

## Variations in trace metal and REE concentrations in shells of *Littoraria* (Gastropoda: Littorinidae)

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Paleoclimate and paleotectonic reconstructions rely heavily on the elemental and isotopic compositions of shell-carbonates. Minor and trace elements are incorporated into the carbonate crystal lattice by replacement of calcium during biomineralization. *Littoraria* are diverse and abundant across the Indo-West-Pacific region in mangroves and rocky shores [1] and have numerous shell architectures and foraging patterns, uniquely adapted to the tropical and subtropical habitats [2].

We investigate whether species specific adaptations cause differences in the partitioning of trace elements from seawater in two species of gastropods: *Littoraria Undulata* which live only in rocky shores and *Littoraria Scabra* which live only in mangroves. These species, both with cone lengths between 1 to 2 cm, were captured alive along the 250 km long coastline of Maharashtra in western India along with seawater samples from the same locations. The concentrations of REEs are enriched by 2-3 orders of magnitude in the shells compared to the seawater. La/Yb ratio ranges from 1-5 in rocky shore seawater to 17-48 in the shells of *L. Undulata* and from 3-7 in mangrove seawater to 6-31 in the shells of *L. Scabra*. However, the Sm/Nd ratio in the shells (0.27-0.47) is higher than the ambient seawater (0.1-0.29). Shells of both species show a positive Eu anomaly ( $\text{Eu}/\text{Eu}^* = 1.4-2.3$ ) in contrast to the negative Eu anomaly ( $\text{Eu}/\text{Eu}^* = 0.2-0.7$ ) observed in the seawater samples. The negative Ce anomaly, characteristic of seawater, is however, retained in the shells. Concentrations of Mn and Y in the shells are positively correlated with that in the seawater samples, whereas Sc and Co concentrations are constant in the shells and independent of their concentrations in the seawater samples. This suggests that Sc and Co are regulated by the gastropod biology. Zirconium, Th and U concentrations are found in the ppb range in the seawater samples, but are depleted in the shells to below detection limits (ppt) of our ICPMS, suggesting regulation by gastropod biology and possible accumulation in soft tissue.

[1] Reid et al. (2009) *Mol. Phylogenet. Evol.* **55**,185-201.[2]Reid, D.G (1989)*Phil. Trans. R. Soc. Lond. B* **324**, 1-110.