Project Title:
MITHE-SN Internship 2008 with Eurometaux: A glimpse of the non-ferrous metals industry's response to REACH

Investigator(s):
Dina Schwertfeger

Summary:
In 2008, MITHE-SN sponsored a number of internships aimed at providing Canadian students international exposure to issues related to metal substances and the environment, with the overall goal of increasing capacity of highly trained personnel in Canada. One such internship posting was with Eurometaux, a Belgian-based organization which acts as the interface between the European non-ferrous metals industry and the European government.

The focus of the internship was to become familiar with issues regarding the implementation of REACH, the new chemicals management regulation in Europe. June 1, 2008 marked the official date after which a European company is expected to (pre)register their chemical substances with the European Chemicals Agency (ECHA). My project involved developing a "REACH Handbook" tool, which was needed to guide members of the non-ferrous metals industry through the information provided in the voluminous REACH guidance documents (RIPs) provided by ECHA, as well as direct them to an assortment of other tools available to help fulfill the requirements of the Chemical Safety Report.

A brief overview of the (scientific) information required under REACH and the non-ferrous metals industry's organizational response to meet these requirements will be presented, as well as some thoughts on the overall internship experience.

Project Title:
Internship at the University of Melbourne (Australia)

Investigators:
Isabelle Proulx
INRS-ETE, Université du Québec, Quebec City, QC.

Summary:
I completed an internship sponsored by MITHE-SN at the University of Melbourne Australia. From October 1st, 2007 to January 22nd, 2008, I worked at the Centre for Environmental Stress and Adaptation Research (CESAR) and the Department of Genetics. The purpose of this internship was to separate *Chironomus* species collected in mining areas of Rouyn-Noranda and Sudbury.

One of the goals of my doctoral research project is to determine if it is justifiable to pool species for contaminant analyses. Animals used as contaminant biomonitors are often pooled because it is difficult, if not impossible, to separate them morphologically. However, by pooling species we assume that their contaminant concentrations do not differ markedly. I am testing this assumption on the globally-distributed and widely used contaminant biomonitor, the midge *Chironomus* (Diptera). I plan to develop species-specific models that will allow various species of *Chironomus* to be used as biomonitors of sedimentary trace metals. To achieve this, I have collected *Chironomus* species along a metal-contamination gradient, but before going forward with the detailed metal analyses, species needed to be correctly identified. Since *Chironomus* species are quite similar morphologically, genetic techniques and examination of giant salivary chromosomes were needed to confidently separate them.

Thus, the objectives of my work in Australia were to learn and carry out DNA methods to identify my species, to acquire more knowledge on *Chironomus* morphological identification and finally, to learn more about giant salivary gland examination. My supervisors were Dr. Melissa Carew, a genetics expert in Diptera identification and Dr. Jon Martin a *Chironomus* taxonomist.

Under the supervision of Dr. Melissa Carew, my genetic analyses ran smoothly. I purified DNA, amplified specific mitochondrial (COI and CYTB) and nuclear (ITS and CAD) genes, obtained different genetic profiles by doing RFLP analyses (Restriction Fragment Length Polymorphism) and sequenced the different profiles. With the sequencing results, I am now able to built phylogenetic trees and do other statistical tests (pairwise distant analysis and parsimony analysis) to separate my species. With Dr. Martin I studied the morphology of my *Chironomus* species. He showed me how to correctly do salivary gland squashes and to interpret chromosome patterns.

With the work that I've done at the University of Melbourne, I am now able to confidently separate my specimens and move forward with my research. Going abroad and being submerged in a completely new working environment is a wonderful

experience. You get to learn new ideas, new ways of doing things and new perspectives. It was a professional and personal growth experience.

Project Title:
MITHE-SN Internship 2008 with the European Nickel Industry Association: the intersection of policy and science - REACH

Investigator(s):
Julie Sommerfreund

Summary:
In 2008, MITHE-SN sponsored a number of internships abroad to build capacity of highly trained Canadians in international applications of research dealing with metals and the environment. One such internship posting was with the European Nickel Industry Association (ENIA), a division of the Nickel Institute based in Brussels. The Nickel Institute is a nonprofit organization that represents the interests of 24 companies which together produce more than 90% of the world's annual nickel output.

The internship focused on the technical implementation of REACH, Europe's regulation on the Registration, Evaluation, Authorisation and restriction of CHemicals. This internship provided the opportunity to observe and contribute to the integration of scientific knowledge with the implementation of a legally binding regulation.

This presentation will provide an overview of how the commodity industry associations respond to the technical demands of a regulation such as REACH, the implications for researchers and the lessons learned from this policy approach., in addition to providing some insight into the overall internship experience.

Project Title:
MITHE-SN Student Internship 2008
(A5) Metal transfer along aquatic food chains

Investigators:
Mueller, K.K.
Institut National de la Recherche Scientifique, centre Eau, Terre et Environnement (INRS-ETE), Québec, QC.

Summary:
A three-month internship at the Centre for Ecology and Hydrology (CEH) in Lancaster, England with Prof. Edward Tipping proved valuable in working towards my doctoral thesis objective to better predict the speciation, and therefore the bioavailability of Cu, Cd, Ni and Zn in natural aquatic systems. My internship objectives were to gain experience using and applying the chemical equilibrium model, WHAM (Windermere Humic Aqueous Model), and to explore the possibility of modifying the WHAM model to take into account the spatial (e.g., lake to lake) variability in the "quality" of DOM.

My internship began with a month of training on the WHAM model, given by Prof. Tipping and his colleague Dr. Steve Lofts. Two major changes to the "off the shelf" version of the model, using estimated activities of dissolved Al(III) and Fe(III) as input data and altering the percent of fulvic acid (%FA) active in the complexation of cations, improved the ability of WHAM to predict my experimentally measured Cu^{2+} concentration ($[Cu^{2+}]_e$) values for 18 lakes on the Canadian Shield. For all but five lakes, WHAM predictions of the free Cu^{2+} concentrations ($[Cu^{2+}]_m$) were reasonable close to the $[Cu^{2+}]_e$ values. For the lakes that fell outside this acceptable range, there are most likely other factors controlling the speciation of Cu. For this reason, the optimum percent FA activity ($\%FA_{opt}$) needed to minimize the difference between WHAM $[Cu^{2+}]_m$ values and my measured $[Cu^{2+}]_e$ values was determined for each lake and compared to the fluorescence quality of the ambient DOM. No clear relationship was found between the DOM fluorescence quality and the $\%FA_{opt}$, but more work is planned to determine whether or not a relationship exists between the speciation of Cu and the fluorescence quality of DOM in freshwater.

This internship, made possible by funding by MITHE-SN, allowed me to not only learn how to use the model WHAM and to optimise it for my own data set, but also to develop an on-going collaboration with Prof. Tipping and Dr. Lofts on both the feasibility and manner in which to integrate the quality of DOM into the WHAM model. I am grateful for the exposures to other research groups, the international research experience gained and the professional relationships made, which will no doubt serve me in future research endeavours.