



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

SARAH KIRST

On Friday, September 8, 2023 at 9:30 a.m. (online)

Thesis Title: The application of silver nanoparticles and bacteriophage to combat
Pseudomonas aeruginosa biofilms

Examination Committee:

Dr. Jaideep Mathur, Dept. of Molecular and Cellular Biology (Exam Chair)
Dr. Cezar Khursigara, Dept. of Molecular and Cellular Biology
Dr. Marc Habash, School of Environmental Sciences
Dr. Ray Lu, Dept. of Molecular and Cellular Biology

Advisory Committee:

Dr. Cezar Khursigara (Co-Advisor)
Dr. Hany Anany (Co-Advisor)
Dr. Marc Habash

Abstract: *Pseudomonas aeruginosa* causes 51,000 infections in hospitalized patients and 2,500 deaths annually in the United States alone. Chronic wound infections typically exist as biofilms. Silver nanoparticles- a typical treatment for chronic wound infections- and bacteriophage- viruses that infect bacteria- are a novel area of research to explore the efficacy of biofilm degradation of *P. aeruginosa* biofilms. Five prospective phages were isolated from the environment and screened against a panel of *P. aeruginosa* clinical isolates. *Pseudomonas* strain PA14 was chosen for downstream characterization experiments which included: efficiency of plating, genome annotation, bacteriophage insensitive mutant frequency, adsorption, and one-step growth curve. The selected phage, Chandler, showed similar efficacy to a cocktail of phages and was chosen for downstream experiments such as the minimum biofilm eradication concentration (MBEC). MBEC and imaging results using scanning electron microscopy demonstrated that sequential and combined application of both treatments displayed high biofilm degradation against PA14 biofilms.

Curriculum Vitae: Sarah completed her Bachelor of Science (Hons.) Co-op in Biology with a specialization in Molecular Genetics at the University of Waterloo in June 2021. She began her Master of Science program in Molecular and Cellular Biology in Dr. Khursigara's lab in September 2021.

Publications: Lin JT, **Kirst S**, Cucić S, Klem A, She YM, Kropinski AM, Anany H. 2022. Isolation, Characterization, and Genome Analysis of a Novel Bacteriophage, Escherichia Phage vB_EcoM-4HA13, Representing a New Phage Genus in the Novel Phage Family Chaseviridae. *Viruses*, 14(11), 2356. 10.3390/v14112356

Martinez-Soto CE, Cucić S, Lin JT, **Kirst S**, Mahmoud ES, Khursigara CM, Anany H. 2021. PHIDA: A High Throughput Turbidimetric Data Analytic Tool to Compare Host Range Profiles of Bacteriophages Isolated Using Different Enrichment Methods. *Viruses*, 13(11), 2120. 10.3390/v13112120.