Department of Molecular and Cellular Biology

Graduate Seminar MCB*6500

Friday, February 5, 2021 @12 p.m.

presented by:

Maude Belanger

(Co-Advisors: Dr. Ian Tetlow and Dr. Jaideep Mathur)

"Regulation of cytosolic invertase in sink tissues and its role in sucrose metabolism"

Cereals grains are of great agricultural importance in the food system and are a major sink organ. The carbohydrates, provided by photosynthetic tissues to non-photosynthetic sink tissues (e.g. seeds and roots), are used for energy and carbon supplies during growth and development. Therefore, sucrose partitioning between source and sink tissues is key for carbon allocation and crop yield. Two distinct pathways of sucrose cleavage use either sucrose synthase (SuSy) or cytosolic invertase (CINV) and are regulators of sucrose metabolism which largely determine the fate of photosynthate in sink tissues. The 10 CINV isoforms have been a lot less studied than the corresponding cell wall and vacuolar isozymes. The expression, post-translational regulation, and biochemical properties of CINVs are still poorly understood, particularly in relation to their operation and integration with other aspects of sink metabolism. Recent studies of a CINV mutant in *Arabidopsis* yielded a drastic growth phenotype demonstrating the crucial role of CINV sucrose metabolism. Studies identified phosphorylation and 14-3-3 protein binding as important post-translational regulatory mechanisms of CINV activity. I hypothesize that CINV in developing sink tissues is regulated by protein phosphorylation and protein-protein interactions, and that CINV is a determinant enzyme in the complex signaling pathway involving CINV and SuSy. The proposed research aims to identify protein-protein interactions *in vivo* with Yeast-2-hybrid assay, and *in vitro* using recombinant CINV isoforms. In addition, the recombinant CINV protein will be used as an affinity ligand for biochemical assays and to test the role of individual phosphorylation sites on CINV activity.