



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

KEVIN REA, on Friday, September 15, 2017 at 1 p.m. in SSC 3317

(Advisor: Dr. T. Akhtar)

Thesis Title: Multifaceted *in vivo* and *in vitro* characterization of *cis*-prenyltransferase 5 from *Solanum lycopersicum*

Examination Committee:

Dr. A. Bendall, Dept. of Molecular and Cellular Biology (Chair)

Dr. T. Akhtar, Dept. of Molecular and Cellular Biology

Dr. M. Kimber, Dept. of Molecular and Cellular Biology

Dr. S. Graether, Dept. of Molecular and Cellular Biology

Abstract: The widespread occurrence of polyprenols throughout the plant kingdom is well documented. These compounds are believed to be assembled by a class of enzymes designated as *cis*-prenyltransferases (CPTs), which are encoded by small, yet largely uncharacterized, CPT gene families in plants. This research aimed to identify and characterize the CPT from *Solanum lycopersicum* (tomato) responsible for polyprenol synthesis. RNAi-mediated knockdown of one member of the tomato CPT family (SICPT5) reduced polyprenols in leaves by ~70%. Assays with recombinant SICPT5 determined that the enzyme synthesizes polyprenols of approximately C50-C55 in length and accommodates a variety of *trans*-prenyl diphosphate precursors as substrates. Introduction of SICPT5 into the polyprenol-deficient yeast *rer2Δ* mutant resulted in the accumulation of C55 polyprenols in yeast cells, restored proper protein *N*-glycosylation, and rescued the temperature sensitive growth phenotype associated with its polyprenol deficiency. Finally, site-directed mutagenesis of SICPT5 identified a suite of amino acids that are catalytically essential.

Curriculum Vitae: Kevin received his Hons. B.Sc. (Major Biomedical Sciences, Minor Molecular Biology and Genetics) from the University of Guelph in the summer of 2015, and then began his M.Sc. in the lab of Dr. Tariq Akhtar in September 2015.

Publications:

Tariq A Akhtar, Przemysław Surowiecki, Hanna Siekierska, Magdalena Kania, Kristen Van Gelder, Kevin Rea, Lilia Virta, Maritza Vatta, Katarzyna Gawarecka, Jacek Wojcik, Witold Danikiewicz, Daniel Buszewicz, Ewa Swiezewska, and Liliana Surmacz. 2017. Polyprenols are Synthesized by a Plastidial *cis*-Prenyltransferase and Influence Photosynthetic Performance. *Plant Cell*. 29 (7), 1709-1725.