Editorial

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1 Introduction to the special issue on “Mineralogy, Speciation and Environmental Health”

Hippocrates, the Greek physician known as the “Father of Medicine”, once noted, “If you want to learn about the health of a population, look at the air they breathe, the water they drink, and the places where they live.” While the overall significance of clean air, land and water on human health is well known as far back as 2,500 years (Hippocrates, 460 BC), the relationship between chemical elements and compounds on health could not be established until 4–5 decades ago. It was not until the advent of sophisticated analytical equipment aided by powerful computers that we began to gain a better understanding of how the geochemical environment of a place affects the health and well being of a population. This recognition in effect laid the foundation of a new specialty that came to be known as “Medical Geology” (Selinus et al. 2005).

Medical Geology is an emerging scientific discipline that examines the impacts that geologic materials and processes have on human and ecosystem health (Selinus et al. 2005).

Thus, Medical Geology:

- Identifies and characterizes natural and anthropogenic sources of harmful materials in the environment. *Know on the Environmental Mineralogy (Geology)*.
- Predicts the movement and alteration of chemical, infectious, and other disease-causing agents over time and space. *Know on the Chemical Flux and Speciation (Environmental Physics and Chemistry)*. See Reeder et al. (2006) for a detailed definition of speciation and bioavailability.
- Provides an understanding of how people are exposed to harmful materials and describes what can be done to minimize or prevent such exposure. *Determine the Environmental Health impacts (Toxicology and Ecotoxicology)*.

This special issue (split in two parts) of *Reviews in Environmental Science and Bio/Technology* thus focuses on the importance and interrelationships of geochemical processes to the health and diseases of humans, animals and plants. It aims to better communication between the health and geoscience communities by elucidating the geologic origins, flow and physicochemical behavior of some toxic elements in the environment that lead to human exposure through the consumption of food and water or simply by breathing, e.g. see for mercury (Navarro 2008), for germanium, see Rosenberg (2009), for boron, see Kot (2009), for uranium (VI), see Qafoku and Icenhower (2008). Human health can be affected by long-term

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exposure to either an excess or a deficiency of certain chemicals in the geologic environment (the soil or groundwater), e.g. for fluoride, see Ozsvath (2009), for arsenic, see Villaescusa and Bollinger (2008), for selenium, see Fernández-Martínez and Charlet (2009). Therefore, it is important to understand the influence that geology [e.g. rock type and soil radon levels, see Mudd (2008)] and the anthropogenic activities [e.g. for mining, see Dold (2008)] have on environmental chemistry.

I would like to thank the contributors who have made valuable efforts to write the review papers that comprise this special issue. I hope that this special issue will favor future close collaboration of geoscientists and medical and public health researchers to address health problems due to geologic materials such as trace elements, rocks, minerals, natural dust and water.

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