



## **$^{18}\text{O}$ of mollusc shell carbonate as a proxy for summer river water temperature: Reconstructing British interglacial climates over the past 800,000 years**

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A range of carbonates exist in terrestrial and freshwater environments that may act as the basis for palaeo-temperature estimation. In many regions, such as Europe, the potential of using freshwater molluscs as a basis for reconstructing Quaternary environments is highly desirable because; 1) they are abundant in a wide range of deposits (interglacial, interstadial and stadial), and 2) isotopic analysis may allow climates to be reconstructed from a small number of individuals rather than extensive assemblages. Work in southern England in monitored river systems has shown that the shells of modern molluscs (*Valavata piscinalis*, *Bithynia tentaculata*) form in isotopic equilibrium with river waters during the summer months. This is true for both large river systems such as the Thames and smaller tributary systems and suggests that this proxy could allow the reconstruction of past summer temperatures.

The potential of this technique for reconstructing relative temperatures is investigated by studying fossil shell assemblages from 6 of the last 8 interglacials over the last 800,000 years. Analysed samples all come from riverine deposits in southern and eastern England and are chosen from deposits which have known quantified estimates of summer temperatures from a number of biological proxies (beetles, plant macrofossils, vertebrates). There is a general consistency of  $^{18}\text{O}$  values from shell assemblages from all the interglacial sites, however, a large deviation from modern shell  $^{18}\text{O}$  values is found within assemblages from interglacial deposits which record summer temperatures that are significantly higher (3-6°C warmer) than temperatures in southern day England. The technique, therefore, allows a potential method of identifying periods of enhanced warmth in the Quaternary record. The relationship between shell  $^{18}\text{O}$  and water temperature is discussed and methods of quantification are proposed.