Carbon stable isotope composition in modern snail shell aragonite and its environmental and climatic implications

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We combined the field collections with the laboratory cultured modern snails, to quantitatively explore the environmental and climatic implications of $\delta^{13}C$ in the land snail shell aragonite. Under laboratory condition, the cultured experiment on the snail *Achatina* cf. *fulica* was carried out. The $\delta^{13}C$ fractionation between snail shell and the diet is 14.7‰±0.7‰. The carbon isotopic compositions of modern snail shells exhibit negative correlations with the average mean precipitation and the mean temperature during the snail living season. Contrarily, the $\delta^{13}C$ of shells shows positive correlation with the elevation and the latitude. The environmental factors impacting on $\delta^{13}C$ of snail shells via regulating and altering the local vegetation types or carbon isotopic compositions. The precipitation and temperature during the snail living season are the fundamental factors that affect and may alter the distribution pattern of the vegetation with different photo-synthetic styles in nature. Finally, an empirical equation between the land shell $\delta^{13}C$ values and annual average precipitation (P) and temperature (T) can be derived as:

$\delta^{13}C_{snail\ shell}=10.33–7.65\log T–3.89\log P$ (R=0.764, n=18, p<0.05)