The Impact of Heat Stress on Temperate Coral *Astrangia poculata*

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References

Introduction

Reef-building corals provide a habitat for marine creatures, protect coastlines from storms, and are a source of income. Corals maintain a symbiotic relationship with various kinds of algae, known as zooxanthellae. Corals can lose their algae in a phenomenon known as bleaching due to increasing ocean temperatures, among other reasons. Bleaching leaves corals without its main food source and they become more vulnerable to disease.

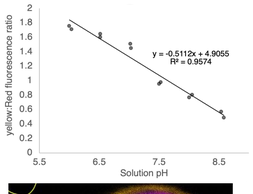
In this project I used a particular coral species called *A. poculata* which is a non-reef building and facultatively symbiotic coral. This coral is hardier than tropical coral and can survive in a wider range of temperatures. Our specific samples came from Rhode Island. I worked on three different projects which are all related to exploring how *Astrangia* and its symbionts respond to heat stress. In high temperatures tropical coral show a decrease in intracellular pH (pHi).

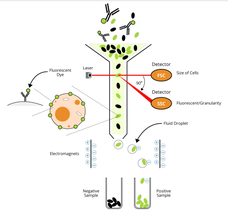
Research Question & Hypothesis

How is symbiont photo health related to intracellular pH in *Astrangia?*
Hypothesis: I expect a decrease in pHi and in chlorophyll per cell

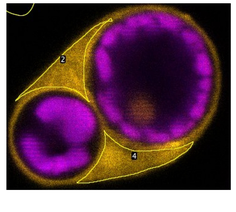
Materials and Methods

Relative fluorescence was read by flow cytometry.

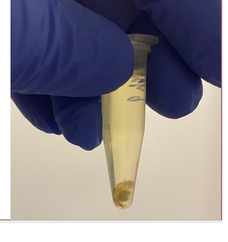




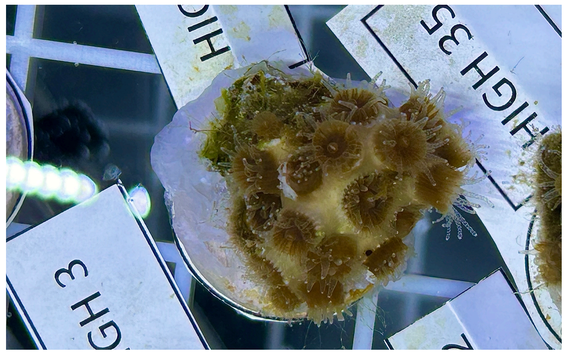
Coral cells were isolated from samples and loaded with SNARF, a pH sensitive dye. They were then imaged under the confocal. Here is an example of a coral cell that contains two symbionts.



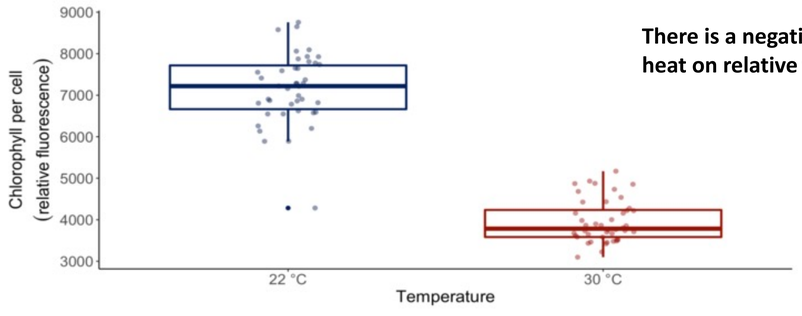
Coral samples were decalcified using PFA (which preserves the tissue) and EDTA (which binds to calcium to dissolve the skeleton). They will then be dehydrated, set in wax, thinly sliced, and observed under the microscope.



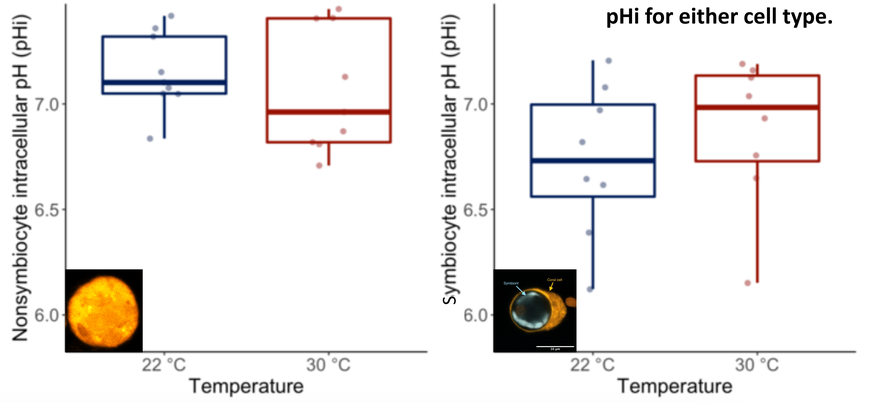
Astrangia poculata



Results



There is a negative effect of heat on relative fluorescence.



There is no effect of heat on pHi for either cell type.

Discussion

Chlorophyll content:

Under heat stress, the chlorophyll of individual symbionts decreases. We can infer that the symbiont is not able to photosynthesize as well and therefore cannot provide nutrient benefits to the coral in this way.

Intracellular pH:

Heat had no effect on pHi for either cell type. So, this temperature difference was not large enough to cause fluctuations in the animals' pH levels, and so it could be that *Astrangia* are able to maintain homeostasis while facing changes in temperature at this level. They were not stressed and this could be because they experience big temperature fluctuations in their natural environment.

Histology:

Coming soon!

Conclusions

Chlorophyll per cell decreased under heat stress

pHi of host animal does not change under heat stress

→ **Symbiont photo health is not essential to *Astrangia* coral pHi as water temperature increases**

Acknowledgements

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