Title: Evaluation of *Bacillus spp.* resistence to chromium in mining areas

Authors: Veronica Rossetto[1], Alberto Paulo de Borba[1], Helena Marques[1], Ana Caroline Goedert[1] and Marcus Adonai Castro da Silva[1]

Institution: UNIVALI[1] – Universidade do Vale do Itajaí, Center of Technological Sciences of the Land and Sea, (Uruguai St., 458, Downtown, Zip Code 88302-202, Itajaí – SC)

Rivers and soils have been suffering acidification due to the environmental impacts caused by heavy metal contamination. Microorganisms, present in toxic environments where such heavy metal are deposed, have developed techniques of sequestration, immobilization and solubilisation of these metals as a tolerance strategy. This microbial tolerance adaptation can be used as a means of *in situ* bioremediation of environments contaminated by chromium. *Hexavalent* chromium - Cr(VI) is considered a highly toxic heavy metal due to its higher solubility in water and permeability to biological membranes which leads to interaction with intramolecular proteins and nucleic acids. *Bacillus spp* are resistant to Cr(VI) and can therefore be used in bioremediation of chromium contaminated mining areas. This project has the objective of evaluating the chromium resistance of *Bacillus licheniformis*; *Bacillus simplex*; *Bacillus ehimensis*; *Bacillus subtilis*; *Bacillus cereus.* These five strains were spared from the Laboratory of Applied Microbiology from the university Universidade do Vale do Itajaí, being previously collected in Criciúma – SC, isolated and identified. Precultures we established in nutrient Agar plates (chromium free) to then be subcultured in nutrient Agar plates containing different chromium concentrations (1 µM, 5 µM, 10 µM, 25 µM, 30 µM, 35 µM, 40 µM, 45 µM, 50 µM e 100 µM – prepared from potassium dichromate) in quadruplicates. These cultures were incubated for seven days at 30°C, growth analysis were then performed. The five strains presented chromium resistance in concentrations of 1µM to 45µM (13,24 µg/mL). Species from the *Bacillus* genus have been demonstrating grate chromium resistance capacity. Some studies found chromium resistance in *Bacillus* ssp. to be between 100 to 200 µg/mL. A study done in Rio Grande do Sul found three species of Bacillus tolerant to 750 µg/mL of chromium. Although the strains tested by our group do not present such a high tolerance to chromium, they can still be qualified as applicable for bioremediation strategies, since according to Brazilian legislation the maximum concentration of chromium in rivers should not be superior to 0,01 µg/mL. We conclude that while we cannot infer what mechanism of resistance is used by these microorganisms it is clear that these microorganisms can be potentially used for bioremediation of environments contaminated with chromium.

Key words: Chromium; Bioremediation; *Bacillus spp.*