

You are what (and where) you eat: Mercury pollution threatens Arctic foxes

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Arctic foxes (*Vulpes lagopus*) with different coat conditions. Credit: N. Bocharova/IZW

New scientific results show that arctic foxes accumulate dangerous levels of mercury if they live in coastal habitats and feed on prey which lives in the ocean. Researchers from the Leibniz Institute for Zoo and Wildlife Research, Moscow State University and the University of Iceland just

published their discovery in the science online journal *PLOS ONE*.

Mercury is usually transferred across the food chain, so the researchers checked which items were the main source of food and measured [mercury levels](#) in the main prey of [Arctic foxes](#).

The scientists compared three fox populations in different environments. Foxes on the small Russian Commander Island of Mednyi fed almost exclusively on [sea birds](#), with some foxes eating seal carcasses. In Iceland, foxes living on the coast ate sea birds whereas those living inland ate non-[marine birds](#) and rodents.

In all three environments different levels of mercury were present in their hair. Foxes living in coastal habitats such as Iceland and Mednyi Island exhibited high levels of mercury.

What does this mean for the foxes? Using museum skin samples from the Commander Islands, the researchers could show that the foxes suffered exposure to mercury for a long time. The researchers confirmed that the source of contamination was their food, as they measured high mercury levels in the prey of foxes such as seals and sea birds.

However, the inland Arctic fox populations of Iceland had low mercury levels. Thus, living inland and eating non-marine birds and rodents instead of eating prey that feeds from the sea protected the inland foxes from [mercury exposure](#). This may have health and conservation implications. The Mednyi Island foxes are almost an opposite example to the inland Icelandic fox population. They live on a small island with no rodents or alternative food source to seals or sea birds. They suffered a tremendous population crash and while the population is currently stable, it is very small and juvenile foxes in particular show high mortality rates. Foxes of all ages exhibit low body weight and have poor coat condition.

"When going into this project we thought that an introduced pathogen would explain the poor condition of the foxes and their high mortality but after extensive screening, we did not find anything", says Alex Greenwood, principal investigator of the study. Instead, the researchers began to suspect that something else was at play. "If pathogens were not the cause, we thought perhaps pollutants could be involved. We thought of mercury because it has been reported in high concentration in other Arctic vertebrates also in remote areas and mercury intoxication is known to increase mortality in mammals. As mercury can have negative effects on overall health, particularly in young individuals, and as we knew that Mednyi foxes were exclusively feeding on potentially contaminated sources, we wanted to see whether contamination with mercury depended on feeding ecology and hence might have been the crucial factor for the population decline on Mednyi Island", comments Gabriele Treu, one of the lead authors of the study. As it turned out, the observed high mercury demonstrated a tight association with feeding ecology and geographical distribution of the [foxes](#).

In terms of conservation and long term population health for the entire arctic food chain of carnivores, [mercury](#) pollution must be stopped.

More information: Bocharova, N. et al. (2013): Correlates between Feeding Ecology and Mercury Levels in Historical and Modern Arctic Foxes (*Vulpes lagopus*), *PLOS ONE* 8(5): e60879.

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