



## **The O<sub>2</sub> and pH microenvironment of symbiont bearing – vs. symbiont free benthic foraminifera in an ocean acidification experiment**

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Under the projection of future CO<sub>2</sub> levels in the world's oceans, phototrophic organisms are believed to be more resistant to the effects of ocean acidification (OA) due to their photosynthetic uptake of CO<sub>2</sub> in daylight, compared with heterotrophic organisms. To test this hypothesis, we measured the microenvironment of O<sub>2</sub>, pH (and Ca<sup>2+</sup>) in different symbiont-bearing (with dinoflagellates, diatoms and red microalgae as symbionts) and symbiont-free benthic tropical foraminifera species at three levels of pH (7.5, 7.8, 8.06). Our experiment showed that in saturated light conditions, the pH microenvironment around symbiont bearing species was elevated by a constant pH level (e.g. 0.1) above the ambient seawater pH in all three OA treatments. The extent of the pH elevation in the microenvironment also strongly depended on the symbiont type, which affected the photosynthetic activity of the individual species. In contrast, pH was almost ambient to seawater around symbiont-free species in light saturated conditions, and decreased around all species in darkness, due to respiration. Our results suggest that photosynthesis will not protect symbiont bearing benthic foraminifera from exposure to low pH conditions under future CO<sub>2</sub> projections.

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