



COLLEGE of
BIOLOGICAL SCIENCE

DEPARTMENT OF MOLECULAR
AND CELLULAR BIOLOGY

Announcement:

All interested members of the university community are invited to attend the Final Oral Examination for the degree of **Master of Science** of

JOSEPH RADFORD

on Friday, February 19, 2021 at 1:30 p.m. (online)

Thesis Title: Influence of temperature cycling and ethanol amendment on arsenic mobility in a contaminated northern wetland

Examination Committee:

Dr. Matt Kimber, Dept. of Molecular and Cellular Biology (Exam Chair)
Dr. Susan Glasauer, School of Environmental Sciences
Dr. Stephen Seah, Dept. of Molecular and Cellular Biology
Dr. Marc Habash, School of Environmental Sciences

Advisory Committee:

Dr. Lucy Mutharia (Co-Advisor)
Dr. Susan Glasauer (Co-Advisor)
Dr. Stephen Seah

Abstract: Pyritic tailings from legacy gold mines frequently leach elevated concentrations of sulfate, iron, and arsenic into surrounding environments, with mines in northern environments being subject to freeze-thaw cycling that can encourage further leaching. In this study, the effects of freeze-thaw cycling and ethanol amendment on an iron and arsenic contaminated wetland sediment were investigated. Sediment chemistry and aqueous element concentrations were monitored, while the microbial communities were probed using 16S gene analysis. In ethanol amended microcosms, greater proportions of arsenic were removed from solution and identified in sulfide associated sediment fractions, presumably because of ethanol stimulated microbial activity. Ethanol addition also stimulated the growth of *Geobacter* and other SRBs. Freeze-thaw cycling tended to cause a lag in microbial sulfate reduction. This implicates that loss of arsenic from wetlands may occur at the beginning of freeze-thaw cycling, until the function of the microbial community with respect to arsenic removal is restored.

Curriculum Vitae: Joseph completed his Bachelor of Science (Hons.) at the University of Guelph in the spring of 2018. In the fall of the same year, he began his MSc graduate studies with co-advisors Dr. Lucy Mutharia and Dr. Susan Glasauer.