**Retrotapes exalbidus from southern South America: Are fossil shells reliable proxy archives for Holocene climate changes?**

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R1 (specimen 1; ca. 3839 years BP)  
R3 (specimen 3; ca. 431 years BP)  
R4 (specimen 4; ca. 5190 years BP)

**Introduction**

In southern South America little is known about the biotic response of marine individual species to large scale climate variability along the Holocene. Fossil shells of the aragonitic bivalve *Retrotapes exalbidus* (previously called *Eurhomalea*) offer the possibility to investigate climate variability in the Beagle Channel and past seasonal dynamics of sea water temperature during the mid-to-late Holocene. This selection is based on two reasons: extinct *R. exalbidus* preserves annual increments in the outer shell layer (Lomovasky *et al.*, 2002); and, although not very common as other venerids, this species is well preserved in different Holocene marine outcrops along the channel.

**Material and methods**

Holocene fossil shells of *R. exalbidus* were sectioned, polished, photographed and measured, and after examination three of them were selected for chemical sampling. In each case, one-half of the shell was used to resolve the annual growth bands and the other half was used for stable isotopes sampling. In addition, a fragment of each shell was used to C-14 dating performed in the Poznán Radiocarbon Laboratory with the accelerator mass spectrometry (AMS) technique. Ontogenetic ages were measured by counting the annual growth increments under a stereo microscope. For the reconstruction of palaeotemperatures from shell oxygen isotopes we used an equation for aragonitic shells taking into account sea surface temperature (SST) and salinity (SSS) at the Beagle Channel (Colonese *et al.*, 2012; Yan *et al.*, 2012).

**Results**

Our results show differences between the three specimens. In the ontogenetic oldest individual (14 years), which gave a calibrated mean value age of 3839 BP, the δ18O values ranged from 1.53‰ to −1.16‰. The two other specimens (8 years), with calibrated mean ages of 5190 BP and 431 BP, gave δ18O values from 1.55‰ to 0.44‰ in the oldest specimen, and from 1.29‰ to 0.72‰, in the youngest one. Besides, we found variations in annual growth increment widths at different radiocarbon ages, probably correlated with environmental changes over the mid-to-late Holocene. We correlated the most positive δ18O values with winter and the most negative δ18O with summer. In addition, the summer values around 3800 yr BP are more negative than around 5000 years or 500 years BP.

**Conclusions**

This sclerochronological study of the growth patterns and the oxygen isotope ratios in fossil *R. exalbidus* shells demonstrated that this species clearly exhibited annual cycles showing seasonality patterns through the mid-to-late Holocene, providing an opportunity to analyze intra-seasonal time scales in the fossil record.

**References**

Colonese *et al.*, 2002; *Archaeological Science* 39, 2735-2746; Gordillo *et al.*, 2008; *Scientia Montis 69* (Suppl. 23), 327-348; Lomovasky *et al.*, 2012; *J. Sea Research* 68, 209-216; Oleh *et al.*, 2018; *Quaternary of S. America and Ant.* 4, 37-58; Sciolla *et al.*, 2018. Shells of *Eurhomalea* from 22,000 to 10,000 BP in the Beagle Channel. *Archaeological Science* 39, 2735-2746; Sciolla *et al.*, 2018. Shells of *Eurhomalea* from 22,000 to 10,000 BP in the Beagle Channel.

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