



Current MITHE-SN Projects Metadata

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Environmental risk assessment of metals in water and sediment: Importance of dietary uptake and water sediment interactions to *Hyalella azteca*. (Aquatic Ecosystems)

Objectives being Investigated

This study will determine the relative contributions of diet and water to metal bioaccumulation and toxicity in aquatic invertebrates. At present the majority of regulatory approaches assume that all biologically available metal comes from the waterborne route. If this isn't the case, then the overall regulatory approach will have to be reassessed. Currently there are no sediment and water quality guidelines for uranium in Canada, making it difficult for the management and protection of ecosystems that are impacted by the uranium mining industry, such as those found in Northern Saskatchewan. The results of this research will assist in the development of U water and sediment guidelines for the protection of aquatic environments.

Study/Sampling Design

DIETARY METAL TOXICITY: Initially this research will involve laboratory studies designed to determine the toxicity of Cd in food and the relative importance of Cd in water and food. We will then attempt to field test our conclusions by either exposing *Hyalella* in cages in Cd-contaminated and control lakes to determine toxicity and accumulation, or by exposing *Hyalella* in the laboratory to field-collected food. The choice of field sites will be based on results from the companion MITHE work of Hare et al. in order to produce data directly comparable to those collected for other invertebrate species.

SEDIMENT ERA: Initially, laboratory experiments will be conducted to determine the toxicity of U spiked sediment from a Canadian Shield lake and how this is affected by overlying water chemistry. U bioaccumulation will be measured to determine the relationship between U toxicity and bioaccumulation, as well as U bioaccumulation and U in sediment and overlying water. Later, the laboratory-based predictions will be validated using field-collected sediments and overlying water from U-bearing sites, or direct in situ work at those sites, in order to provide direct estimates of U bioavailability in the field and the potential toxicity of U containing sediments.

Number of projects providing material for study: 0

Location of Field Site(s)

These have not yet been selected. They will be chosen after sufficient progress has been achieved in the laboratory-based studies and will be selected to be compatible with other MITHE-RN studies, if possible.

Human Studies

Outcome or Process Studied

--- none provided ---

Exposure Medium, and Metals/Substances Quantified

--- none provided ---

Biological Endpoint(s) Monitored

--- none provided ---

Biota Studied

Species

Hyalella azteca (Crustacea, Amphipoda), periphyton

Metals, etc. Quantified

Primary metal of interest: Cd and U

Additional metals being measured: Ag, Al, As, B, Ba, Be, Bi, Co, Cr, Cu, Fe, Ga, La, Li, Mn, Mo, Ni, Pb, Rb, Sb, Se, Sr, Tl, V, Zn

Biological Endpoint(s)

Survival, growth, reproduction, metal bioaccumulation

Physical Material(s) Studied

Medium/Media

Water and sediment

Metals, etc. Quantified

Primary metal of interest: Cd and U

Additional metals being measured: Ag, Al, As, B, Ba, Be, Bi, Co, Cr, Cu, Fe, Ga, La, Li, Mn, Mo, Ni, Pb, Rb, Sb, Se, Sr, Tl, V, Zn

Bibliographic References on-file with Secretariat: No

Data Available: No

Data Archived with MITHE-SN: No

Collaborators

Dr. Uwe Borgmann (Co-Inv.) – Aquatic Ecosystem Protection Research Division,
Environment Canada

Metals in the Human Environment Strategic Network

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