



The Canadian Geo-location Endeavour Using Isotopes and Trace Elements in Hair

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The Canadian human hair provenance project has two main objectives: 1) to build a Canadian database of isotopes and trace elements from tap water and hair samples, and 2) to assess the extent of temporal effects on these samples.

To address objective 1, a cross-Canada sampling campaign has been started to collect hair and tap water samples. In the past two years, our group has collected samples from the eastern part of Canada (Newfoundland, Nova Scotia, New Brunswick, Prince Edward Island, Quebec and Ontario). Water samples are divided into three groups – groundwater, surface water and bottled water. The GIS maps show the isotopic distribution of the tap water sources varies with latitude. Hair is analyzed for carbon (C), nitrogen (N) and hydrogen (H) isotopes. The C and N results show that in general, Canadians eat a typical diet showing a small isotopic variation. However, some cases will be presented which may explain why some people have C and N values outlying the collected sample average. In terms of H isotopes in human hair, GIS maps illustrate the distribution of this isotope in the eastern provinces of Canada. In some cases, a large variation in H was observed for the same locality with no significant difference in human activities and/or consumption. However, based on hair collected from across Canada from previous years, H isotopes in hair show a correlation to water collected from the same locality.

To address objective 2, hair and tap water samples were collected at 4 month intervals (to represent different seasons in Canada) from several volunteers residing in two cities located in the province of Ontario (i.e. Sudbury and Ottawa) and one city from the province of Quebec (i.e. Montreal). For all isotopes measured, there was little variation observed over the course of the year in any individual from those small to medium-size cities. On-going sampling efforts will address if any variation may occur on a yearly basis.