UNIVERSITY of GUELPH

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*

ZACHARY THOW

on Tuesday, April 27, 2021 at 9:30 a.m. (online)

Thesis Title: **Preliminary characterization of Vorin and VorinI: a putative toxin-antitoxin pair produced by *Erwinia amylovora***

Examination Committee:

Dr. Mike Emes, Dept. of Molecular and Cellular Biology (Exam Chair)
Dr. Rod Merrill, Dept. of Molecular and Cellular Biology
Dr. Stephen Seah, Dept. of Molecular and Cellular Biology
Dr. John Dawson, Dept. of Molecular and Cellular Biology

Advisory Committee:

Dr. Rod Merrill (Advisor)
Dr. Stephen Seah
Dr. Jennifer Geddes-McAlister

Abstract: Fire blight is a lethal disease of the *Rosaceae* plant family caused by *Erwinia amylovora*. A previous bioinformatics approach led to the discovery of Vorin and VorinI in *E. amylovora* as putative virulence factors of this plant pathogen. Vorin/VorinI is a novel type II toxin-antitoxin pair, where the effector, Vorin, is a secreted virulence factor and a mono-ADP-ribosyltransferase (mART) toxin that is toxic to both eukaryotes and bacteria. The non-lethal catalytic domain of Vorin, Vorin-cat, could not be expressed in *E. coli* despite reduced transcript levels, periplasmic expression, or semi-synthetic production. An inactive Vorin-cat variant was purified from inclusion bodies, successfully refolded, and was shown to bind NAD^+ substrate. The immunity partner, VorinI was also purified and shown to be a properly folded protein. Further characterization of this novel toxin-antitoxin system may facilitate the development of anti-virulence compounds to treat fire blight in *Rosaceae*

Curriculum Vitae: Zach completed his Bachelor of Science (Hons.) at the University of Guelph in the fall of 2018, and then began his MSc in the lab of Dr. Rod Merrill, that same semester.

Publications: Tremblay, O., **Thow, Z.**, Geddes-McAlister, J., and Merrill, A.R. (2020). Several New Putative Bacterial ADP-Ribosyltransferase Toxins Are Revealed from In Silico Data Mining, Including the Novel Toxin Vorin, Encoded by the Fire Blight Pathogen Erwinia amylovora. Toxins (Basel). *12*, 1–30.