

Reference:

Dong, W. L. Liang, S. Brooks, G. Southworth, B. Gu. 2010. Roles of dissolved organic matter in the ^(h)speciation of mercury and methylmercury in a contaminated ecosystem in Oak Ridge, Tennessee. *Environ. Chem.* 7:94-102.

Hypothesis:

The authors of this paper hypothesized that in the absence of sulfide, low concentrations of dissolved organic matter (DOM), through complexation with Hg^{2+} and methylmercury (CH_3Hg^+), can control the transformation, biological uptake and bioaccumulation of mercury in contaminated aqueous environments.

Why this study was done:

The East Fork Poplar Creek (EFPC) aquatic ecosystem was heavily polluted with mercury by past industrial activity. Corrective action was taken to reduce mercury concentrations in the water, but it was found that CH_3Hg^+ concentrations in fish and other biota were not correlated with levels of dissolved mercury in the EFPC waters. This study was undertaken to discover how geochemical conditions at the site were affecting the speciation, transformation and bioaccumulation of mercury.

Primary experimental methods:

Water samples were collected ^{from what locations?} and a subset of these was subjected to polycarbonate or cellulose nitrate membrane filtration. Cold vapour atomic fluorescence spectrometry (CVAFS) was used to measure dissolved mercury in the filtrates and total mercury in the unfiltered samples: first, samples were oxidized with BrCl , and then resultant free halogens were removed with hydroxyammonium hydrochloride ($\text{NH}_2\text{OH}\cdot\text{HCl}$). Hg^{2+} was then reduced to gaseous Hg^0 with SnCl_2 , adsorbed onto gold, and finally thermally desorbed into N_2 gas. The samples were also analysed for dissolved organic carbons (DOCs), significant anion and cation concentrations, and alkalinity (in the form of HCO_3^-).

Distribution of mercury-containing species was calculated separately for Hg^{2+} and CH_3Hg^+ using equilibrium geochemical speciation software. Modelling was based on a broad range of experimental