Designing a Novel Heavy Metal Bioremediation System Utilizing Immobilized Algae Partnered with Heavy Metal Resistant Microbial Isolates Collected from Contaminated Superfund Mine Sites and Identified with a 16S Ribosomal Subunit Analysis

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Heavy metal contamination in the environment, specifically in aquatic systems, has been a top concern for nearly 100 years. This heavy metal contamination is found at nearly every one of the estimated 500,000 abandoned mine sites in the United States. Of these mine sites, 0.003% are actively funded for cleanup by the EPA, and these cleanup methods cost $300 million annually and are not low-impact. This project seeks to solve this problem through five phases. First, two EPA Superfund mine sites are studied to determine the concentration of heavy metals at different points along contaminated streams, in addition to collecting water samples to be used in Phase 2, which consists of identifying unique morphologies of bacteria found in the water samples and isolating them to be used in a bioremediation system. The isolates are then screened for heavy metal resistance and successful formation of biofilms in high concentrations of heavy metals, two standards a final group of 24 isolates must meet to be identified in Phase 4 with the 16S Ribosomal Subunit Analysis. The identified bacteria are then grouped by genera and partnered with algae in a sodium alginate bead to serve as the heavy metal remediation system.

Awards Won:

Third Award of $1,000

Drexel University: Full tuition scholarship $250,000

Patent and Trademark Office Society: Second Award of $500

University of Arizona: Tuition Scholarship Award