Ecotoxicology-on-a-chip: single cell growth under chemical perturbations

Behrendt lab:
https://www.iob.uu.se/research/environmental-toxicology/research-groups/ecological-toxicology/

Background

Environmental pollution can affect the growth and metabolism of exposed organisms. In order to assess the severity of chemical pollution, Ecotoxicologists typically measure growth and metabolic effects in complex multicellular organisms with slow generation times (‘indicator species’). While this approach is characterized by a high fidelity to detect the adversity of pollutants in the laboratory, it is also expensive and time-consuming. Due to the latter, managerial decisions on the remediation of pollution thus typically only occurs long after pollutant effects have been measured. This disconnect, from the time of exposure to actions taken, is a major problem for environmental health, drinking water safety and industry.

Project description and aims

In this master thesis, you will make use of the rapid growth of bacteria in state-of-the-art microfluidic devices with the aim to accelerate the detection of adverse chemicals in aqueous solutions. The master thesis revolves around the operation of existing microfluidic devices (‘Mother machines’1) and in analyzing the resulting image data for chemical effects on single-cell growth (e.g., via ‘DELTA’2).

Methods

In this project, you will use the following methods:

- Basic Microbiology
- Microfluidics
- High-throughput automated microscopy
- Tracking and quantifying single-cell growth in large image datasets

You should be a master-level student with experience in automated image analysis and a keen interest for interdisciplinary science. Students from all walks of life and backgrounds are welcome to apply!

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