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Foreword to the Research Front on 'Antimony – Environmental Issues to Human Health'

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Antimony has a fascinating, but also difficult, environmental chemistry, with many fundamental questions yet unanswered. In the Foreword to the first Research Front on antimony published in *Environmental Chemistry* in 2009,[1] William Maher, the guest editor, qualified antimony in the environment as 'the new global puzzle' and listed some issues that, besides developing better analytical procedures, urgently needed to be examined: chemical speciation, environmental cycling, mechanisms by which plants and animals accumulate and exclude antimony, and potential environmental risks. These subjects remain topical seven years later. The present Research Front gathers a series of papers on antimony, ranging from environmental issues to human health, with the aim of reflecting the current situation and fostering significant future work. Not surprisingly, many of these papers tackle the questions posed by William Maher.

The need for reliable data, and hence for reliable analytical methods, remains the Achilles heel in antimony research, with adequate certified reference materials still missing for many matrices and many open questions regarding chemical speciation. Daus and Hansen[2] clarify the situation as far as chromatographic-based methods for the determination of Sb^{III}/Sb^{V} redox speciation is concerned; their review article opens the Research Front. Antimony biomethylation remains a controversial issue with reported results being suspiciously dependent on the techniques (with the most widely applied hydride generation very prone to artefacts) and standards used.[3] In this regard, the new analytical method for determining the content of trimethylated antimony in plant tissues developed by Mestrot and co-workers[4] represents a significant step forward that will help to develop studies on soil-plant transfer of this alkyl derivative of antimony.

Antimony mobility in the various environmental compartments remains a hot topic, as discussed in three articles in the present Research Front. Majzlan and co-workers[5] address existing contradictory observations in the literature regarding the mobility of antimony in water and soils by taking into account the kinetics of formation of the mineral tripuhyite, which is considered to be the last sink of antimony in nature. Other discrepancies such as the greater mobility of antimony observed in shooting range soils when compared with that observed in laboratory experiments and the absence of Sb^{III} in such soils are addressed in a study by Ilgen and Trainor,[6] wherein the effects of chemical controls on the oxidation of Sb^{III} to Sb^{V} are examined. Interestingly, Pb^{II}, present in high amounts in such soils, owing to its use in bullets, catalyses this oxidation process. The effect of a third factor, i.e. microorganisms, on the mobility of antimony is studied in unpolluted wetland soils by Rouwane et al.[7] These authors have found that, in contrast with arsenic, soil microbial activity may not fully control the release of antimony, with natural organic matter probably being a key controlling factor.

On the biological side, current knowledge on how antimony enters cells and how cells react in the presence of this element is presented in the review article by Tamás.[8] Finally, the response of human epidermal keratinocytes to Sb^{III} (added as potassium antimony tartrate) and As^{III} (added as sodium arsenite) points to a potential action of antimony as a human skin carcinogen worthy of further study.[9]

The Research Front closes with the presentation of a new approach, using antimony as an example, for building up knowledge from data. The Building up Knowledge Initiative (BUKI)[10] aims to avoid repetition of unproven beliefs and studies on similar subjects that jeopardise real scientific progress. Antimony presents an excellent test case for the BUKI.

We are very pleased to present this collection of papers at the forefront of antimony environmental research and hope that the studies will provide precious, pertinent food for thought for further antimony research. We thank the authors and referees for their substantial contributions to this Research Front.

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