

Preservation of 3D Cambrian arthropods

Contact persons

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Context

The Orsten Biota of Sweden is an upper Cambrian fossil lagerstätte famous for preserving complete and exquisitely detailed external surfaces of larval and minute arthropods in 3D (Waloszek 2003). These fossils are important for informing on early arthropod development and assemblage dynamics in Cambrian ecosystems. However, the details of the preservation processes associated with these soft-bodied arthropods remain incompletely understood (Maas et al. 2006, Eriksson et al. 2012). The aim of this project is to examine the tiny bivalved arthropods, called phosphatocopids, from the Orsten Biota of Sweden, in the context of reconstructing their preservational pathways. A collection of already prepared samples is available for the project, and preliminary analyses have revealed the possible presence of bacterial and microbial films, which may have assisted with the preservation of these fossils. For this project, the student will collect data on soft-part anatomy and associated elemental chemistry on samples ranging from very complete individuals to poorly preserved/incomplete specimens. The quality of preservation will be linked to specimen size and position of the valves, to build up a more complete picture of the preservation pathways of these important arthropod fossils

Aims and Methods

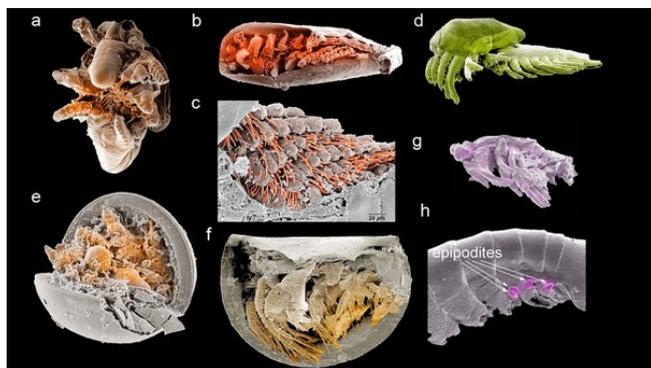
Specimens are available that have already been collected, extracted by acid digestion, and mounted on an SEM stub. The student will work with approximately 40 phosphatocopine specimens, imaging them under the SEM in details looking for microfabrics and microbial structures that illuminate the preservational pathways. The student will also make a database of measurements and coded characters on the entire collection and run correlation statistics to identify if preservation quality is link to size, developmental stage or degree of opening of the valves, or with the presence / absence of microbial indicators. EDX elemental analysis can also be undertaken to examine the chemistry of these fossils. Further analyses could be initiated, depending on the interest of the student

References

Eriksson, M. E., Terfelt, F., Elofsson, R., & Marone, F. (2012). Internal Soft-Tissue Anatomy of Cambrian 'Orsten' Arthropods as Revealed by Synchrotron X-Ray Tomographic Microscopy. *PLOS ONE*, 7 (8), e42582. <https://doi.org/10.1371/journal.pone.0042582>

Maas, A., Braun, A., Dong, X.-P., Donoghue, P. C. J., Müller, K. J., Olempska, E., Repetski, J. E., Siveter, D. J., Stein, M., & Waloszek, D. (2006). The 'Orsten' | More than a Cambrian Konservat-Lagerstätte yielding exceptional preservation. *Palaeoworld*, 15 (3), 266-282. <https://doi.org/10.1016/j.palwor.2006.10.005>

Waloszek, D. (2003). The 'Orsten' window | a three-dimensionally preserved Upper Cambrian meiofauna and its contribution to our understanding of the evolution of Arthropoda. *Paleontological Research*, 7 (1), 71-88. <https://doi.org/10.2517/prpsj.7.71>



Website

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

Prerequisite