.

# Growth

- Dabob Group
- Fidalgo Group
- Oyster Bay Group



*Knocking out oysters*

