



Role of bacteria in controlling the toxicity and mobility of arsenic in soils

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Arsenite (AsIII) and arsenate (AsV) are the primary forms of As in soils whereby arsenite is known to be the more mobile species in the environment and is 25 to 60 times more toxic than arsenate [1]. Our previous studies show that bacteria present in soil solution are able to concentrate moderate to high contents of arsenic metal. Moreover, experimental studies on arsenic-oxidizing bacteria reveal slight differences between the amount of AsIII introduced and the amount of AsV recovered [2]. In this study, arsenic has been added to different types of bacteria in batch experiments in order to understand the processes involved. Ten types of bacteria have been chosen based on their different genomic-response to arsenic stimulation. Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM) were applied to study the arsenic-induced morphological changes of the bacteria. The surfaces of different strains reacted differently in the presence of arsenite. In most cases arsenic stimulates the appearance of polysaccharides outside the cell wall and around the colonies, including arsenic-rich fine needles. These needles are presumed to be arsenate because of the reduced solubility of AsV compared to AsIII under oxidizing conditions. These results indicate that bacteria play an important role concerning the concentration and mobilisation of arsenic in soils. Moreover the oxidation of arsenite into arsenate reduces the toxicity of As.

[1]Corwin D. L., David A. and Goldberg S. (1999), *Journal of Contaminant Hydrology*, 39, 35-38. [2]Weeger W., Lièvreumont D., Perret M., Lagarde F., Hubert J-C., Leroy M., Lett M-C. (1999), *BioMetals*, 12, 141-149.