

This Week's Citation Classic

Uthe J F, Armstrong F A J & Stainton M P. Mercury determination in fish samples by wet digestion and flameless atomic absorption spectrophotometry. *J. Fish. Res. Board Can.* 27:805-11, 1970. [Fisheries Research Board of Canada, Freshwater Institute, Winnipeg, Canada]

A simple method for the determination of trace amounts of mercury in fish tissue is described. The method is not labour-intensive and it is possible to carry out many analyses per day. The sensitivity and precision of the described method make it most suited to the determination of mercury at concentrations of 0.01-1.0 µg/g. The method can be modified to give a considerable increase in sensitivity if required. [The *SCI*[®] indicates that this paper has been cited over 110 times since 1970.]

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"The problem of mercury contamination of fishery products arose in North America with the discovery of highly contaminated fish in the South Saskatchewan River by Wobeser¹ in 1969. Due to the large quantity of fish being held prior to sale and the possibility that substantial amounts of this fish would contain levels of mercury in excess of established health tolerances, the Freshwater Institute was requested to assist the Inspection Service of the Canadian Department of Fisheries and Forestry in analysis of these products for mercury. At this time, I was a member of the technology section of the institute under E.G. Bligh and was involved in a study of organochlorine pesticides in freshwater fish. John Armstrong and Mike Stainton were analysts in the eutrophication section under J.R. Vallentyne. The three of us were brought together to carry out this project. The first step in our studies was the development of

the analytical method described in the paper. Obviously we needed a method that was simple, fast, as accurate as anything then available, easily adaptable to the analysis of a large number of samples, able to determine sub µg/g concentrations of mercury, relatively free of many skilled technical manipulations, and based on the equipment and instrumentation then at hand. The cold vapour atomic absorption method of Hatch and Ott² was eminently suited to this task as was the wet digestion procedure of Jacobs *et al.*,³ since the first could easily be automated⁴ and the second demanded little technical handling or sophisticated glassware.

"We were extremely fortunate in that we did not run into a number of technical difficulties in setting up the method. This was due to the methods of the originators cited above and the technical skills of the individuals working on the day-to-day inspection analysis. We were pleased with the demonstration that the method was as good as those then in use.⁵ The determination of traces of mercury in environmental materials was reviewed in 1974⁶ and 1979.⁷

"I was asked to include a comment on why I think this paper has been so highly cited. A couple of researchers have commented that the gadget described in the paper for placing the sample into the bottom of the Kjeldahl flask was the most valuable part of the whole paper. I must confess surprise that this paper was cited so much rather than the papers upon which we based this method. It may be that our paper was simply in the right journal at the right time and dealing with the right materials to be widely noticed by individuals initiating studies upon environmental contamination by mercury. I would also like to think that the simplicity of the method also encouraged its adoption."

1. Wobeser G. *Mercury concentrations in the muscle of fish from the Saskatchewan River.* Paper presented to the Canadian Committee on Freshwater Fisheries Research. Meeting no. 3, January 1970, Ottawa, Canada.
2. Hatch W R & Ott W L. Determination of submicrogram quantities of mercury by atomic absorption spectrophotometry. *Anal. Chem.* 40:2085-7, 1968.
3. Jacobs M B, Yamaguchi S, Goldwater L J & Gilbert H. Determination of mercury in blood. *Ind. Hyg. Assn. J.* 21:475-80, 1960.
4. Armstrong F A J & Uthe J F. Semi-automated determination of mercury in animal tissue. *At. Absorpt. Newsletter* 10:101-3, 1971.
5. Uthe J F, Armstrong F A J & Tam K C. Determination of trace amounts of mercury in fish tissues: results of a North American check sample study. *J. Ass. Offic. Anal. Chem.* 54:866-9, 1971.
6. Uthe J F & Armstrong F A J. Micro-determination of mercury and organomercury compounds in environmental materials. *Toxicol. Environ. Chem. Rev.* 2:45-77, 1974.
7. Jaworki J F. The determination of mercury and its compounds. (National Research Council of Canada, Subcommittee on Heavy Metals and Certain Other Elements, eds.) *Effects of mercury in the Canadian environment.* Ottawa:NRCC, 1979. Report no. 16739. p. 188-200; 213-90.