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Poster Abstract - L.03

PHOTOSYNTHETIC BACTERIA AS A TOOL FOR HEAVY METAL REMOVAL

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Photosynthetic microorganisms are particularly suitable to be employed in bioremediation processes devoted to the degradation or recovery of pollutants from contaminated environments[1,2]. The potentialities of these organisms in terms of heavy metal tolerance and biosorption abilities have been extensively explored.

In order to assess the potential of purple non-sulphur bacteria for bioremediation, the ability of *Rhodobacter sphaeroides* strain R26.1 to grow photosynthetically in heavy metal contaminated environments was investigated. Bacterial cultures were carried out in artificially polluted media, enriched with millimolar amounts of the following transition metal ions Hg^{2+}, Cu^{2+}, Fe^{2+}, Ni^{2+}, Co^{2+}, MoO_4^{2-} and CrO_4^{2-}. The effects on lag phase duration, maximum growth rate, and pigment-protein complex expression were evaluated.

The analysis of growth parameters revealed a generally high-level tolerance to heavy metal contamination.

We are investigating the ability of *Rb. sphaeroides* cellular cultures to sequester (i.e. by absorption and adsorption) the heavy metal. Cr, Co, Cu, Fe, Mn, Mo, Ni and Zn determination has been performed by Inductively Coupled Plasma Atomic Emission Spectrometry previous mineralization of samples by a microwave system. Such measurements indicate that for some of the investigated metals, significant amounts are retrieved in *Rb. sphaeroides* biomass harvested from supplemented media. Biosorption abilities of living bacterial cells towards further noxious heavy metals are currently under investigation in our laboratories.

The information acquired allow to expect that either metabolically active processes or passive biosorption abilities might account for the high tolerance observed. Intracellular sequestration to prevent exposure to essential cellular components is one of possible mechanisms for heavy metal resistance.

Further investigations, using proteome techniques, are expected to reveal the mechanisms involved and to evaluate the real potential of this purple bacterium in the bioremediation field.

(1) White, C., Sayer, J.A., and Gadd, G.M. (1997). *FEMS Microbiol Rev* **20**: 503-516.
(2) Gadd, G.M. (2000). *Current Opinion in Biotechnology* **11**: 271-279.