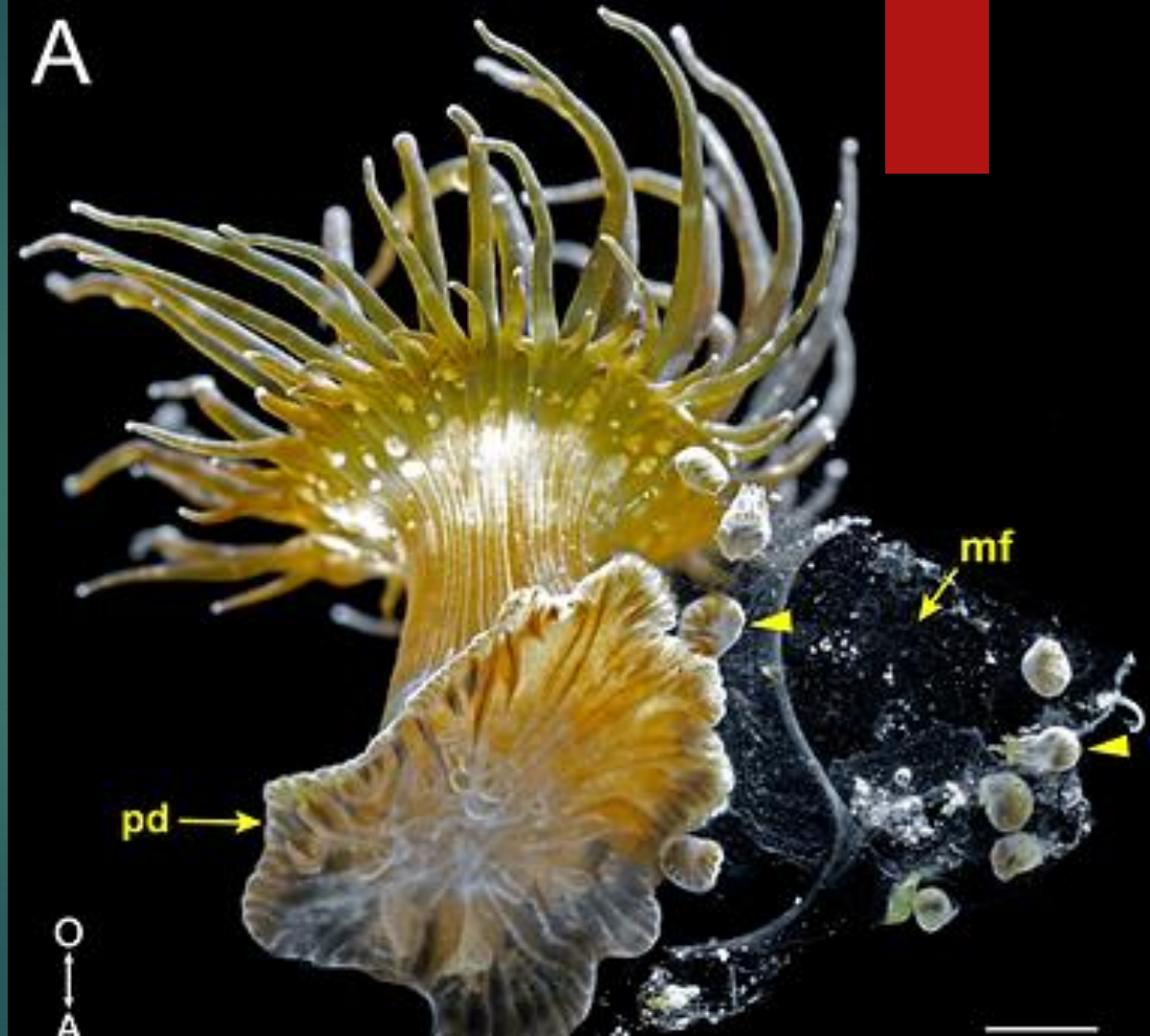
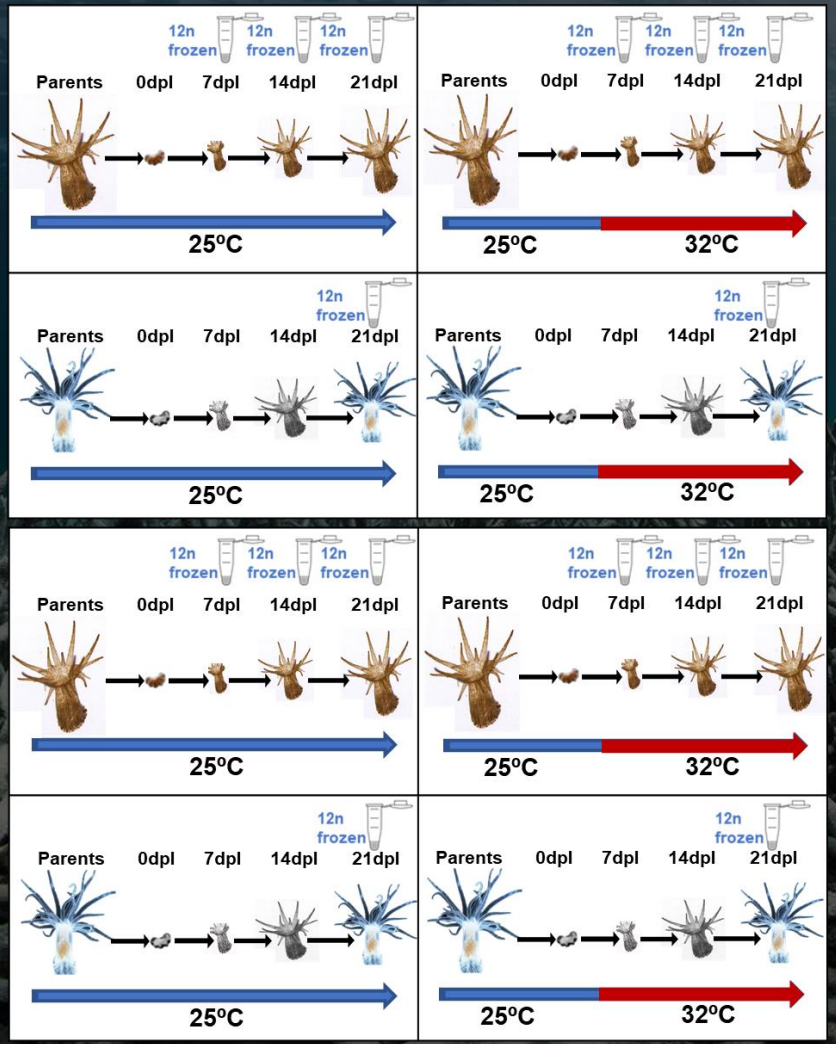
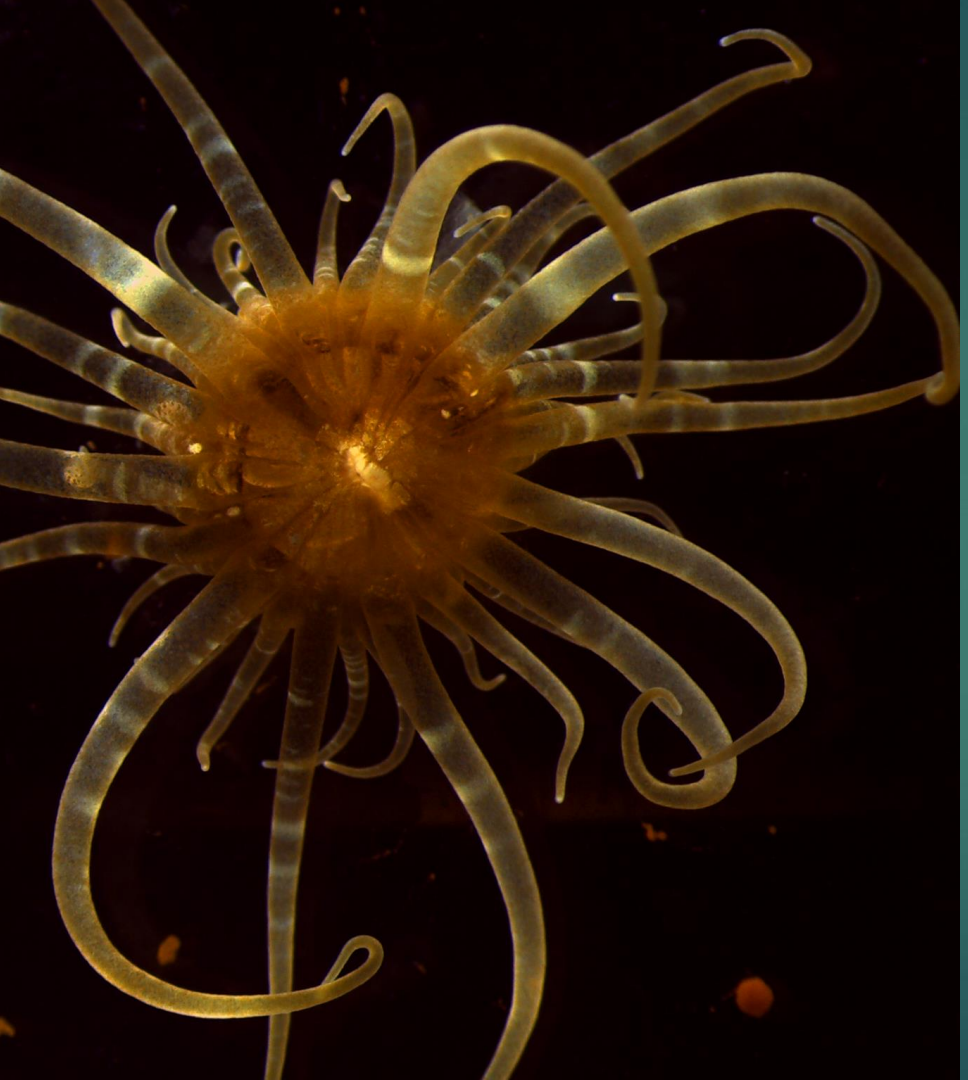
Early-Stage Development of Aiptasia Pedal Lacerates

Project Summary

- This project aims to understand the effects of environmental and inherited factors such as temperature, nutrition, genetic lines and symbiotic state in the early stages of development as measured by tentacle counts for the sea anemone, Aiptasia, a model system for the study of coral-algal symbiosis.




H2 Sym
n=23 parents,
82 lacerates
H2 Apo
n=18 parents,
49 lacerates
CC7 Sym
n=24 parents,
50 lacerates
CC7 Apo
n=18 parents,
39 lacerates
12n frozen
Parents
0dpl
7dpl
14dpl
21dpl
25°C
32°C

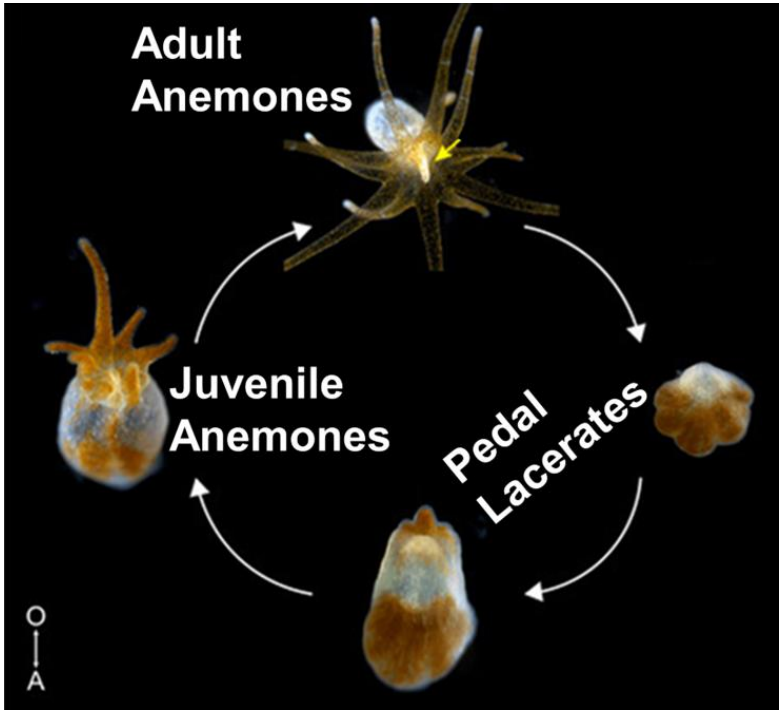


Project Goals

- Data visualization
- Linear modeling
- Hypothesis testing for effects of treatments
- Analysis of variance
- Mixed effect modeling

Workflow goals for this quarter

- Learning to use GitHub
- Improve file management and organization
- Streamlining data analysis – how I use R
- Creating reproducible data for my future self and also collaborators

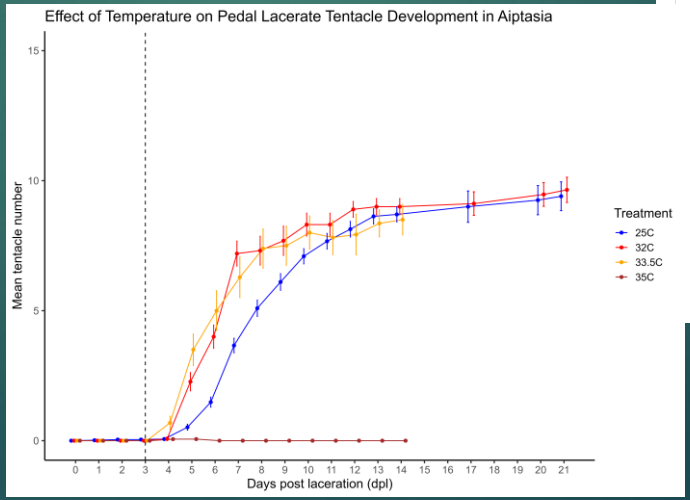


Challenges

- Computer issues - Encoding issue with R Studio basically erased all my codes and work from the summer
  - Important argument for GitHub for version control
- Missing about a couple weeks of class because of travel

Success this quarter

- Recovering codes from lost R-Script
- Data visualization – Saving my outputs
- Improve file organization on repo – ReadMe
- Reproducibility of data



junbcai Revert "Update Exp3_Heat_Ramp.R" 1012da1 42 minutes ago 72 commits

code	Revert "Update Exp3_Heat_Ramp.R"	42 minutes ago
data	Merge branch 'main' of https://github.com/junbcai/heatinglacerate	1 hour ago
figs	Rerun R Script	5 hours ago
manuscript	Create README.md	5 hours ago
results	Create README.md	5 hours ago
tables	Rerun R Script	5 hours ago
.gitignore	Update .gitignore	1 hour ago
Project Proposal for Analytical Workfl...	Update R and Exp 1 CSV and project report	1 hour ago
README.md	Update README.md	11 hours ago
Workflow Diagram.drawio	Update Workflow Diagram.drawio	1 hour ago

README.md

Pedal Lacerate Development

This repository contains the contents for part of Jun Cai's thesis project relating to *The growth and development of pedal lacerates under different environmental stressors.*

Description

This project was piloted by Oregon State undergraduate students as a part of a CURE (Course-Based Undergraduate Research Experience) in Spring of 2022. This project was influenced largely by the work in Presnell, J.S., Wirsching, E., Weis, V.M. 2022. *Tentacle patterning during Exaiptasia diaphana pedal lacerate development differs between symbiotic and aposymbiotic animals*. PeerJ. In this study, we aim to characterize the effects of different environmental factors on the development rate (as measured by tentacle growth) of pedal lacerates, the asexual buds of the tropical sea anemone *Exaiptasia diaphana*. This repository contains data from the initial pilot project and follow-up experiments on the subject.

Table of Contents

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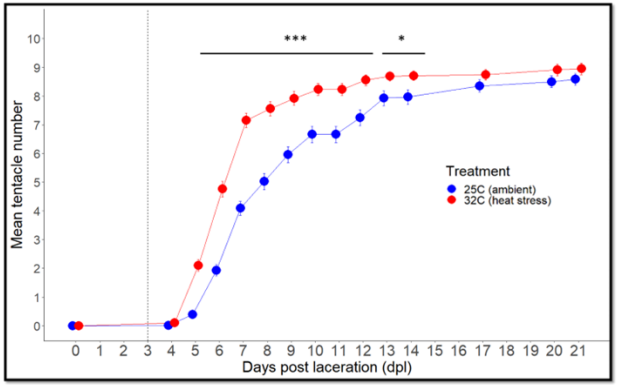

Fig 2: **Mean tentacle numbers for pedal lacerates from adults with different water temperatures**. Pedal lacerates reared at 32°C (heat stress) have significantly more tentacles than pedal lacerates reared at 25°C (ambient) from 5 to 14 dpl. After 14 dpl the difference becomes not significant.

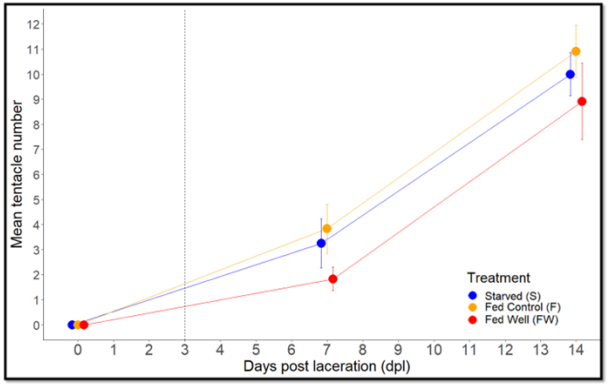

Fig 3: **Mean tentacle numbers for pedal lacerates from adults with different feeding regimens**. Pedal lacerates were generated from symbiotic H2 adults which were either starved, fed with *Artemia* brine shrimp (F), or fed with *Artemia* brine shrimp enriched with S.presso formula (FW) for 14 days before the experiment. There were no significant differences between the three feeding regimens.

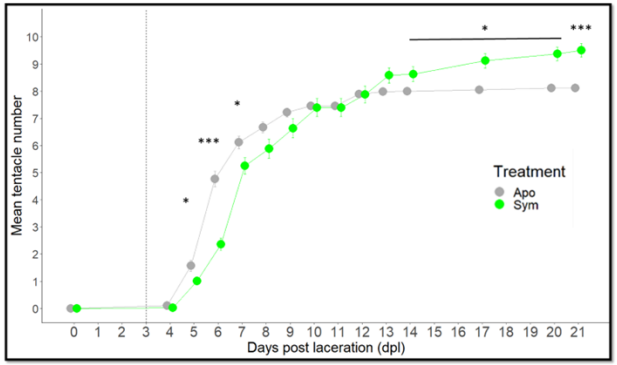

Fig 4: **Mean tentacle numbers for pedal lacerates from adults with different symbiotic states**. Aposymbiotic pedal lacerates have significantly more tentacles than symbiotic pedal lacerates at 5-7 dpl. After 7 dpl the difference becomes not significant. After 14 dpl the trends switches to symbiotic pedal lacerates having significantly more tentacles than aposymbiotic pedal lacerates.

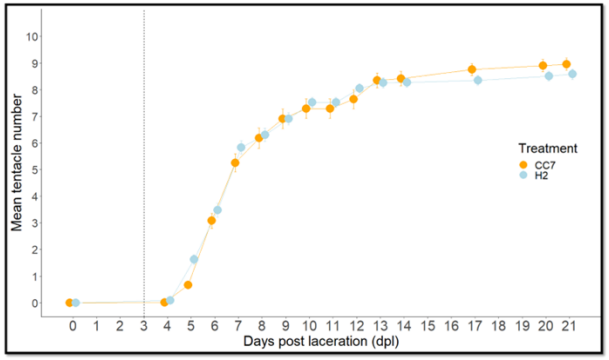

Fig 5: **Mean tentacle numbers for pedal lacerates from adults with different clonal lines**. There were no significant differences between the two clonal lines.

Scientific insights achieved (project specific)

- Different environmental factors influence the growth and development of pedal lacerates in Aiptasia
- Heat to a certain extent provides a beneficial affect to the asexual buds (juvenile animals) at the earliest stages of development
- Symbiotic state likewise shows differential effects in terms of the development of pedal lacerates at the earliest stages
- Potentially this could answer questions about the differential resilience and physiology of juvenile and adult cnidarians to climatic changes

Insights and sticking points (workflow specific)

- There is a lot of bad habits and stubborn/lazy scientists
- New tools and strategies of data analysis – large learning curves but rewarding in terms of saving time
- Troubleshooting and discussing work with others – You're probably not the first to have this problem

Future-plans

- Bare minimum – Continue the file structures and coding best practices learned
- Still need to get better at R – using R-markdown or R Notebook
- Adding and analyzing symbiont density to my raw data
- Learn how to use typesetting strategies with Markdown and Latex in preparing future manuscripts
- Using second-level features of GIT such as branching, diff, merge and etc.