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SELINUS, Olle, Brian ALLOWAY, Jose A. CENTENO, Robert B. FINKELMAN, Ron FUGE, Ulf LINDH and Pauline SMEDLEY (eds)  
2005 *Essentials of Medical Geology: impacts of the natural environment on public health*, Burlington, Elsevier Academic Press, 812 pages.

General readers be warned, if you should cautiously pick-up the *Essentials of Medical Geology: impacts of the natural environment on public health*, figure one, on the first page of the preface, is the periodic table. Now for chemists, geologists, and a number of other disciplines starting a discussion with the periodic table is old hat. I was concerned this book would overwhelm me when I read the opening quote from Paracelsus (1493-1541). Those with a basic interest in public health fear not for the editors have taken pains to make the writing and subject matter accessible to most. This is good because the Inuit regions of Nunavik, Nunavut, and the Northwest Territories will see value in the *Essentials of Medical Geology*.

According to the editors of the volume, medical geology is the “science dealing with the relationship between natural geological factors and health in humans and animals and with understanding the influence of ordinary environmental factors on the geographical distribution of such health problems” (p. xi). Environmental health questions are of critical importance to all northerners, and especially for Inuit and Athabaskans (Dene, Yukon First Nations and Metis). Indigenous Peoples have, after all, a close relationship to the natural environment; a sensitivity to changes in that environment, and because of traditional food systems and cultural practices a vulnerability to the sometimes subtle input of toxic substances. In northern Canada, great investments have been made in understanding natural and anthropogenic levels and exposures to heavy metals, radionuclides, and Persistent Organic Pollutants (POPs).

In 2003, the second *Canadian Arctic Contaminants Assessment Report*, human health chapter, concluded that Inuit mothers had 6-12 times higher levels of toxaphene, oxychlorodane, trans-nonachlor, PCBs (polychlorinated biphenyls), mirex, and HCB (hexachlorobenzene), than Caucasians (Van Oostdam *et al.* 2003: 96). Similar results were noted for Inuit women's exposure to mercury, lead and cadmium. Northern pathways for POPs, metals and radionuclides include air and water. Ultimately toxic substances bioaccumulate and are made bioavailable in traditional foods. Human health impacts from the mixture of biogeochemical transformations are of pressing concern for all northerners and so *Essentials of Medical Geology* is a book of obvious importance.

Alarming high rates of contaminants in the North mirror changes in the environmental health of the planet. That is, there have been increasing inputs of contaminants into the North over the last 20-years from sources and use outside of the North. It is of critical importance to contextualize exposure to contaminants in traditional country food with knowledge of the benefits to the health of Inuit from gathering and consuming their traditional diets. It is also important to understand the natural processes that lead to high exposure levels. In Canada, the Northern Contaminants Program (NCP) has added a great deal to Inuit understanding about their exposure to environmental contaminants, pathways, and the effects of these to their health. However, the NCP, and internationally the Arctic Monitoring and Assessment Program (AMAP 1998), focus on a limited aspect of environmental contaminants and our place within different Arctic ecosystems. While AMAP and CACAR reports have added greatly to our understanding of northern ecosystems, for those of us working on issues related to environmental impacts on public health, *Essentials of Medical Geology* is an important general text and reference. This book is equally useful to students and teachers of public health (the primary audience for this text), but will be useful for other researchers; as well as, for policy makers and government officials.

Over 60 international authors and scientists have contributed to the 31 chapters of this book. The first eight chapters in the section "Environmental biology," set the foundation and scope for understanding the primary biophysical processes linking environment and human health. The next 12 chapters, in the section "Pathways and exposure," demonstrate the inevitable modes of exposure and the exposure limits for different contaminants (mostly metals). The next eight chapters grouped as "Environmental toxicology, pathology and medical geology," will interest many readers. The eight chapters demonstrate the power of environmental medicine, toxicology and epidemiology, as Centeno (2005: 527) notes, the study of "risk factors affect(ing) human health, which includes the practice of how to minimize and/or prevent any adverse effects." The final section, before the three essential appendices, within the section "Techniques and tools," is six chapters describing the major methodological practices now available to understanding this very complex field of study.

In northern environmental health research, a considerable effort goes into documenting and contextualizing contaminants research with traditional knowledge. While a lot of Indigenous knowledge has been amassed, it is clear we know relatively

little about environmental health impacts from long-range contaminants (Furgal *et al.* 2003; Jensen *et al.* 1997). Most of the environmental contaminants affecting the health of northerners are relatively recent input, as a result of industrial development in the North and from outside the North. Contaminants are largely coming from outside of the lived and traditional experience of the Inuit. What we have learned from the NCP and from the work of scientists who have been funded through the Northern Ecosystem Initiative (Environment Canada) scratches the surface for what is known about environmental contaminants.

If there are obvious limits to the applicability of medical geology, it is as an area studies complimentary to environmental medicine or industrial medicine. As a field, “medical geology brings together geoscientists and medical and public health researchers to address health problems caused or exacerbated by geologic processes such as volcanic eruptions, earthquakes, and dust” (Selinus *et al.* 2005: xi). I would add to this list of geologic processes, the knowledge that toxic gases and particulates travelling North, because of the nature of the arctic system, ultimately are deposited. Thus, the North becomes the ultimate sink for unsustainable development elsewhere.

There is considerable attention in the text to arsenic, mercury, cadmium, selenium, lead and other heavy metals that are of particular relevance to Inuit health. Researchers will appreciate the scientific index. For example, searching the text for zinc (Zn) we move through various chapters to read about adverse effects in domestic animals, analysis to detect zinc levels, bioavailability of zinc, biological function and response, geophagy, impacts of nutrition, and so on. The example of zinc is illustrative in that in traditional diets we would want to know the uptake of zinc from abandoned mines and its availability from other sources into the natural environment and traditional foods. Because the authors of each chapter come from a unique specialization, disciplinary and national perspective, and so on, the examples used to explain interactions and so on rely on their assumptions. For example we may read about mercury in the context of commercial industrial food systems (agriculture) or the implications for traditional food systems, urban contexts, impacts from mining, and so on.

As with other texts, anything essential will of course have a broad coverage on a number of topics. Readers looking for specific Inuit references will not be impressed by this text. From a personal point of view, the editors could have improved their volume by including work by scientists who have contributed to the AMAP and CACAR. Part of my presentation of reviewing this text with these particular references is to provide readers with a more relevant review. There is a rich body of literature on arctic environmental health, only suggested by these few references, which *Essentials of Medical Geology* contributes to. As is the case with any text, there are other references readers will want to read that can enhance your understanding more completely and perhaps with a greater focus on the North. The references in the book are rich and diverse and can assist readers to delve more deeply on any particular subject. The book itself is written easily, albeit the diversity of authors means that different styles are used throughout the book. This particular anthology will not be taken far from the classroom, library, or office; it is large and cumbersome hard cover, typical of other science text books.

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