

Methane consuming bacteria in freshwater lakes

Marco Suarez

Greenhouse gases help to keep our planet atmosphere warm. However the levels of these gases are currently increasing, which is leading to global warming. One of those gases is Methane. Although biologic production of methane is big, fortunately a large amount of that methane is consumed by a group of microorganism known as methanotrophs before being released to the atmosphere.

Methane is produced also in the sediments of freshwater lakes. Some lakes known as stratified lakes have different water layers according to the temperature (i.e colder at the bottom than the surface). In those lakes the methane is largely consumed by methanotrophs who live in the water column. Despite the consumption of methane by microorganisms, freshwater lakes are known to release methane to the atmosphere. Since methanotrophs are influencing global weather when controlling methane emissions, it becomes highly relevant to study them.

This project attempted to characterize the ecology of methanotrophs in freshwater lakes. The main studied site was Lake Erken in Sweden. Here using a molecular method known as PCR I studied the presence or absence of methanotrophs at different depths in the water column. I correlated this to environmental data such as methane and oxygen concentration in the water. I found that methanotrophs were present from the surface to the bottom of the lake (18 meters). Methanotrophs were however more abundant in the methane zone, which was from 12 meters and below.

Using a technique called T-RFLP; I studied the community composition of methanotrophs in Lake Erken. Surprisingly it was found that there were two different communities in the water column, which were defined by the abundance of methane in the water. Furthermore neither of these communities was similar to that of another lake called Lake Tämna. Sequencing of my samples show also that the diversity of methanotrophs in Lake Erken is restricted to a few closely related genera. Together these findings show us that environmental factors have a complex role in the distribution of methanotrophs, affecting them on different ways for different species. Many questions about the ecology of methanotrophs remain however unanswered and further studies may be required.

Degree project in Biology, Master of science (2 years), 2012
Examensarbete i biologi 45 hp till magisterexamen, 2012
Biology Education Centre and Department of Limnology, Uppsala University
Supervisor: Stefan Bertilsson