GIANT CLAMS IN A CHANGING OCEAN

EFFECTS OF OCEAN WARMING AND ACIDIFICATION ON A SOLAR-POWERED BIVALVE

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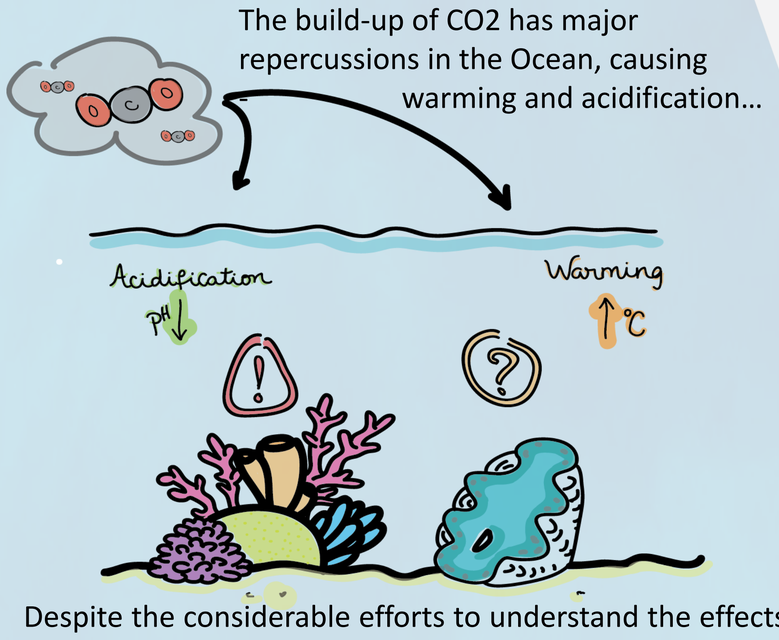
INTRODUTION



Despite the considerable efforts to understand the effects of these stressors in coral reefs, little is known regarding the impacts over giant clam populations.

Giant Clams as part of the reef structure

Zooxanthellae in the clam's mantle

Giant clams are iconic tropical bivalve molluscs enrolled in a endosymbiotic relationship with photosynthetic dinoflagellates (zooxanthellae).

They play important ecological, cultural and economic roles and, with population already in decline, represent a conservation priority.

AIM

To investigate the impacts of ocean warming and acidification and warming on the holobiont "Giant clam + Zooxanthellae"

Tridacna maxima juvenile

METHODS

Acclimation:

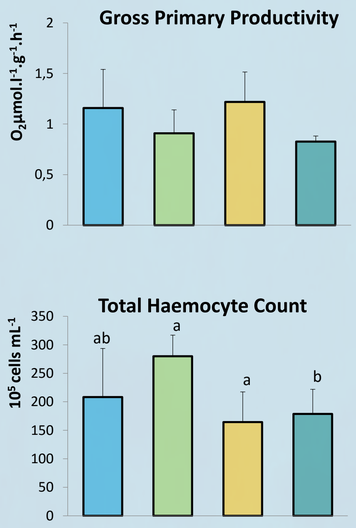
- **Period:** 60 days
- **Temperature:** Δ 3ºC ↑
- **pH value:** Δ 0.4 units ↓

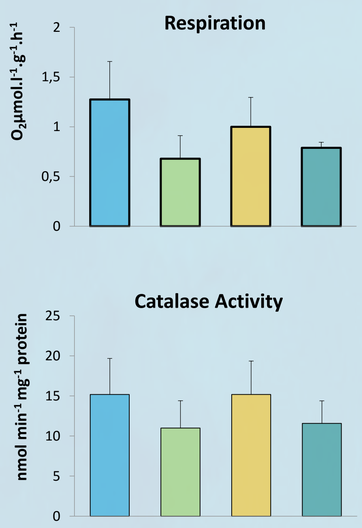
Endpoints:

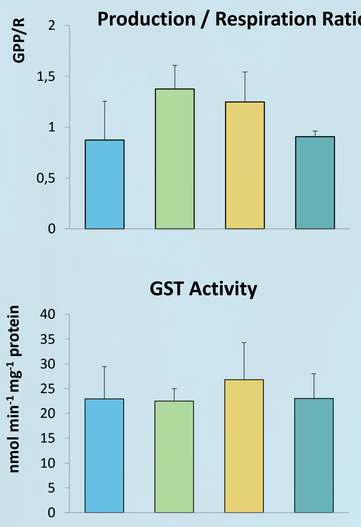
- Respiration (R) and productivity (P);
- Zooxanthellae size and asymmetry;
- Total haemocyte count (THC);
- Antioxidant enzymatic activities (CAT and GST)
- Heat shock response (HSR: HSP70/HSC70)
- Lipid peroxidation (malondialdehyde levels).

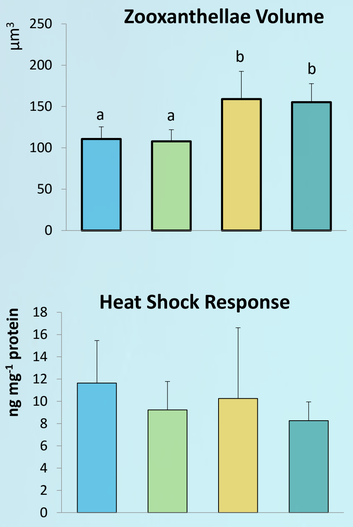
CONTROL 28ºC | pH 8.0	**WARMING** 31ºC | pH 8.0
ACIDIFICATION 28ºC | pH 7.6	**W + A** 31ºC | pH 7.6

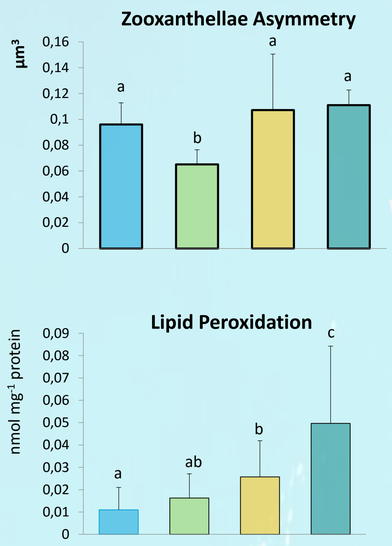
RESULTS











Zooxanthellae H&E

CONCLUSIONS

- The exposure to warmer temperatures elicited an increase in zooxanthellae size and asymmetry. Moreover, a decrease in the haemocytes numbers was also observed, with potential implications in the organism nutrition and immune system.
- There was no evidence of the activation of heat shock response nor detectable differences in antioxidant enzymatic activities. On the other hand, lipid peroxidation increased in clams exposed to acidification, which could be attributed to an increase in cellular damage.

Anthropogenic pressure has already been responsible for the decline of giant clam populations worldwide and climate change will most likely impose additional stress, undermining the conservation efforts taking place.

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