How methane becomes fish food

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Methane is an organic carbon compound containing the fundamental building block of nearly all living material: carbon. It provides an important source of energy and nutrients for bacteria. Methane is produced in oxygen-free environments and is found in abundance at the bottom of lakes.

The Brazilian post-doctoral researcher in biology and ecology, Angela Sanseverino, has presented a study that shows methane from lakebeds to be present in fish tissue. The study was carried out in cooperation with, inter alia, David Bastviken, Water and Environmental Studies (WES), Linköping University.

Angela Sanseverino has studied a combination of two biomarkers: a stable isotope that indicates the presence of methane along with a specific fatty acid from methane-oxidizing bacteria. The study was carried out on fish and other parts of the food web from a lake in the Pantanal, inland Brazil. The findings of the study have been reported in a recently published article in the prestigious online research journal PLOS ONE.

"This is the first time we can say with any great certainty that methane from the lake bed has ended up in fish tissue via the food chain", says David Bastviken. "Isotopic studies have been carried out in the past, but they have been more uncertain as they only related to one biomarker. We now have two independent biomarkers presenting the same results. This considerably increases the certainty of our findings."

"It is like opening a black box. It turns out that carbon, which we thought was lost forever, can return to the food chain."

Methane is taken up by methane oxidizing bacteria, which in turn are eaten by zooplankton and other aquatic organisms. These organisms eventually end up in fish stomachs, meaning that food webs not only feed off organic carbon from plants in the lake or from the surrounding land; but also from deep-lying and oxygen-free, yet carbon-rich, sediment stores where methane is formed.

More studies are being planned to show the potentially vast importance that methane could have on the food chain in different types of lakes and conditions. For example, what happens in Swedish lakes during the winter?

However, David Bastviken does not believe these studies will affect his estimates of the methane emissions from lakes and watercourses. He has previously proven that these have most likely been greatly underestimated in the existing calculations of the global greenhouse gas emissions.

More information: Methane Carbon Supports Aquatic Food Webs to the Fish Level by Sanseverino AM, Bastviken D, Sundh I, Pickova J, Enrich-Prast A (2012). *PLoS ONE* 7(8)
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