

Identification of metal-tolerant organisms isolated from the Plankenburg River, Western Cape, South Africa

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Abstract

The ability of biofilms to resist pollutants makes them advantageous for use in bioremediation. The objective of this investigation was to isolate metal-tolerant micro-organisms from a site along the Plankenburg River. Microbial biofilms cultivated in multi-channelled flow cells were exposed to varying concentrations of aluminium (Al), iron (Fe), copper (Cu), manganese (Mn), nickel (Ni) and zinc (Zn), stained with the BacLight™ viability probe, visualised using epifluorescence microscopy and analysed using ScionImage. Exposure to the highest Al, Fe, Cu and Mn concentrations increased the percentages of dead cells. A difference in live and dead cells after exposure to varying Zn and Ni concentrations was not evident. When exposed to the lowest concentrations, no notable difference could be detected in comparison with the untreated control. Possible metal-tolerant micro-organisms were identified from the exposed flow cells using polymerase chain reaction (PCR) and deoxyribonucleic acid (DNA) sequencing, followed by ClustalX alignment and phylogenetic analysis. Phylogenetic analysis identified a variety of organisms, including *Bacillus* sp., *Pseudomonas* sp., *Delftia tsuruhatensis* strain A90, *Kocuria kristinae* strain 6J-5b, *Comamonas testosteroni* WDL7, *Stenotrophomonas maltophilia* strain 776, *Staphylococcus* sp. MOLA:313, *Micrococcus* sp. TPR14, *Sphingomonas* sp. 8b-1 and *Microbacterium* sp. PAO-12. Two major clusters could be distinguished based on their Gram-reactions.

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