



**Announcement:**

All interested members of the university community are invited to attend the Final Oral Examination for the degree of **Master of Science** of

**LILIA VIRTA**

on Tuesday, October 30, 2018 at 9:30 a.m. in SSC 1511

**Thesis Title:** Polyisoprenoid alcohols influence plastidial membrane dynamics and photosynthetic performance in *Solanum lycopersicum* and *Arabidopsis thaliana*.

**Examination Committee:**

Dr. A. Nassuth, Dept. of Molecular and Cellular Biology (Exam Chair)  
Dr. T. Akhtar, Dept. of Molecular and Cellular Biology  
Dr. J. Colasanti, Dept. of Molecular and Cellular Biology  
Dr. R. Mullen, Dept. of Molecular and Cellular Biology

**Advisory Committee:**

Dr. T. Akhtar (Adv)  
Dr. J. Wood  
Dr. J. Colasanti

**Abstract:** Polyisoprenoid alcohols (polyprenols and dolichols) are a class of natural products whose distribution throughout the plant kingdom is well known, yet their functional role is poorly understood. These compounds are assembled by a class of enzymes known as *cis*-prenyltransferases (CPTs), which are encoded by small gene families in plants. In this study, RNAi-mediated knockdown of members of the tomato (*Solanum lycopersicum*) and *Arabidopsis thaliana* CPT families (SICPT5 and AtCPT7) reduced polyprenols in leaves by ~56%. Subcellular fractionation studies and *in vivo* localization of CPT fluorescent protein fusions demonstrated that both CPTs reside in the chloroplast stroma and their products accumulate into chloroplast membranes. Fluorescence anisotropy measurements revealed that polyprenol-deficient chloroplast membranes were more disordered than wildtype membranes. These ‘disordered’ membranes exhibited lower phase transition temperatures and calorimetric enthalpies relative to wildtype, indicating alterations in integral membrane protein stability. These results uncover a role for polyprenols in governing chloroplast membrane dynamics.

**Curriculum Vitae:** Lilia obtained her Bachelor of Science (Hons.) at the University of Guelph in April 2016, and then began her M.Sc. in the lab of Dr. Tariq Akhtar in September of the same year.

**Publications:** Akhtar, T.A., Prezemysław, S., Siekierska, H., Kania, M., van Gelder, K., Rea, K.A., Virta, L.K.A., Vatta, M., Gawarecka, K., Wojcik, J., Danikiewicz, W., Buszewicz, D., Swiezewska, E., and Surmacz, L. (July 2017) Polyprenols are synthesized by a plastidial *cis*-prenyltransferase and influence photosynthetic performance. *Plant Cell* Vol. 29, pp. 1709-1725.

Van Gelder, K. Rea, K.A., Virta, L.K.A., Whitnell, K., Osborn, M., Vatta, M., Khozin, A., Skorupinska-Tudek, K., Surmacz, L., and Akhtar, T.A. (September 2018) Medium-chain polyprenols influence chloroplast membrane dynamics in *Solanum lycopersicum*. *Plant Cell Physiol.* (online) pp. 1-16.