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Magnesium, calcium, strontium and radiocarbon in the shell of the brachiopod *Pajaudina atlantica*: implications for growth, biomineralisation and palaeo-proxy application

Volker Liebetrau[1], **Hana Jurikova**[1,2], Marcus Gutjahr[1], Daniela Henkel[1], Claas Hiebenthal[1], Stefan Krause[1], and Anton Eisenhauer[1]

[1]GEOMAR Helmholtz Centre for Ocean Research Kiel, Kiel, Germany
[2]GFZ German Research Centre for Geosciences - Helmholtz Centre Potsdam, Potsdam, Germany (jurikova@gfz-potsdam.de)

Brachiopods present a key taxon for Phanerozoic palaeo-climatic and palaeo-environmental reconstructions, owing to their good preservation and abundance in the geological record. Yet to date, only little is known on the mechanisms that control the incorporation of some key elements into their calcitic shells, as well as the mechanisms behind the biomineral formation itself, especially in thecideid brachiopods. To evaluate the distribution and controls on Mg, Ca, and Sr we examined the composition of natural *Pajaudina atlantica* Logan, 1988 (Thecideidae, Brachiopoda) originating from Canary Islands, Spain as well as specimens cultured experimentally under various pH-pCO_2 and temperature conditions [1]. At a high-spatial resolution, electron microprobe analyses (EMP) revealed substantial intrashell and intraspecific Mg and Ca heterogeneities that seemed to be principally linked to growth features and different microstructures rather than changes in temperature. Strontium, on the other hand, appeared uniform across the shell and related to the culture medium or seawater Sr content. After almost two years of culturing, however, the new shell production was only minimal and cryptic, and difficult to evaluate by visual inspections. By combining culture-specific geochemical fingerprints with radiocarbon dating of natural samples, we estimated the growth rates to be on the order of several tens to few hundreds of µm per year, which may potentially suggest a large life span and slow growth of this species, and if true, would certainly make them a highly interesting archive for inferring past ocean variabilities.

[1] Jurikova H., *et al.* (2019) *Geochim. Cosmochim. Acta* **248**, 370–386.