Best Aquatic Environment Poster at Environ 2021

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An investigation into the genomic and proteomic effects of heavy metal exposure to the hyperaccumulator plants *Eichhornia crassipes* and *Pistia stratiotes*.

Water quality is a measure of the chemical, physical, and biological state of water, and standards of water quality will depend on the intended use e.g., standards expected for drinking water are different from standards expected for irrigation water. Water quality is closely connected to the health of people, animals, and the environment. Water quality can be degraded by numerous chemicals, biological contaminants, non-biodegradable products etc. Of importance in this study is heavy metals. Heavy metal contamination in water is largely due to human activities such as agriculture and mining. Natural processes such as weathering of rocks and volcanoes account for contamination of water by rare heavy metals. With long-term exposure to humans, heavy metals exert their toxic effect by binding to biological molecules such as enzymes or transport proteins, altering their configuration and inhibiting their activities, resulting in diseases such as cancer and kidney dysfunction.

Several plants have been found to be capable of removing heavy metals from water. Of particular importance in this study are hyperaccumulator plants water hyacinth (*Eichhornia crassipes*) and water lettuce (*Pistia stratiotes*).

Figure 1: Image of *P. stratiotes* (left) and *E. crassipes* (Right).

My study aims to understand, at genomic and proteomic level, how these plants can remove high concentration of heavy metals from water. Since this study is being done at genomic level, my focus is on two genes, metallothionein and phytochelatin synthase genes which are known to be involved in heavy metal accumulation in plants but are not extensively studied in *P. stratiotes* and *E. crassipes*. Findings from this project will improve how plants and/or plants genes are used in their native ecosystem by eco-engineers, and will explore the use of advanced biotechnology to harness the genetic power of plants to remedy heavy metal contaminated water and improve water quality in the Northern Hemisphere.