



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

NORRIS CHAN

On Thursday, March 17, 2022 at 1:30 p.m. (online)

Thesis Title: Studies on the stability and interaction of the E3 ubiquitin Ligase HOS1 and proteins involved with cold acclimation and stomatal development in *Vitis riparia*

Examination Committee:

Dr. John Vessey, Dept. of Molecular and Cellular Biology (Exam Chair)
Dr. Annette Nassuth, Dept. of Molecular and Cellular Biology
Dr. Ian Tetlow, Dept. of Molecular and Cellular Biology
Dr. Tariq Akhtar, Dept. of Molecular and Cellular Biology

Advisory Committee:

Dr. Annette Nassuth (Co-Advisor)
Dr. Ian Tetlow (Co-Advisor)
Dr. Robert Mullen

Abstract: Frost injury in wine grape (*Vitis vinifera*) has led to serious losses in grape production every year. Studying the frost tolerance mechanism of the freezing tolerant grape (*Vitis riparia*) is an important step to solve this problem. ICE (inducer of CBF expression) transcription factors play an important role in preventing freezing injury through the ICE-CBF-COR pathway. On the other hand, ICE proteins are involved in three essential steps of stomatal development by forming dimers with three other bHLH transcription factors SPCH, MUTE and FAMA. In Arabidopsis, the E3 ubiquitin ligase HOS1 (HIGH EXPRESSION OF OSMOTICALLY RESPONSIVE PROTEIN 1) negatively regulates the ICE-CBF-COR pathway by interacting with and ubiquitinating ICE proteins, which leads to their degradation. It is not yet clear if HOS1 also interacts with and causes degradation of the stomata-specific proteins and any other *Vitis* ICE protein. We successfully amplified and cloned the cDNA for the single homolog of *VrHOS1*. BiFC analyses suggests that *VrHOS1* can interact with all 4 *VrICE* proteins, *VrSPCH* and *VrFAMA*, but not with *VrMUTE*. However, the function of *Vitis* HOS1 protein domains in its localization and protein-protein interaction was not clear. The Co-IP and protein degradation assays were inconclusive due to the low accumulation of *VrHOS1* protein extracts and the use of improper control. Nevertheless, our results indicate a possible connection between cold acclimation and stomatal development by *VrHOS1*.

Curriculum Vitae: Norris completed her BSc (Hons.) in Molecular Biology and Genetics at the University of Guelph in Winter 2019. She began her MSc of Molecular and Cellular Biology in the lab of Dr. Nassuth in Fall 2019.