

TITLE: Arthropod fossil preservation: experimental taphonomy approaches

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Context

This project examines the taphonomic processes linked to the exceptional preservation of fossil arthropods with soft tissues at the early Ordovician Fezouata Biota locality (Van Roy *et al.* 2010; 2015). After death, an organism experiences decay before being buried and fossilised, and experimental taphonomy approaches examine how different conditions effect the decay process. The goal is to identify the order in which anatomical structures decay, and this can be used as a guide to interpreting soft-bodied fossils, such as those found in the Fezouata Biota. When initially developed for vertebrates, this approach revealed that the most informative anatomical features are often the ones that decay first (Sansom *et al.* 2010). Vertebrates are rare at the Fezouata Biota, but arthropods are abundant. Arthropods have an external exoskeleton, whereas vertebrate has an internal skeleton, so it is unclear if the model can be applied to Fezouata Biota arthropods. This project will explore this issue by combining information from fossils and decay experiments on arthropods.

Objectives and Methods

The project will consist of running a decay experiment on modern crustacean arthropods, under the following conditions: oxygenated ; anoxic ; and anoxic + antimicrobial conditions. Specimens will be examined periodically during decay to identify the order in which major anatomical features rot away. In parallel, a database will be generated from the University of Lausanne's Fezouata Biota fossil collection. Fossil arthropod specimens will be examined to make a list of the anatomical features preserved at this site. This list will be compared to the decay order obtained from the arthropod decay experiments, in order to quantify the amount of decay seen at the Fezouata Biota. This project combines laboratory experiments on modern animals, paleontological data collection on fossil arthropods, and quantitative methods (relatively simple statistical analyses).

Literature

Van Roy, P., *et al.* 2010. Ordovician faunas of Burgess Shale type. *Nature*, 465, 215-218.
Van Roy, P., Briggs, D.E.G., & Gaines, R.R. 2015. The Fezouata fossils of Morocco: an extraordinary record of marine life in the Early Ordovician. *Journal of the Geological Society*, 172, 541-549.
Sansom, R.S., Gabbott, S.E., & Purnell, M.A. 2010. Non-random decay of chordate characters causes bias in fossil interpretation. *Nature*, 463, 797-800.



WEB sites

<https://wp.unil.ch/paleo>

Choice of orientation : (supprimer les orientations qui ne conviendraient pas)

1) Sedimentary, Environmental and Reservoir Geology