Cuttlebone elemental and stable isotopic signatures as temperature proxy for cuttlefish (Cephalopoda, Sepiidae)

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Seasonal temperature variation has the potential to dramatically affect the growth patterns and population structures of growing cephalopods. In particular, temperature significantly impacts the size that cephalopods can attain during the exponential growth phase. Elemental and stable isotopic ratios in marine calcium carbonate are commonly used as proxies for reconstructing animal's life history and also for past climate changes. However, validation experiments on temperature effect on microchemistry of cuttlefish endoskeleton, such as cuttlebone are still lacking. Present study design a controlled experiment by rearing hatchling cuttlefish of Sepia pharaonis at three different temperatures (20, 25, 30 ^{o}C) for one month, and analyzing stable isotopic ratio and trace element concentration in rearing water and cuttlebones, in order to find a suitable temperature proxy. Results showed that Li/Ca, Mg/Ca and $\delta^{13}C$ was negatively related were negatively linear related to temperature in cuttlebone. The combination of spatially resolved microchemical analysis and growth increment interpretation could be used to reconstruct life histories from wild cephalopod population in future.