

Climatic and ecological constrains using stable isotope chemistry of *Megathiris* *detruncata*

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The modern brachiopod species *Megathiris detruncata* has a long fossil record in Europe and its earliest representative is known from the Eocene. The taxon, therefore, could provide a long-term archive to trace variation in climate and/or changes in habitat conditions during the Cenozoic. In order to test these potentials, measurements of stable carbon and oxygen isotopic compositions were carried out on several specimens.

The investigated samples derived from 49 locations of 14 countries and their age ranges from the Eocene to present. The modern specimens are represented by two regions, the Mediterranean and the Atlantic. These sites yielded the same average $\delta^{13}\text{C}$ value of 2.2‰, and very similar average $\delta^{18}\text{O}$ values of $1.7 \pm 0.4\text{‰}$ (n=12) and $1.5 \pm 0.7\text{‰}$ (n=9), respectively. These data could indicate similar ecological conditions for the living brachiopods. The somewhat higher $\delta^{18}\text{O}$ values can be linked to heavier $\delta^{18}\text{O}_{\text{seawater}}$ in the Mediterranean, while the wider data spread in the Atlantic localities reflect broader range in habitat depth.

The isotopic data from the modern sites are used as a base-line for comparison to values from other epochs. Many fossil samples yielded lower isotopic values than the modern specimens. The offsets can be explained by two major factors (1) climatic (i.e., different T and/or $\delta^{18}\text{O}_{\text{seawater}}$ at the time), and (2) alteration of the original in-vivo isotopic values (i.e., diagenesis). Samples with both much lower $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values than the modern specimens are considered as altered, which is supported by macroscopic and SEM observations of the shells (i.e., recrystallization). Based on the well-preserved specimens, preliminary interpretations of the epoch-average $\delta^{18}\text{O}$ values with matched global $\delta^{18}\text{O}_{\text{seawater}}$ data indicate that populations of *M. detruncata* lived in warmer temperature during the Eocene and middle-late Miocene. However, similar environmental temperature range to the modern data are recorded for the early Miocene and Pleistocene.

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