

Master thesis project:

‘Determining chemical stress effects in single phytoplankton cells’

Master-thesis background

Phytoplankton, oceanic photosynthetic unicells, contribute approximately 50% of the world’s primary production and form the basis of all aquatic food webs. The survival and growth of these vital ecosystem members is easily disturbed by external stress such as exposure to chemical pollutants (e.g. herbicides or oil spills). Given their significance, toxicologists routinely assess the effects of chemicals on phytoplankton; however, this is commonly done by measuring the response within bulk populations of cells, which neglects that individual cells are (*phenotypically*) different and have varying abilities to withstand stress. In this project, the student will investigate the heterogeneity of stress responses within single cells of phytoplankton via cutting-edge, high-throughput experiments. The data gained from this project will significantly advance our ability to predict chemical risks for the most basal members of aquatic ecosystems.

Master-thesis project description and aims

In this master thesis, you will make use of available hydrogel microfluidic devices to immobilize single cells of phytoplankton. You will learn how to make these devices and subsequently expose individual cells to defined gradients of chemicals. After training in automated microscopy, you will measure the effects of chemical exposure via imaging and analyze the resulting (image) data.

Methods

In this project, you will learn the following methods:

- Basic microbiology
- Microfluidic device construction and operation
- High-throughput automated fluorescence microscopy
- Analyzing single-cell growth and fluorescence in large image datasets

You should be a master-level student with some experience in e.g. image analysis, microscopy and/or phytoplankton and a keen interest for interdisciplinary science.

Students from all walks of life and backgrounds are welcome to apply!

Have a look at what we are up to: <https://behrendtlab.com/>

Interested? Please contact Lars Behrendt, lars.behrendt@scilifelab.uu.se. The scope of the project is a 30-45 hp master thesis