

Past and Present Research Systems of Green Chemistry

September 14-16, 2015 Orlando, USA

Isolation and characterization of heavy metal tolerant bacteria for the purpose of bioremediation

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The accumulation of heavy metals such as lead, zinc, copper and nickel can cause soil and water contamination in metropolitan, rural and industrial areas. This environmental contamination leads to significant biological problems affecting the growth, morphology and biochemical activities of fauna, flora and microbial populations in both soil and water. Heavy metal toxicity can also have a major impact on human health causing neurodegenerative diseases, reproduction problems and renal failure. Bacteria found in severely polluted areas have been shown to have specific genes that allow them to adapt to and grow in these environments. They have developed mechanisms to tolerate such pollutants, and this ability has made them potential agents of bioremediation. We are investigating whether heavy metal tolerant bacteria isolated from Newtown Creek in Brooklyn, NY can be used as a tool for bioremediation. Fifteen bacterial isolates were collected and are being characterized. All isolates grew on medium containing 4.0mM to 20.0mM of Pb(NO₃)₂, Ni(NO₃)₂ or CuSO₄. Several isolates contain plasmids that are currently being sequenced – this is important as heavy metal tolerance genes are frequently found on plasmids. Future work will include identifying the mechanisms of tolerance and observing plant growth in heavy metal contaminated soil that is amended with heavy metal tolerant bacteria to determine their potential as bioremediation tools.

Biography

Finola Fung-Khee is now a junior student at City College recently transferred from BMCC. She is majoring in Chemistry with a concentration in Environmental Chemistry and plans to continue on to a PhD program in Toxicology. Ms Fung-Khee has been working under the mentorship of Dr Sarah Salm since June 2014 in the bioremediation of heavy metals using bacteria. The authors would like to thank the Louis Stokes Alliance for Minority Participation and the Science Department at BMCC for the research facilities and financial support.

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