

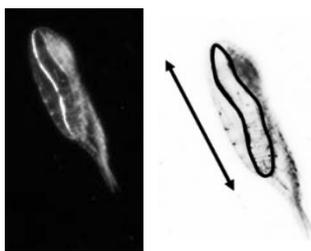
Master project in Marine Ecology starting autumn 2019:

"Lipids in high Arctic copepods determined from *in situ* images collected with a Video Plankton Recorder"

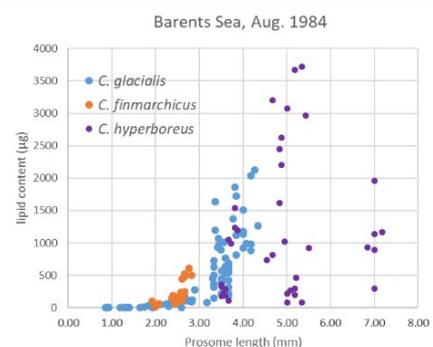
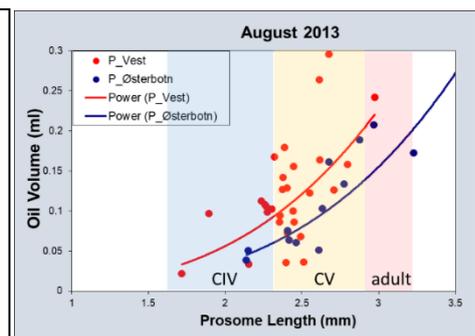
Supervisor: Fredrika Norrbin, Arctic Marine and Systems Ecology, AMB, UiT

I am looking for a MSc student for this project, which involves analysing **lipids in *Calanus*** from images collected in the sea using a **Video Plankton Recorder (VPR)** in the Barents Sea and Polar Basin and NE Greenland. This will give both lipid values, and depth and environmental information for the observed copepods. The lipid content in copepods collected using a plankton net at the same stations will also be analysed from **photographs**, and with chemical analysis of **total lipid** in single individuals. For each individual, the antennae will be removed for later DNA-analysis in order to determine the exact species of *Calanus* in the sample.

Lipid (primarily wax ester) is stored by many copepods towards the end of the season in order to survive winter, and especially to have the energy to produce eggs after the winter starvation period. The content in an individual reflects the feeding conditions at a certain locality and the feeding history of the animal. Larger species can hold more lipid in their body, which is why there is a worry that climate change may cause part of the large-bodied *Calanus* populations in the Arctic to be replaced with the smaller-sized *C. finmarchicus*. This may affect the food web and especially how predators will be able to utilize the zooplankton resource in the future. Being able to study lipid content in copepods remotely at their natural depth can contribute to the understanding of these environmental effects.



Figures. The dark-field image to the left is from the VPR, and the right-hand image shows how the contour of the lipid sac and the length can be measured. The graph on the top right shows how oil-volume generally scales with size of the copepods (data from Porsangerfjord, N Norway). The graph also shows how individuals from two different stations may have different content of lipid. The bottom right graphs shows lipid values from three species of *Calanus* in the Barents Sea. Even within the same species, lipid varies between individuals from different stations with different nutritious history.



The total lipid and DNA project will take place in collaboration with PhD candidate Jon Brage Svenning (NFH, UiT) and Postdoc Marvin Choquet (Univ. Nord, Bodø), respectively.

What will you do?

The first cruise (to the Barents Sea) will take place in July 2019, and regrettably there is no space for extra participants on the ship.

- The second cruise (to NE Greenland fjords) is scheduled for August 2020, and the MSc candidate is welcome to join.
- There are funds available to travel to Bodø for the DNA analyses in autumn 2019.
- The analyses of the VPR images will take place at AMB, under guidance from me.
- The results will be both a test of a new method and be of ecological interest!

What will you learn?

You will get some knowledge of several methods used within marine ecology studies:

- You will learn to operate the VPR and extract data and pictures, as well as analyse the results. This will give you some skills useful for working with advanced instrumentation.
- Most of our processing is done in Matlab, which is a commercial programming package similar to R, but somewhat different. Whether or not you already are familiar with R, you will learn to work with computer data processing.
- You will get some insight into biochemical analyses and simple DNA analyses.

Interested?

Contact me at fredrika.norrbin@uit.no

Disclaimer: This project is separate from the Nansen Legacy program, but the topic is of interest also for this research program.