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Biosorption of Copper (Cu^{2+}) and Lead (Pb^{2+}) Ions by *Chlorella* sp. and *Navicula* sp. Isolated from Addalam River, Quirino, Philippines

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***Abstract*:** *Adverse ecological and health effects of heavy metals have increased ever since the second part of 20th century. The discharge of these metals into freshwater ecosystems as a result of pedogenetic processes and anthropogenic activities has become a serious problem all over the world. Biosorption is a cost-effective method of removing metal ions from aqueous solutions using biological materials. Microalgae are versatile biosorbents that can grow under a wide range of conditions. In this study, local strains of freshwater microalgae from Addalam River were successfully cultured under the optimal conditions of 28 ±2 °C temperature and light/dark duration of 12:12 h in Bolds Basal Medium (BBM). Two microalgae species were identified in their genera: Chlorella and Navicula, these were chosen as candidate species for this study. Biosorption capacity of Chlorella sp, and Navicula sp. was evaluated for the removal of Cu and Pb ions from aqueous solutions. Experiments were performed in BBM containing the selected heavy metals (10 mg L-1) with 1.00 mL of living algae at 28 ±2 °C and pH 6.6 ±0.1. The final metal ion concentrations after biosorption were analyzed using Atomic Absorption Spectrophotometer (AAS) for Cu and Electrothermal Atomic Absorption Spectrophotometer (ETAAS) after Microwave-Assisted Digestion for Pb. The results indicated that Chlorella sp. was a more competent species for the removal of Cu at 99.73% and Pb at 64.40% while Navicula sp. also showed a remarkable biosorption capacity at 87.10% for Cu and 62.60% for Pb. Taken together, Chlorella sp. and Navicula sp.; two microalgae from Addalam River—and possibly other microalgae species—may emerge as potentially more ecofriendly and economical alternative for the removal of toxic metals in wastewaters and probably offset the cost of eutrophication.*

Keywords: *AAS, Biosorption, Heavy Metals, Microalgae*

1. Introduction

Rivers, large and small, and all of their tributaries, are often referred to as the circulatory system of the planet: the arteries and veins of our landscape—quenching, nourishing, filtering, transporting, supporting life, providing places of beauty, serenity, and spirit. They provide fisheries, agricultural lands, tourism, water for farms, towns and cities, and they support populations, cultures, and economies. This is no mere metaphor, as people have seen what happens when too much or too little water damages entire ecosystems and affects all of the species that depend on them for life and livelihood. If water is the life-blood of the planet, then certainly its stewards constitute the immune system of its liquid pathways [1]–[2].

Majority of the world's rivers are deteriorating. They are either dying or are now endangered. We now face a situation where rivers are seriously unable to perform their valuable function of providing water and food, and many other services to humanity—to all life [2]. As specified by the Philippines Environment Monitor (PEM) of 2003, Region II has the highest potential source of groundwater of 2, 825 Million Cubic Meters (MCM) but then