Understanding spatial and temporal trends in ichnofossil communities and diversity in Baltic Early Paleozoic

Summary

Trace fossils are valuable tools for reconstructing past environments and benthic communities. This PhD project focuses on Paleozoic trace fossils in the Baltoscandian basin, which are yet poorly documented and understood. The project will advance ichnotaxonomic research, establish a regional ichnofossils database, and analyse the spatial and temporal trends in ichnofossil diversity and disparity. It is expected that comparison with climate reconstructions, environmental proxy indicators and shelly fossil groups allows identifying links between the evolving trace fossil communities and environmental conditions. The successful candidate will be employed as an early-stage researcher at TalTech with a net income starting from €1200.

Research field:	Earth sciences
Supervisors:	Prof. Dr. Olle Hints Dr. Ursula Toom
Availability:	This position is available.
Offered by:	School of Science Department of Geology
Application deadline:	Applications are accepted between June 01, 2022 00:00 and June 30, 2022 23:59 (Europe/Zurich)

Description

Description of the research

Trace fossils record biological activity and are valuable tools for reconstructing past sedimentary environments. Unfortunately, a relatively small number of ichnological studies are devoted to the Lower Palaeozoic carbonate environments worldwide. Trace fossils in shallow-marine carbonates are controlled by the faunal composition and distribution, sediment characteristics and early diagenetic processes.

This PhD project aims to fill the existing gaps in ichnofossil taxonomy by studying and describing new taxa and complementing the regional ichnofossil database. Based on the new and updated data, the project will examine how the regional climate, seawater chemistry, oxygen availability, sea-level changes, availability of nutrients, bioproductivity, and sedimentation rates supported or affected ichnodiversity and ichnodisparity in the shallow-marine environments of the Baltoscandian palaeobasin.

The project will address the following research questions: (1) Are trace fossils and shelly fossils diversity curves similar in the region; (2) Did the input of nutrients from coastal upwelling and pyroclastic material support increased ichnodiversity and ichnodiversity; (3) Is there a correlation between sedimentation rates and ichnodiversity and ichnodisparity; (4) To what extent the distribution of trace fossils was affected by the evolving climate in Baltica. Through these and other ideas, the project will contribute to a better understanding of the evolution of the biosphere and trace fossils of shallow-marine carbonate environments during the Early Paleozoic.

Supervisors:

Main supervisor: Dr. Ursula Toom
Co-supervisor: Prof. Dr. Olle Hints

Responsibilities

- Taking part in fieldwork, collecting fossils and documenting features of outcrops and drill cores;
- Using lab facilities, working with various research equipment and specialised software;
- Describing fossils and conducting taxonomic work, compiling and analysing research data;
- Presenting the results in seminars, workshops and international conferences;
- Writing and publishing articles in leading geoscience journals (minimum of three papers in four years);

- Attending PhD courses, participating in teaching and supervising undergraduate students;

Requirements

The successful applicant should have:

- Background in geosciences, particularly palaeontology, and some experience with trace fossils, field experience and understanding of carbonate sedimentology;
- Capacity to work both as an independent researcher and as a team member; readiness to collaborate with other students and researchers at TalTech, and partner institutions worldwide;
- Fluent English, both verbal and written.

The following would be beneficial:

- Previous scientific publications;
- Skills with analytical tools used in geosciences; experiences with X-ray computed tomography (CT), and reconstructing fossils in 3D would be especially valuable;
- Good knowledge of Paleozoic fossils, geology and stratigraphy;
- Previous hands-on experiences with geological and paleontological collections;
- Interest in data management, databases and data analysis tools.

Along with the motivation letter, the candidates should submit their MSc thesis, and any other proof of previous independent research and writing skills are welcome.

We offer

- Modern working environment, lab facilities and friendly research group;
- Opportunities for conference visits, research stays and networking with globally leading universities and research centres in the field of trace fossil research;
- Employment as an early-stage researcher, with net income starting from EUR 1200 (increase possible based on student's performance);
- Developing student's transferable skills during PhD studies and research.

About the Department of Geology and bedrock geology research group

The Department of Geology is the centre of expertise in geology, mineral resources, and mining at TalTech. Our researchers focus on bedrock geology, paleoenvironments, mineral resources, mining engineering and circular economy. Bedrock geology has been among the key study fields in the Department of Geology since the 1950s. The research group of bedrock geology holds competencies in regional geology, sedimentary rocks, stratigraphy and palaeontology of Estonia and beyond. The main work of the group is aiming at a better understanding of the interactions between geo- and biosphere processes in deep time. The group's main research directions are paleoenvironment and paleoclimate reconstructions using multiple proxy indicators, paleobiodiversity dynamics, mass extinctions and their links with climate and environmental changes, and high-resolution bio- and chemostratigraphy.

Additional information

For further information, please contact Dr Ursula Toom (ursula.toom@taltech.ee) and Prof Olle Hints (olle.hints@taltech.ee).

To get more information or to apply online, visit https://taltech.glowbase.com/positions/515 or scan the the code on the left with your smartphone.