

A new aerobic chemolithoautotrophic arsenic oxidizing microorganism isolated from a high Andean watershed

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Abstract

Biological arsenic oxidation has been suggested as a key biogeochemical process that controls the mobilization and fate of this metalloid in aqueous environments. To the best of our knowledge, only four aerobic chemolithoautotrophic arsenite-oxidizing (CAO) bacteria have been shown to grow via direct arsenic oxidation and to have the essential genes for chemolithoautotrophic arsenite oxidation. In this study, a new CAO bacterium was isolated from a high Andean watershed evidencing natural dissolved arsenic attenuation. The bacterial isolate, designated TS-1, is closely related to the *Ancylobacter* genus, in the *Alphaproteobacteria* class. Results showed that TS-1 has genes for arsenite oxidation and carbon fixation. The dependence of bacterial growth from arsenite oxidation was demonstrated. In addition, a mathematical model was suggested and the kinetic parameters were obtained by simultaneously fitting the biomass growth, arsenite depletion curves, and arsenate production. This research increases the knowledge of chemolithoautotrophic arsenic oxidizing microorganisms and its potential role as a driver for natural arsenic attenuation.