

**POSTDOCTORAL RESEARCH PROGRAM
NATIONAL EXPOSURE RESEARCH LABORATORY
U.S. ENVIRONMENTAL PROTECTION AGENCY
Cincinnati, OH**

**Speciation of Arsenic in Fish Tissues by Selective Extraction, Ion Chromatography Separation,
and Inductively Coupled Plasma Mass Spectrometric Detection**

PROJECT # NERL 2004-03

A research project is available through the Postgraduate Research Program at the U.S. Environmental Protection Agency (EPA), National Exposure Research Laboratory (NERL) in Cincinnati, Ohio.

BACKGROUND: The determination of arsenic in environmental samples has predominately focused on methods which solubilize the available arsenic via an acid digestion. The acid digestion oxidizes the chemical bonds associated with arsenic thereby liberating it from the matrix prior to detection. The loss of chemical form and related information via digestion has become a larger issue as the toxicity of arsenic is documented to be species specific or chemical form dependent. The current data used for risk assessment for arsenic in water and food are based on nonspecies specific analytical methods. Therefore, to improve the accuracy of these risk assessments, species specific information is required in both food and water.

The predominant arsenic species present in environmental samples are arsenite (As(III)), arsenate (As(V), monomethylarsonic acid (MMA), dimethylarsinic acid (DMA), arsenobetaine (AsB) and arsenosugars {(As(328), As(392), As(408), As(482))}. The arsenite and arsenate are the inorganic forms and are believed to be the most toxic species. MMA and DMA are the metabolites of inorganic arsenic exposure and are believed to be the by-products of the body's attempt to detoxify the arsenic. Arsenobetaine is commonly associated with ingestion of fish and is believed to be relatively non-toxic. The arsenosugars are thought to biotransform in the body and their toxicity is currently a subject of debate. The vastly different toxicities of arsenicals in seafoods have made the speciation of arsenic a growing area in exposure assessment and analytical literature. Further development of this literature is critical to formulating accurate risk assessments for arsenic.

The purpose of this project is to evaluate protocols for the extraction, separation, and detection of arsenicals in seafood. To date, NERL has been able to devise a separation and detection scheme for all the arsenicals associated with seafoods using IC separations and ICP-MS detection. Several laboratories have reported on potential extraction techniques. This traineeship will focus on utilizing some of this existing technology to develop an extraction technique which will preserve the arsenicals in their original chemical form and allow for sub-ppb detection of individual species.

QUALIFICATIONS: Applicants should have received a bachelor's or master's degree in chemistry within the last three years. Applicants must be able to conduct research independently without direct supervision. U.S. citizenship status is preferred. The program is open to all qualified individuals without regard to race, sex, religion, color, age, physical or mental disability, national origin, or status as a Vietnam era or disabled veteran.

The participant will be selected based on academic records, recommendations, research interests, compatibility of background and interests with research programs and projects at NERL, and the availability of funds, staff, programs, and equipment. The appointment is full-time for one year and may be renewed upon recommendation of NERL and subject to availability of funds. The participant will receive a monthly stipend based on research area and prior experience. The participant must show proof of health and medical insurance.

The Postgraduate Research Program for NERL is administered by the Oak Ridge Institute for Science and Education. ***Please reference Project # NERL 2004-03 when calling or writing for information.*** For additional information and application materials contact: Postgraduate Research Program/NERL, Attn: Betty Bowling, Science and Engineering Education - MS 36, Oak Ridge Institute for Science and Education, P.O. Box 117, Oak Ridge, Tennessee 37831-0117, Phone: (865) 576-8503 FAX: (865) 241-5219, e-mail: bowlingb@ornl.gov.

An application can be found at <http://www.ornl.gov/orise/edu/EPA/app-gugrgpd.pdf>