

X-ray imaging of internal organs of early Miocene freshwater ostracods (Crustacea) from the Riversleigh area in Queensland, Australia

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Ostracods (seed shrimps) sampled from the limestone and guano deposit of one of more than 300 fossil sites of the Riversleigh Station in Queensland, Australia, were first reported in 1989 [1], but not investigated in detail until recently. A closer light- and scanning electron microscopic study of this Miocene ostracod fauna revealed the presence of visible soft part preservation in 26 of about 800 specimens recovered. While some specimens are represented by valves only, with preserved, originally uncalcified inner lamellae, others show parts of appendages retained in their original position, with setae and setules present and with high detail in surface structure [2]

To identify possible preservation of internal structures in ostracod specimens from this fauna, propagation phase contrast X-ray synchrotron microtomography has been undertaken on beamline ID19 of the European Synchrotron Radiation Facility. Sixty-seven specimens were tomographed at a 0.56 µm voxel size, with 29 specimens revealing preserved inner anatomical features. Two specimens featuring details of their reproductive system were subjected to nanotomography with 25 nm voxel size at the nano-imaging station ID22NI. Here, preservation of highest fidelity down to the subcellular level was made visible.

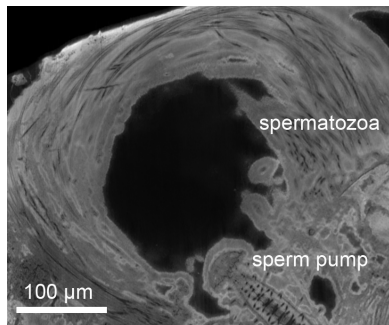


Figure 1: Propagation phase contrast X-ray synchrotron microtomography of a ca 17 Million year-old male ostracod of the species *Heterocypris collaris* (ESRF beamline ID 19).

The early Miocene deposit of Bitesantennary Site is known for its exceptionally preserved and diverse bat fauna [3]. The locality, only approximately 5m² in size, has been interpreted as a former cave area, with illuminated groundwater-fed rock pools inhabited by ostracods and other freshwater fauna and flora. Bats roosting in this cave provided masses of guano, which promoted phosphatization of embedded microfaunas, leading to the here described exceptional preservation of internal structures in ostracods.

References

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