Department of Molecular and Cellular Biology

Graduate Seminar MCB*6500

Friday, Feb. 16, 2018 in SSC 1511 @ 12 noon

presented by:

Matthew Carswell

(Advisor: M. Emes)

"Posttranslational modification of starch biosynthetic enzymes in maize amyloplasts and regulation by 14-3-3 proteins"

The starch-rich endosperm of *Zea mays* and other cereal grains supports the bulk of human caloric intake, is a critical component of animal feed and serves several industrial applications. Wild-type maize amyloplasts exhibit a phosphorylation-dependent trimeric protein complex between two starch synthases and a starch branching enzyme, SSI-SSIIa-SBEIIb. An amylose extender (*ae*$^-$) mutant of maize characterized by a deletion within a region of SBEIIb containing two known phosphorylation sites (Ser286 and Ser297) exhibits altered starch granule morphology and possesses a novel heteromeric complex containing starch branching enzyme I. Proteomic analyses from maize and barley whole cell extracts have shown a ubiquitous class of 14-3-3 regulatory proteins to interact with SBEIIb *in vitro*. 14-3-3 monomers are able to form dimers and bind client proteins at phosphorylated motifs to regulate enzyme activity, localization and protein interactions. I hypothesize 14-3-3 proteins function as adaptors to facilitate formation of heteromeric complexes between enzymes of starch biosynthesis in the amyloplasts of maize endosperm. To test my hypothesis, I will identify the subcellular localization and isoforms of 14-3-3 proteins in maize amyloplasts. Co-immunoprecipitation experiments will identify *in vivo* interactions between 14-3-3 proteins and starch biosynthetic enzymes. Several recombinant SBEIIb mutants will then be developed to characterize a putative 14-3-3 binding site. My study will provide insight into the biochemical pathway underpinning starch biosynthesis, which essential towards improving crop yields and developing novel starches with desirable physiochemical properties.