# A simple biomineralization model explains the elemental and isotopic composition of euryhaline ostracods

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Ostracod-calcite elemental ratios (e.g. Mg/Ca and Sr/Ca) and isotopic values ($\delta^{18}O$ and $\delta^{13}C$) are widely used to infer paleoenvironmental changes in marine and terrestrial settings. However, applications of these proxies can be problematic due to unknown environmental and/or biological parameters affecting the elemental partitioning and isotopic fractionation between ostracod calcite and their environments [1]. A recent review on ostracod oxygen isotope systematics [2] suggests ostracod calcification occurs within a closed system and via fast and (near) quantitative precipitation of environmental dissolved inorganic carbon (DIC). This new model suggests variation in environmental [DIC], [Ca] and salinity are expected to impact ostracod calcite growth rates via the effect of these parameters on the calcite saturation state of the ostracod calcifying fluid ($\Omega_{cf}$). Mineral growth rate is known to control elemental partitioning in inorganic carbonates but its effect on ostracod elemental partitioning is unknown.

Here we review previously published geochemical data for the euryhaline and thermotolerant ostracod *Cyprideis* sp. in line with the chemical parameters of the ostracod host waters. We show that *Cyprideis* sp. partition coefficients Kd(Mg) and Kd(Sr) are strongly correlated to modelled ostracod $\Omega_{cf}$, which mainly depends on the environmental [DIC], [Ca] and salinity: $\Omega_{cf} = [DIC].[Ca]/K_{sp}$, with $K_{sp}$ the stochiometric solubility product for calcite. A comparison of *Cyprideis* sp. data with data obtained from other euryhaline ostracod taxa shows a single relationship links ostracod Kd(Mg) and Kd(Sr) values, indicating mineral growth rate is the primary factor controlling elemental partitioning in euryhaline-ostracod calcite. Finally, the absence of relations between the ostracod-water oxygen isotope fractionation and the ostracod Kd(Mg) and Kd(Sr) values, suggests ostracod $\delta^{18}O$ is not significantly affected by mineral growth rate effects.

[1] Dettman and Dwyer (2012) *Dev. in Quaternary Science*
[2] Devriendt et al. (2017) *Geochimica et Cosmochimca Acta*