Thematic Network on Arctic Marine Biodiversity (former Microtomography of Arctic Marine Organisms)

hosted by UiT Arctic University of Norway, Norway

Lead: Andreas Altenburger

Activities 2023

Research:

- Segmentation of scan data in VGStudio MAX
- Application to get instrumentation to use in the TN (Horizon)
- Sample collection and preparation
- Scanning of additional specimens of Arctic marine invertebrates (brachiopods)

Publication:

- Manuscript writing and scientific publication https://doi.org/10.1007/s00435-023-00617-4; https://www.uarctic.org/news/2023/9/publication-geometric-morphometrics-of-macro-and-meiofaunal-priapulid-pharyngeal-teeth-provides-a-proxy-for-studying-cambrian-tooth-taxa/

Outreach:

- Presentation of the Network at Fram talks in Tromsø
- Participation and presentation of the TN at the UArctic Assembly
- UArtic video interview: https://vimeo.com/903994952

A request for changing the name of the Thematic Network on Microtomography of Arctic Marine Organisms to Arctic Marine Biodiversity was made on January 22, 2024. The name change was accepted by the Thematic Networks Leadership team on February 18.

The name of thematic network was changed to better reflect the scope and aspirations of the efforts of the network.

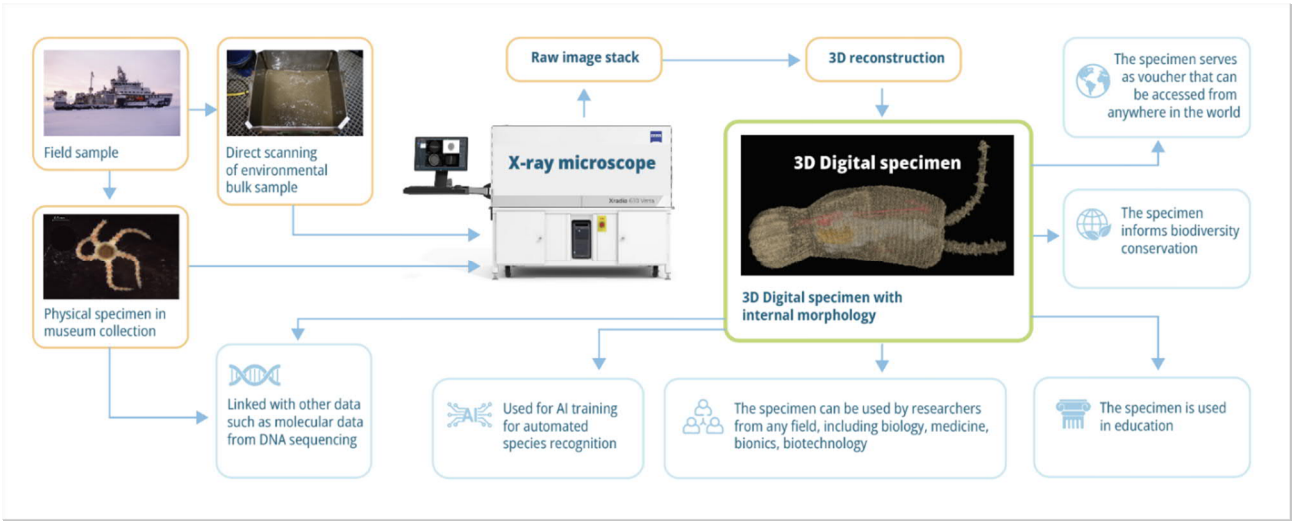
“The original name was conceived to highlight our innovative approach to preserving Arctic marine specimens through X-ray microtomography, which remains a cornerstone of our work. However, as our network has evolved, so too has the breadth and depth of our research and goals. The new name, Thematic Network on Arctic Marine Biodiversity, encompasses not only our ongoing commitment to generate digital twins of arctic marine organisms, but also our broader mission to understand and ultimately protect the rich and diverse marine life of the Arctic.”

Conducted and planned activities 2024:

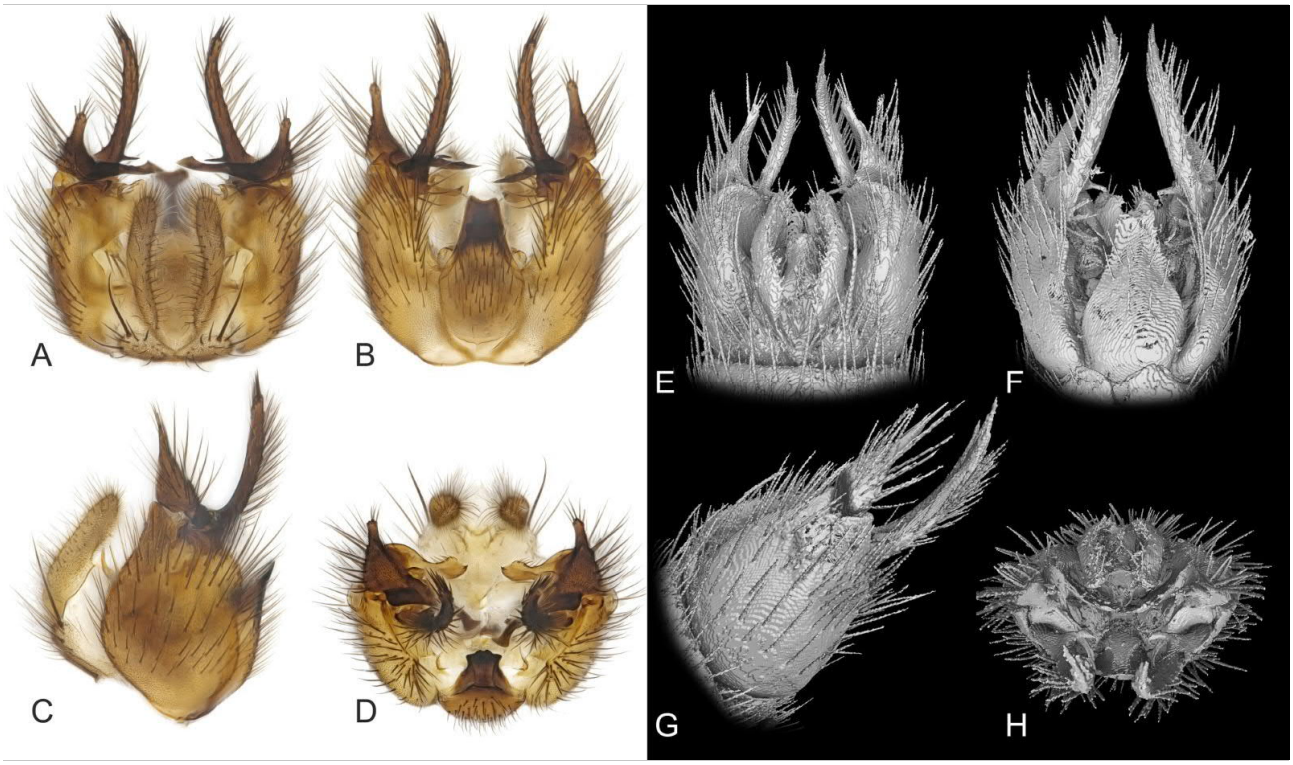
The UArctic Thematic Network on Arctic Marine Biodiversity is creating a 'digital collection' of Arctic fauna using X-ray microtomography to preserve species threatened by climate change and to facilitate open science. This initiative allows for the detailed documentation of fragile marine life, supports the description of new species, and enhances public education through digital and 3D-printed museum exhibits.

The network, which has recently undergone a name change to better reflect its mission, will launch a project on Scalidophora in 2024 and has expanded its efforts with additional organism scannings in Luleå, Sweden. A collaborative EU Horizon application, involving 19 European partners including UArctic, aims to further support research and conservation activities.

A notable 2023 publication by Joel Vikberg Wernström and colleagues demonstrates the network's research capabilities, using geometric morphometrics to study priapulid pharyngeal teeth as a proxy for Cambrian "tooth taxa.



The Digital Extended Specimen enables global access and the integration of diverse data types associated with a single physical specimen.



*Examples of light microscope images of the terminalia of a fungus gnat (*Exechiopsis distendens*) macerated and submerged in glycerol viewed from four angles (A-D) and another terminalia of the same species rendered from a XRM test scan of an unmounted dry, pinned insect (E-H). The terminalia at the posterior end of the insect's abdomen is about 0.5 mm wide. Images by Jostein Kjærandsen & Joel Wernström, UiT, unpublished.*

Those are not marine, but we wanted to test if it works for insects as well together with a colleague of mine. On the left side are light microscopy images (the traditional way). On the right hand side are XRM images that allow a 3D representation of the same structures (insect terminalia).

XRM images of the kinorhynch Echinoderes drogoni. *The specimen is around 380 µm long. DIGIBANK will develop methods to improve the scan quality and utility of XRM for scientific specimens. Renders by Joel V. Wernström, UiT, unpublished.*