Arsenic Resistance of Bacteria Isolated from Electric Energy Towers

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Abstract:

Arsenic is a heavy metalloid known for its toxicity, that mainly occurs as As (V) in AsO^{3}_{4}, arsenate, and as As (III) in AsO^{-2}, arsenite. The toxic arsenic in soil and aqueous environments is considered as one of the prominent environmental causes of cancer mortality in the World. Developing efficient and eco-friendly technologies to remove arsenic from soil and water systems is of great importance to many countries. Bioremediation of heavy or toxic metal contaminated sites has been often shown to be more efficient than chemical and physical methods, besides being more cost-effective. Due to its toxicity, arsenic has no function as a trace element; however, some aerobic bacteria are able to oxidize arsenite into arsenate, much less toxic. The objective of this study was to determined arsenic resistance of strains isolated on electric energy towers, for further use in studies with bioremediation. Forty eight isolates of genera *Exiguobacterium* (3), *Serratia* (5), *Pseudomonas* (5), *Bacillus* (5), *Lysinibacillus* (6) and *Acinetobacter* (24) were evaluated for tolerance against heavy metals arsenite and arsenate on Tris minimal medium containing different concentration of heavy metals salts (0.5–10 mM). The OD was prepared by a spectrophotometer ASYS ExpertPlus to monitor cell growth and determine the minimum inhibitory concentration (MIC) that completely inhibits growth of bacteria. To differentiate between metabolically active and inactive cells at the end of the experiment, Tetrazolium chloride (TTC) was add into the cultures. TTC (white) became red where the cultures were still alive due to the activity of dehydrogenases. The most of the isolates grew up at high concentrations of arsenate (8 -10 mM), except for 2 isolates belong to the genera *Bacillus* (BD 01) and *Lysinibacillus* (BD 23) that resist only 2 mM. Although arsenite is more toxic, all the isolates were able to grow at 2mM. Most of the isolates (33) tolerated up to 8 mM of arsenite and the more resistant was the genus *Acinetobacter*, which 15 isolates were able to grow at 10 Mm and stay alive at the end of the experiment. Therefore, the isolates of the genus *Acinetobacter* could be exploited for remediation of environment contaminated with arsenic. Financial support: FAPESP, Bandeirante Energias do Brasil

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