Arsenate resistance in bacteria isolated from an Antimony Mine in South Africa

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Arsenic is widely distributed throughout the earth's crust with sources of contamination ranging from erosion of local rocks to industrial effluents, various commercial processes and combustion of fossil fuels[1]. The mechanism of toxicity is exerted by metal-thiol interactions leading to the inactivation of a wide range of proteins. Microorganisms have mainly two mechanisms of resistance to elevated levels of arsenic, reduction of arsenate and extrusion of resulting arsenite[2]. Reduction of arsenate chances the solubility of the oxyanion with potential applications in the bioremediation industry[3]. 17 Sites were sampled at a South African Antimony mine experiencing high levels of arsenic throughout the mining and refining process. Enrichments yielded six pure cultures resistant to up to 0.25M arsenate and 0.1M arsenite. Two isolates showing the highest reduction rates were targeted for further investigations. A TLC screening method combined with a modified molybdenum blue spectrophotometric method[4] for the quantification of reduction of arsenate was developed and preliminary results indicate reduction rates comparable and higher to that of *E. coli*. Both isolates were identified with 16S rDNA PCR and sequencing and the sequences deposited into Genbank. The gene encoding arsenate reduction was amplified by PCR with sequence specific primers, cloned and sequenced.

1. Smedley and Kinniburg 2002
2. Rosen *et al.* 1991, Ji *et al.* 1994
3. Ahman *et al.* 1997
4. Johnson and Pilson 1972