

# OCEAN ACIDIFICATION IMPACTS ON THE PHYSIOLOGY AND ADHESIVE PROPERTIES OF THE STARFISH *ASTERIAS RUBENS*

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The increase in atmospheric CO<sub>2</sub> due to anthropogenic activity is an acidification of the ocean which could lead to pH as low as 7.7 and 7.4 by 2100 and 2300, respectively. The impact of this phenomenon will depend on the considered organisms and ecosystems. In particular little is currently known on the effects of acidification on temperate ecosystems. The intertidal rocky shores are of great interest in this context as intertidal organisms face tidal pH and temperature changes. They may harbor organisms pre-adapted to the changes predicted for the coming years and centuries. Furthermore, the intertidal environment will be more affected as shallow waters will face the highest decrease in seawater pH. Therefore, we studied the effects of ocean acidification on *Asterias rubens*, the common starfish of the Belgian coast which is known to structure some intertidal shores through its predator activity. Effects on the physiology but also on the adhesion capacities of the organism were investigated using organisms maintained at pH 8.1, 7.7 and 7.4 for periods of 15 and 31 days. Our results showed that *Asterias rubens* did not regulate its acid-base balance as no accumulation of HCO<sub>3</sub><sup>-</sup> was observed and no dissolution of the skeleton as a buffer was detected by measures of Mg<sup>2+</sup> and Ca<sup>2+</sup> in the coelomic fluid. However, the starfish showed no consequence from the decrease of the coelomic fluid pH as all activities measured (respirometry, adhesion capacities) were not significantly affected by seawater pH decrease. Equilibration of the coelomic pH with the seawater pH was fast (typically less than 24 hours). The former was always lower than the latter. This suggests an accumulation of respiratory CO<sub>2</sub> inside the organism which creates a respiratory acidosis and so a decrease of the pH. In conclusion, it seems that *Asterias rubens* withstands the effects of ocean acidification, at least for short terms (one month). If this is confirmed, the balance between the predator and its prey (*Mytilus edulis*, the blue mussel) may shift with time as many studies have shown deleterious effects on the latter. The rocky intertidal shores may face changes in the coming centuries and move to a new equilibrium.

**Keywords:** ocean acidification; echinoderms; acid-base regulation.

\*These authors have contributed equally to this work.