

Bachelor or Master project

Tracing dechlorinating bacteria in Baltic Sea sediment

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Credit: Bachelor 15 credits; Master 45 or 60 credits

Start: Spring or early autumn 2016

The Baltic Sea is contaminated with organic pollutants such as polychlorinated biphenyls (PCBs). PCBs are a group of in total 209 substances, which all share a common structure, but with varying degree of chlorination. In the environment, PCBs may change from more highly-chlorinated to lower-chlorinated forms, thereby changing their toxicity and bioaccumulation potential. A previous study on PCBs in sediment cores collected in the Baltic Sea indicate that high-chlorinated PCB congeners are dechlorinated and transformed to low-chlorinated congeners. Moreover, our preliminary data suggest that this process is only taking place in some sediment layers, but not in others. The question is - What makes these microenvironments in the Baltic sediments so much more effective in supporting dechlorination?

The aim of this degree project is to test the hypothesis that occurrence of dechlorinating bacterial communities capable of efficient reductive dechlorination of PCBs in the sediments may explain the dechlorination pattern observed in the sediments from different locations of the Baltic Sea. By testing this hypothesis, we would improve our understanding of functional properties of these communities to transform halogenated environmental contaminants. This would allow predicting the dechlorination potential at specific PCB-impacted sites.

Methods: Microbial DNA will be extracted using the sediment samples with varying levels of PCB dechlorination. Using standard methods (cloning, qPCR), the community DNA will be analyzed to detect phylotypes within the bacterial community that had the capability to dechlorinate. The community abundance and composition will be related to the concentrations of different PCB congeners in the sediments.

We seek an independent student with some training in microbiology and/or molecular ecology. Practical knowledge of PCR and cloning methods is an advantage.

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