Proposal for a Master thesis project (30–60 hp)

Genotoxicity and embryo malformations in amphipods exposed to contaminated sediments

Aim
To evaluate applicability of genotoxicity assays in amphipods exposed to chemical stressors

Project description
To assess biological effects of environmental contaminants, an approach that combines various toxicological endpoints is needed. The amphipods are benthic animals that are currently used in the marine monitoring as sentinel species, and there is an on-going evaluation of the embryo aberration analysis as a tool for developmental toxicity diagnostics when evaluating biological effects of contaminants. This evaluation is a part of current efforts to develop indicators of environmental status for implementation of Marine Strategy Framework Directive conducted by HELCOM and Swedish EPA.

In this project, we will evaluate genotoxicity markers in laboratory experiments by exposing amphipods to chemicals with known genotoxic properties. Changes in DNA and proteins, such as oxidative damage or methylation, in the females and their embryos will be examined using mass spectrometry. Moreover, alterations in the genotoxicity markers in the exposed animals will be related to embryo malformations, which is the currently accepted endpoint for developmental toxicity. The relationships between the genotoxicity markers and the embryo aberrations will provide an understanding of the mechanisms behind the reproductive toxicity and embryo development in the polluted environments and a tool for a large-scale screening in monitoring surveys.

Selected references
Löf et al., Ecological Indicators 60 (2016), 18-30
Gorokhova et al., Aquatic Toxicology 127 (2013), 46-53
Josefsson et al., Chemosphere 85 (2011), 1444-1451

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