



Palaeoenvironmental distribution of *Terebratula* (*Brachiopoda*) (early Pliocene, SE Spain)

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Today only about 400 brachiopod species exist, among which terebratulids are by far the most successful clade. The Cenozoic-Pleistocene genus *Terebratula* represents an exception to the Post-Permian trend in brachiopod retreat to cryptic and offshore habitats. It was very abundant in warm-temperate to subtropical shallow-water environments in the Mediterranean and Paratethys realms, despite the general dominance of bivalves and the pervasive bioturbation and predation pressure during the Neogene. However, *Terebratula* went extinct in the Calabrian (Pleistocene). Understanding the causes that drove this genus to extinction requires a better knowledge of the optimal environmental conditions during the heyday of *Terebratula*, which are currently poorly known. The aim of our study is to contribute to the knowledge about the environmental distribution of *Terebratula*. The Águilas Basin (SE Spain) is an ideal study area because *Terebratula* shell beds occur there cyclically in early Pliocene (Zanclean, MPI3 biozone) deposits. We studied 26 samples from the Cabezo Alto (CA) section, which has a continuous representation of the main facies in the study area and includes two *Terebratula* pavements. From the samples, assemblages of planktonic and benthic foraminifera were analyzed as palaeoecological proxies. Geochemical proxies include data from X-ray fluorescence from bulk sediment samples and oxygen isotopes from *Terebratula* shells. The CA section was used as a template to analyze three additional pavements and a spectacular *Terebratula* biostrome, all from the same sequence. Our results suggest that *Terebratula* preferred low sedimentation rates, relatively oligotrophic, well-oxygenated conditions and moderate to strong hydrodynamics at water depths of about 60 – 100 m. Oxygen isotopes suggest water temperatures of 17 to 20°C (assuming the Águilas Basin sea water $\delta^{18}\text{O} = 1.5\text{‰}$ VSMOW in the late Zanclean). Calibration of Axis 1 scores from Detrended Correspondence Analysis of our planktonic foraminifera dataset with extant samples from the literature even suggests paleo-sea surface temperatures ranging from $\sim 20^\circ$ to 25°C. In the Águilas Basin, the terebratulid concentrations occur consistently at the toset of subaqueous delta-scale clinofolds, with decreasing abundance of individuals proximally and distally from this subenvironment.