# Department of Biochemistry and Molecular Biophysics Seminar

## Wednesday, September 23 at 4:00 p.m. in Ackert 120

Coffee and cookies at 3:45 p.m. in Chalmers 168


## Dr. Isabel Molina, Professor and Tier 2 Canada Research Chair in Plant Lipid Metabolism, University of Algoma


## From Triacylglycerols to Estolide Oils: Building a Liquid Cuticle on Tobacco Stigmas


Plant surfaces are protected by lipid barriers containing a core structure of polyesters derived from hydroxy fatty acids. One of such barriers is the cuticle, composed of the polyester cutin and waxes, which covers the aerial primary surfaces of plants and provides a first line of defense against pathogens, UV radiation, and water loss. Because cutin is covalently bound to cell walls, it is insoluble in conventional solvents, making it challenging to isolate in pure form and trace its biosynthetic intermediates. In contrast, the tobacco (*Nicotiana tabacum*) wet stigmas accumulate ω-hydroxy fatty acids in the form of glyceride estolides that remain soluble, making an oily secretion. This solubility is a key experimental advantage: individual biosynthetic intermediates can be isolated to dissect the pathway, whereas cutin can only be studied as an insoluble product. However, it is uncertain whether stigma lipid polyesters and cutin are assembled by similar biosynthetic pathways and involve related genes. To gain insight into the mechanism of biosynthesis of stigma lipid estolides, we have characterized their composition across tobacco stigma development and monitored their biosynthesis using a novel in planta radiolabeling approach that does not elicit wound response. Furthermore, we performed transcriptomic analyses of developing stigmas, which highlighted genes linked to cutin biosynthesis. Using a reverse genetic approach, we have characterized mutants of two candidate genes. These mutants displayed a dry stigma phenotype, poor pollen attachment, and decreased amounts of ω-hydroxy fatty acids in their stigma exudates. This study establishes a foundation for identifying the key components of the stigma estolide biosynthetic pathway. It may also offer novel insights into cutin biosynthesis.