

## **Disequilibrium oxygen isotope precipitation of land snail shell aragonite: implication for vital effect**

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Biogenic carbonate materials are regarded as archive for paleo-environmental reconstructions. However, the potential vital effects appeared among some genus/species limit their application, while the mechanisms producing this kind of oxygen isotope disequilibrium remain unclear. Particularly, although  $\delta^{18}\text{O}$  signatures preserved in land snail fossils has been widely applied in constraining the past terrestrial environmental conditions, such as temperature, rainfall amount and humidity, whether these shells precipitated in isotope equilibrium or not has never been investigated. According to the cultivation study of land snails, we have observed a good correlation between shell and body water  $\delta^{18}\text{O}$  values, with a similar slope of  $\sim 0.7$  at each temperature, deviated from the isotopic-equilibrium precipitation (slope=1). By applying an empirical calibration of biogenic aragonite, calculated equilibrium shell  $\delta^{18}\text{O}$  values present a good correlation to the observed shell  $\delta^{18}\text{O}$  values, with a slope around 0.7, for both cultivated and natural land snails, indicating that the land snail shell precipitated in  $\delta^{18}\text{O}$  disequilibrium. This kind of disequilibrium correlations is also existing in other cultured water taxa, such as ostracod, coccolith and dinoflagellate, with the species-specific slope. We will discuss the potential mechanism producing this kind of disequilibrium  $\delta^{18}\text{O}$  values and its implication to the paleo-environmental reconstructions.