INTRODUCTION

Water is the most important commodity that each and every living organism needs without it society and life itself comes to and end **(Tchobanoglous and Schroedar, 1994).** The wide diverse biological activities of all living organism, plants or animals are primarily controlled by the availability of water. Existence of population of a number of countries and their cultures has been correlated with the presence of good water resources **(Abdel Hamid, 1998).**

The intensified industrial activities, sewage, agriculture and waste water disposals are greatly contributing to the increase of heavy metals levels in the environment, mainly in the aquatic system **(Da Costa et al.,** 1996).

The presence of heavy metals pollutants in water resources is a threat to humans and other life forms **(Namasivayam and Yamuna, 1995).**

Certain metal ions and their coordination complexes play a variety of fundamental roles in microbial growth and metabolism. Meanwhile, other metallic species are toxic to microbial life. Heavy metals contaminating drinking water represent a threat to public health due to their accumulation through food chain **(Holan and Volesky, 1994).** This aspect coupled with their persistence results in a serious health hazard threatening water supplies and populations depending on them **(Alloways and Ayres, 1997).**

Iron is not considered health hazardous, yet oxidation of iron in water results in settling out of red-brown particles.

These sediments are responsible for staining properties of water and cause plugging of water pipes. A frequent problem resulting from increased concentration of iron in water is the occurrence of iron bacteria which form red-brown slime that clog water system **(Dave Varner et al., 1996)**.

The biologically available concentration of lead is low owing to its high molecular weight and low solubility in water **(Nies, 1999)**. Its toxicity for man and animals is due to its action on central nervous system, kidneys, red blood cells and reproductive system **(Goyer, 1993 and Johnson, 1998)**.

Safe drinking water requires that drinking water be absolutely free from heavy metals and pathogenic organisms are obviously of prime importance, and water treatment processes should be designed to achieve this end **(Ali and Mehana, 1995)**.

The removal of heavy metals contaminating water at low concentrations is very difficult by chemical means and often inadequate when applied to large volumes **(Volesky, 1987)**. Thus, there is a serious demand to establish new methods for the removal of heavy metals from drinking water.

Biological processes including biosorption of heavy metals and radionuclide by microbial biomass is relatively rapid and efficient process

(Gadd and White, 1993). This phenomenon may be exploited in biotechnology processes concerned with bioremediation of metal bearing effluents and waste water stream. Also, it can be used for metal radionuclide recovery economic reasons and/or environmental protection **(Wong and Fung, 1997 and Andres et al., 2000)**.

Application of biosorption technology to the treatment of heavy metals contaminating water has been given significant attention recently by the research community. Biosorption process is based on metal binding capacities of various biological materials.

Biosorption can be defined as the ability of biological materials to accumulate heavy metals through metabolically mediated or physiochemical pathways of uptake **(Fourest and Roux, 1992)**.

Uptake of metals by microorganisms is essentially a biphasic process which can be divided according to the dependence on cell is metabolism into metabolism dependent biosorption and metabolism independent biosorption. It can be also classified according to location of accumulated metal ions into extracellular, cell surface and intracellular accumulation **(Gadd, 1990; Bengtsson et al., 1995 and Blackwell et al., 1995)**. **(Volesky and May-Philips, 1995 and Simmons and Singleton, 1996)**.

Algae, fungi, yeast and bacteria have been proved to be potential biosorbents **(Volesky, 1986; Ibeanusi et al, 1995; Ursa and Macha, 1999; Sag et al. 2000 and Andres et al., 2000)**.

The capacity of microbial cells to absorption process and removal of metal ions from aqueous solutions are significantly influenced by environmental conditions as pH, temperature, biomass concentration and presence of ions **(Chen and Ting, 1995).**

As a result of metal microorganisms interaction not only microbial population (biomass) was changed but also its molecular structure varied under heavy metal stress **(Yu et al., 2003).**

The genetic basis for heavy metal resistance in bacteria had been reported as plasmid-encoded resistance **(Gupta et al., 1997)** or as plasmid less character **(Li et al., 2000 and Sharma et al., 2000).**

In this study it was aimed to isolate some heavy metal resistant bacterial strains from drinking water at different sites in Sharqia governorate. The capability of isolated and identified bacteria strains to uptake Pb^{+2} and Fe^{+3} was evaluated.

The effect of increasing concentration of Pb^{+2} and Fe^{+3} on the efficiency of bacterial strains was examined. Optimization of environmental and cultural conditions for the tested strains to ensure maximum growth and metal uptake was achieved. Ultra structure studies using Transmission electron microscope to diffuse the biosorption process and study distribution and compartmentalization of metallic ions in bacterial cells was investigated.