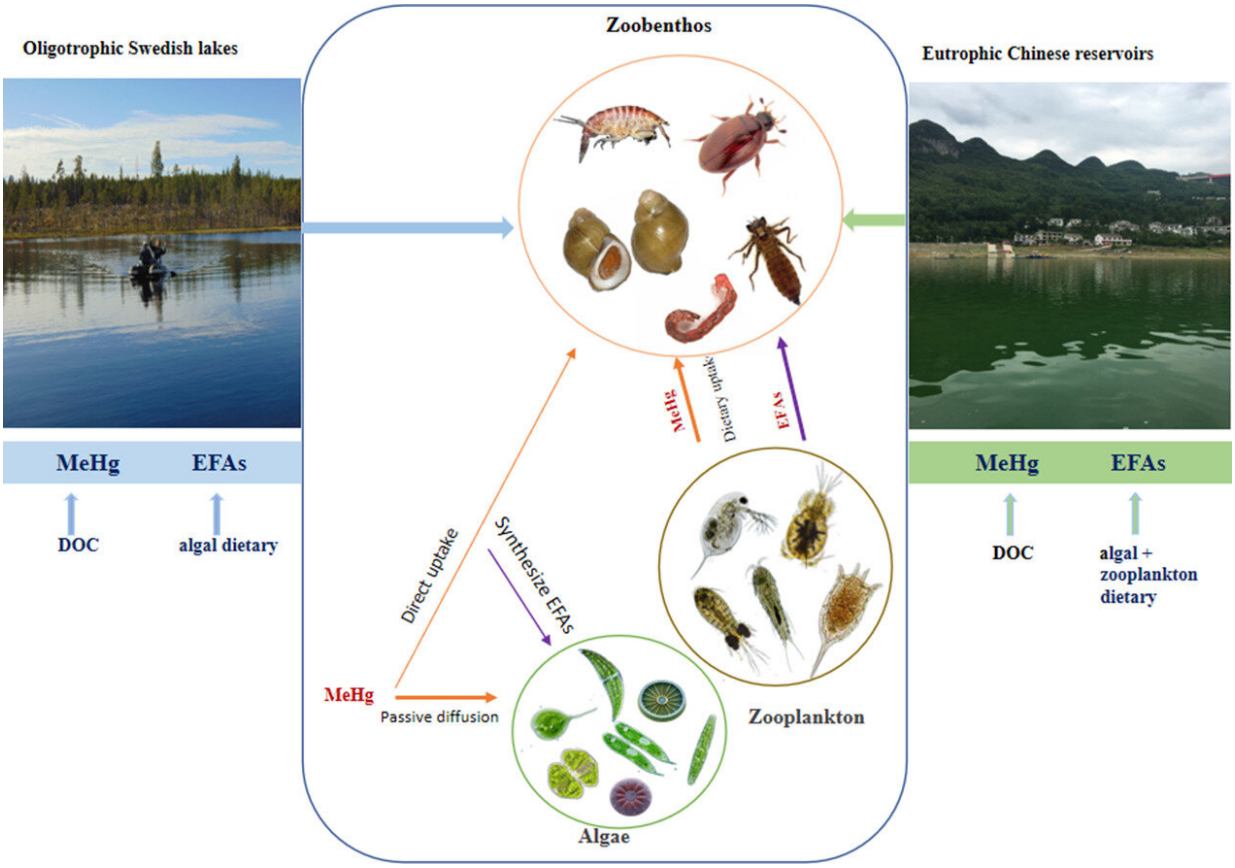
High levels of mercury in fish are affected by diet and environment

May 13 2021, by Li Yuan



The effects of abiotic (water chemistry) and biotic factors (dietary algae) factors on Hg and PUFA bioaccumulation in zoobenthos from Chinese reservoirs and Swedish lakes. Credit: IGCAS

Fish provide important dietary nutrients, such as essential proteins, lipids

and polyunsaturated fatty acids (PUFA). However, they are also a major contributor to the potent neurotoxin mercury (Hg) exposure to humans.

As the major food sources for fish, zoobenthos can transfer Hg and PUFA from the base of food webs to fish. In addition, compared to fish, zoobenthos rely more on primary producers as food and are susceptible to changes in environmental conditions.

Recently, Dr. Jing Min and Prof. Yan Haiyu from the Institute of Geochemistry of the Chinese Academy of Sciences (IGCAS) found that environmental characteristics and algal diet sources can result in difference of Hg and PUFA in zoobenthos.

The study was published in *Science of The Total Environment*.

The researchers compared Hg and PUFA bioaccumulation of zoobenthos in two largely contrasting aquatic ecosystems: freshwater reservoirs in China and natural lakes in Sweden.

"Chinese reservoirs, where frequent aquaculture activities can be seen, are generally eutrophic and alkaline, whereas lakes in Sweden are mostly oligotrophic, acidic and humic," said Dr. Jing.

Considering the eutrophication is the dominated environmental variables, the researchers explored the effect of abiotic (water chemistry) factors on Hg and PUFA bioaccumulation in zoobenthos. They also investigated the effect of base food web composition on Hg and PUFA bioaccumulation in zoobenthos through algae dietary by using PUFA as the biomarker.

The results showed that the average total Hg and methylmercury in zoobenthos were higher in Chinese reservoirs than those in Swedish lakes. Average eicosapentaenoic acid content of zoobenthos was similar

in these two habitats, yet average docosahexaenoic acid content of zoobenthos was higher in Chinese reservoirs than that in Swedish lakes.

"Besides the composition and density of algae, the essential fatty acids accumulation of zoobenthos in Chinese reservoirs is also related to the dissolved organic carbon concentration," said Prof. Yan.

Additionally, the eutrophication of Chinese Reservoirs didn't lower the Hg bioaccumulation in zoobenthos, and plankton was proved to be the main dietary sources of Hg in zoobenthos from Chinese reservoirs. By contrast, in Swedish lakes, dissolved organic carbon concentration was the main impact factor for Hg bioaccumulation in zoobenthos.

The study revealed the diet influence on Hg and essential fatty acids bioaccumulations in zoobethos from different aquatic systems, which may help assessing the fitness of aquatic food webs in the future.

More information: Min Jing et al. Diet influence on mercury bioaccumulation as revealed by polyunsaturated fatty acids in zoobenthos from two contrasting environments: Chinese reservoirs and Swedish lakes, *Science of The Total Environment* (2021). DOI: 10.1016/j.scitotenv.2021.146410

Provided by Chinese Academy of Sciences