Geophysical Research Abstracts
Vol. 20, EGU2018-10910, 2018
EGU General Assembly 2018
© Author(s) 2018. CC Attribution 4.0 license.

Arsenic-binding heterobactin produced by the tolerant actinobacterium *R. erythropolis* S43

Gerardo Retamal-Morales (1,2), Ringo Schwabe (2), Marika Menhert (2), Dirk Tischler (2), Michael Schlömann (2), and Gloria Levicán (1)

(1) Universidad de Santiago, Microbiología Básica y Aplicada, Biología, Santiago, Chile (gloria.levican@usach.cl), (2) TU Bergakademie Freiberg, Institute of Biosciences, Freiberg, Germany (michael.schloemann@ioez.tu-freiberg.de)

Arsenic is an ubiquitous metalloid on earth, however, it can become a pollutant due to industrial activity such as mining. This highly toxic metalloid has become an environmental issue in several countries including Chile and Germany, thus, low cost and environmentally friendly solutions are necessary nowadays. Rhodococcus erythropolis S43 is an arsenic-tolerant actinobacterium isolated from an arsenic contaminated soil in and old mine, including arsenic smelter close to Freiberg, Germany. This strain has showed to be able to produce siderophores when exposed to iron depleting conditions. Here we explore the putative siderophore production pathway in R. erythropolis S43 and the arsenic binding capacity of these molecules . A bioinformatic search of siderophore production related genes was performed in the genome of the strain S43, showing the putative siderophore production cluster htbABCDEFGHIJK, previously described for heterobactin production. To induce siderophore production the strain was cultured in iron depleted M9 liquid media and tested using the colorimetric method CAS assay to evaluate iron chelating capacity of siderophores, the arsenic-binding capacity was determined using As-mCAS assay, a modified version of the traditional CAS. The binding activity of the metabolites was expressed in μM equivalent of desferroxamine B (DFOB), a commercially available siderophore. The metabolites produced by S43 showed iron and arsenic binding properties achieving a chelating activity equivalent to 160 μM of DFOB in the raw extract, and about 10 mM of DFOB in a concentrated extract made in 80% methanol. This last concentrate was evaluated by HPLC showing one absorbance peak at 11.8 min retention time in a methanol-water gradient, which showed iron and arsenic binding activity. These findings suggests that R. erythropolis S43 produce one type of heterobactin-like siderophore able to bind both elements. This results open a novel perspective to face the arsenic contamination problem, using the arsenic-binding capacity of bacterial siderophores.