

## Microfossils in ancient ceramics: tracing the firing temperature and the raw materials

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When studying archaeoceramics, several analytical methods are usually involved. Most basic information on composition comes from polarized light optical microscopy (OM), X-ray powder diffraction, scanning electron microscopy, electron microprobe analysis (EMPA) and inductively coupled plasma mass spectrometry. Other complementary methods, e.g., Fourier transform infrared spectroscopy, electron paramagnetic resonance, and X-ray fluorescence, were used as well. The last decade witnessed a new approach of the archaeo-ceramic, connected to micropalaeontology (Quinn and Day, 2007; Quinn, 2008; Wilkinson *et al.*, 2017). It proved to be an important and reliable tool in studying archaeoceramics as it may offer important information not only on clayey raw materials used, but also on the firing temperature. Here we apply the micropalaeontological methods to investigate the provenance of 4<sup>th</sup>–2<sup>nd</sup> century B.C.E. terracotta figurines found near Durres (Albania). The study was performed on thin sections for OM and polished thin sections for EMPA.

The area consists of Miocene to Pliocene shales and mudstones, and Late Pleistocene to Early Holocene alluvial clayey deposits which might provide ceramic raw materials. The ceramic body of the terracotta figurines consists of an illite-like matrix, displaying a low anisotropy. There are only few small fragments of quartz, feldspars, muscovite, chloritized biotite and heavy minerals. Among lithoclasts, quartzite and basalt predominate. Framboidal pyrite and slightly thermally decomposed calcareous foraminifera tests are peculiar constituents. The latter still preserve the shape and internal details which allow their determination. Abundant planktonic species such as *Orbulina* spp. and *Globigerina* spp. have been identified. Firing in an oxidizing atmosphere and a temperature at over 850 °C but below 900 °C, is supported by the reddish colour of the sherd, the low birefringent matrix and the weak decomposition of the calcareous foraminifera tests.

To find whether the terracotta figurines were produced locally or have been imported, clayey rocks suitable for ceramics were micropaleontologically investigated. The Miocene to Pliocene shales and mudstones cropping out north-east of the site contain foraminifers similar to those found in the terracotta ceramic body. Even more, the shales are host of framboidal pyrite. Therefore, we may consider that these rocks were used as raw materials to produce locally the terracotta figurines.

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