Mercury pollution: New studies show a lot of work must still be done

Studies in New York show high levels of mercury in an ancient bone, as well as in 1930's fish. A simple test for mercury compounds is still needed

by Richard H. Gilluly

There has been widespread concern about mercury found in fish and wildlife in numerous locations ever since Canadian scientists 18 months ago discovered large amounts of the metal in fish in Lake St. Clair on the Canadian-United States border near Detroit.

As a result, the Food and Drug Administration began to enforce the Federal limit of 0.5 parts per million of mercury in foodstuffs, and large consignments of fish were removed from interstate commerce when they were found to exceed this level. There was legitimate reason for concern: In the 1950's dozens of persons in Minimata, Japan, died or were made severely ill when they ate fish contaminated with methyl mercury wastes from a plastics factory.

But the Minimata poisoning apparently resulted from direct release of the highly toxic methyl mercury into waterways from the factory. In many cases during the recent mercury scares, there has been no evidence that the mercury was in this toxic form. This is despite the fact that methylation of mercury is known to occur biologically —from the action of anaerobic bacteria in polluted streams. Conceivably, says Dr. Henry A. Schroeder of the Dartmouth Medical School Trace Elements Laboratory, some of the mercury found recently may be in the form of relatively nontoxic inorganic compounds. He said that tests to determine the form of mercury are difficult and complex. Scientists and Federal agencies badly need a simple, easy test (SN: 7/24/71, p. 63).

But until one is developed, FDA officials operate on the assumption that all mercury in foodstuffs is methylated. They say that the 0.5 ppm limit has proved to be a wise one on this basis; given the half-life of mercury in the human body and the amounts of methyl mercury that cause acute toxicity, the limit provides a ten-fold safety margin for the occasional fish eater. FDA says the limit should, therefore, usually assure safety even for regular fish eaters.

As for the possible sources of mercury in fish and wildlife, speculation continues. Although the Lake St. Clair and Great Lakes mercury almost certainly came from chlorine-alkali plants along the Detroit and St. Clair Rivers, some scientists have found evidence that air pollution from coal-burning power plants and factories may be a major source. Other scientists believe that naturally occurring mercury may sometimes cause high levels in living creatures.

Work recently completed at the New York Department of Environmental Conservation in Rome, N. Y., suggests that the mercury problem has been around for a long time and that at least in some instances naturally occurring mercury is probably the source.

Earl J. Harris, associate analytical chemist at the department's pollution laboratory, analyzed a 15,000-year-old mastodon bone from a museum and found that it contained 1.19 ppm of mercury.

Harris also found "approximately the same level of mercury in fish taken from Lake Champlain in 1932 and Lake Ontario in 1939 as we do in newly captured fish." The old fish were contributed by the New York State Biological Survey. Like the mastodon bone, they had been kept all these years in the New York State Museum in Albany.

Harris' colleague, Ralph Karcher, chief analytical chemist at the laboratory, says there was plenty of industrial activity along the Great Lakes in the 1930's, and that the mercury in the old fish easily could have come from these sources. But he agrees this does not explain the mercury in the mastodon bone. Harris is hesitant to speculate whether the mercury was in the bone when the animal died or whether it was absorbed later through the soil. Within the next month he hopes to have determined what form the mercury is in—methylated or inorganic.

The major effort at the Rome laboratory is to trace mercury contamination—its sources and its effects on fish and wildlife. As a result of large-scale testing of fish, and consequent enforcement action, laboratory officials estimate that industrial mercury discharges into New York waterways have been reduced by 97 percent. The program has been in operation only a year.

The analytical technique used so far has been gross determination of mercury levels with a Perkin Elmer atomic absorption spectrophotometer. This instrument detects and measures mercury vapor, from a sample treated with reagents, by its effects on the spectrum of light from a cathode lamp passing through a vapor sample.

The laboratory has measured mercury levels in snow as well as in organisms and has found as much as 0.35 ppm in snow falling in New York State near Rome. This may indicate that the source is industrial air pollution. This in turn could be the explanation for the high mercury content in nearby Lake Delta and in game fish in the lake. □

Harris: Mercury pollution appears to have been a problem for some years.