Tolerance to ocean acidification in sea urchins: are cidaroids better adapted?

Collard Marie[1,2], Frank Dehairs[2] and Philippe Dubois[1]

[1] Laboratoire de Biologie Marine, Université Libre de Bruxelles, 50 avenue F.D. Roosevelt, 1050 Brussels, Belgium
E-mail: marie.collard9@gmail.com

[2] Laboratorium voor Analytische Chemie, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium

The increase in atmospheric CO2 due to anthropogenic activity results in an acidification of the surface waters of the oceans (OA). The impact of these chemical changes depends on the considered organisms, in particular on their ability to regulate the pH of their extracellular fluids. Echinoderms are considered as poor acid-base regulators. However, we found that Euechinoidea (most sea urchins) present a greater buffer capacity than that of seawater unlike Cidaroidea (the other sub-class of sea urchins). This is quite surprising as cidaroids are important components of the deep-sea benthos, which is often below the saturation horizon for calcium carbonate. In the present study, we investigated the effects of decreased seawater pH (8.1 as control, 7.7 and 7.4) on the acid-base balance and buffer capacity in the cidaroid *Eucidaris tribuloides* (tropical subtidal) compared to euechinoids *Tripneustes ventricosus* (tropical subtidal) and *Paracentrotus lividus* (temperate intertidal) in order to determine the response of these taxa in front of future OA. When exposed to reduced seawater pH, both euechinoids accumulated DIC from the surrounding seawater into their coelomic fluid (CF) (as evidenced by δ13C measurements) resulting in an increased buffer capacity of the latter. This led to a compensation of the CF pH which was complete for *T. ventricosus* but only partial for *P. lividus*. On the contrary, *E. tribuloides* showed no changes at all in any of the physiological parameters and the DIC present in the CF probably originates from the metabolism. This difference might be explained by the presence of presumed “respiratory organs” in the latter only.