

Bioremediation of Industrial Wastewater. II- Isolation and Characterization of Heavy Metal Ions Tolerant Genes in Gram-positive Bacteria

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THE THREAT of heavy metals pollution to public health and wild life led to an increased interest in developing systems that can remove or neutralize its toxic effects in industrial effluents and municipal wastewater. The present study was conducted to identify the bacterial isolates with superior ability to accumulate heavy metal ions, and to analyze some genes encoding metal resistance in such isolates using PCR and DNA sequencing. Bacteria were isolated from the industrial ponds of Sadat City, Egypt, and their heavy metal resistance was assessed. Identification indicated that some isolates were belonging to genus *Bacillus* and showed remarkable resistance to cadmium, zinc and cobalt. Specific DNA sequences could be amplified from the genomic DNA of the tested isolates using polymerase chain reaction (PCR). Amplification of ~ 400bp fragment was performed using the primer pair CzcD1 and CzcD2, and it was identical to the expected amplified fragment encasing the *Czc* gene. Alignment indicated that there is 99% similarity ratio between pAczc1 clone of the isolated *Bacillus cereus* and *Czc* gene of *Alkaligenes* sp., *Ralstonia* sp. and *Ralstonia metallidurans*.

Keywords: Heavy metal, Wastewater, CzcD resistant gene, Gram-positive bacteria, PCR, DNA sequencing.

Pollution is a change in the physiological, chemical, radiological or biological quality of the resource (air, land or water) caused by man or due to man's activities that is injurious to existing, intended, or potential uses of the resource (Salomons *et al.*, 1995). The main cause of water pollution is the discharge of solid or liquid waste products containing pollutants on to the land surface or into surface or coastal water. The wastes that contribute to water pollution may be broadly grouped into sewage, industrial, and agricultural types (Dix, 1981). A number of sites contaminated by heavy metals around the world are associated with human activities such as discharge of wastes into natural waterways, various metallurgical industries, accidental spills or mining (Trajanovska *et al.*, 1997).