

Department of Molecular and Cellular Biology
Graduate Seminar MCB*6500

Friday, January 22, 2021 @12 p.m.

presented by:

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“Investigating the effects of plastidial oligogalactolipid-synthesizing SFR2 on stromule formation and behaviour”

The plastid, a characteristic organelle of green plants, is the site of numerous important metabolic activities including photosynthesis and de novo fatty acid synthesis. While generally ellipsoid in shape, plastids spontaneously extend and retract stroma-filled tubules (stromules) through mechanisms and for functions that are not yet understood. The Mathur laboratory's investigations on stromule formation have led to considering the involvement of plastid acyl-lipid synthesis. Unlike most phospholipid-based membranes in eukaryotic cells, plastid membranes are predominantly composed of galactolipids. While bilayer-distorting monogalactosyldiacylglycerol and bilayer-promoting digalactosyldiacylglycerol are prevalent under normal growth conditions, oligogalactolipids (tri- and tetragalactosyldiacylglycerol) accumulate under certain membrane-damaging conditions (e.g. freezing stress). These additional bilayer-promoting lipids are produced from monogalactosyldiacylglycerol by the SENSITIVE TO FREEZING 2 (SFR2; At3g06510) enzyme, situated on the outer envelope membrane. It is hypothesized that SFR2 activity has an effect on stromule formation and behaviour. Investigations of this hypothesis will be based upon the transgenic overexpression of fluorescently-tagged SFR2 in model plant *Arabidopsis thaliana*. Characterization of the overexpression phenotype, along with the creation of appropriate transgenic controls, will be conducted. The relationship between stromule formation and lipid composition will be examined through parallel lipid profile and stromule frequency analyses (using thin layer chromatography and confocal laser scanning microscopy, respectively) under various conditions and levels of SFR2 expression. The results of this research may provide insights on the morphology and behaviour of this essential plant organelle.