The coral reef-dwelling *Peneroplis pertusus* brought to light: recalcification during culture experiments

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Ocean acidification is a consequence of current global climate changes. The concomitant decrease in pH and carbonate ion concentration in sea water may have severe impacts on calcifying organisms. Coral reefs were among the first ecosystems to be recognized as vulnerable to ocean acidification. On coral reefs, large benthic foraminifera are among the major calcium carbonate producers.

The aim of this study was to evaluate the effects of a lower pH and presence or absence of light on large benthic foraminifera. We performed culture experiments reproducing ocean acidification conditions to study the shell (test) resistance to dissolution of the miliolid and symbiont-bearing species *Peneroplis pertusus*. Furthermore, resilience of decalcified specimens under dark or light treatments was documented.

We found that after four days, small signs of test decalcification were observed on the specimens kept at pH 7.2, and severe test decalcification was observed on specimens kept at pH 6.9. All the specimens were alive, even the strongly decalcified ones, which demonstrates the resistance of *P. pertusus* to a lowered pH, at least on the short-term. After being partially decalcified, some of these living specimens were placed back at higher pH 7.8. After around 10 days, test recalcification occurred, but only on individuals that were daily exposed to light. These results highlight the crucial role of the symbionts that are able of photosynthesis, which provides the required energy for the recalcification process. Moreover, the newly formed chambers were abnormal, and the ultrastructure of their walls was altered. We conclude that even if symbiont-bearing large benthic foraminifera show some resistance and resilience to lowered pH, they will stay strongly affected by ocean acidification conditions.

Keywords: Ocean acidification, Large Benthic Foraminifera, Culture experiments

