

IMPACT OF OCEAN ACIDIFICATION ON THE SEA URCHIN *ECHINOMETRA MATHAEI* AND ITS ROLES AS GRAZER AND BIOERODER IN CORAL REEFS

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Coral reefs are particularly vulnerable to ocean acidification resulting from the increase of anthropogenic carbon dioxide in the atmosphere and its dissolution in seawater. The existence of coral reefs depends on the calcification rate of hermatypic corals that must remain higher than erosion. Sea urchins are, on the one hand, key species for the resilience of coral reefs through their grazing activities of invading macroalgae. On the other hand, they are also major bioeroders of reef substrate.

One objective of this study was to evaluate the effect of ocean acidification on the growth and the physiology of sea urchins. The impact of acidification on the balance between coral accretion and bioerosion by sea urchins has also been investigated.

The study was conducted in two identical artificial reef mesocosms. Experimental tanks were maintained respectively at mean pH_{total} 7.7 and 8.05 (with field-like night and day variations). The major physico-chemical parameters were identical, only $p\text{CO}_2$ and pH differed. The growth, the carbonate chemistry of the coelomic fluid and the respiration rate of sea urchins were monitored throughout the experiment, as well as the growth of corals. Biomechanical analyses were performed on sea urchins and coral skeletons. Bioerosion by sea urchins was estimated. Preliminary results indicate that *Echinometra mathaei* can maintain growth and metabolism, at least at short term and under this moderate acidosis. On the other hand, coral growth was negatively affected. These opposite effects could have an impact on the subtle and dynamic balance between bioerosion by sea urchins and bioaccretion of corals and on the long term survival of coral reefs.

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