BCHM 421/422, 2019/20

Project Outline: Our long-term research goal is to understand the *molecular, regulatory, and functional properties of key enzymes of plant carbohydrate and phosphate metabolism.* Current objectives are to assess the influence of seed development or environmental stressors such as nutritional phosphate deprivation on the function, regulation, protein:protein interactions, and subcellular targeting of key enzyme proteins. Post-translational modifications (PTMs) such as glycosylation and reversible phosphorylation have been a major focus since they represent pivotal regulatory events that integrate signaling, gene expression and metabolism with developmental and stress responses.

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Keywords:
1. plant metabolism & its control
2. protein purification & characterization
3. molecular biology & proteomics
4. post-translational enzyme modification
5. protein kinases & signal transduction

Project Goals: To identify the organization and control of plant carbohydrate and phosphorus (P) metabolism by characterizing the molecular, regulatory, and functional properties of key enzymes that regulate: i) C-partitioning to important storage end-products (starch, oil, & protein) in developing seeds, & ii) plant P acquisition and use (P is an essential but environmentally limiting macronutrient needed for crop growth and development). Our studies have significant applications to problems in Canadian and worldwide agriculture and environmental protection including the: i) targeted modification of storage oil versus protein levels in oilseed crops such as canola, and ii) development of P-use efficient crops, urgently needed to reduce agriculture's rampant but highly inefficient use of non-renewable, unsustainable, polluting, and expensive P-containing fertilizers.

Experimental Approaches: Projects may involve enzyme purification (using our ATKA FPLC) and characterization, immunological tools (western blotting &/or co-immunoprecipitation using specific antibodies), and molecular/genomic approaches such as mRNA profiling, recombinant enzyme expression and purification, and analysis of transgenic plants in which enzymes we study have been being 'knocked out' or overexpressed. All of these techniques are relevant to a broad variety of careers in the biological and life sciences, and biotech industry. Full time summer 2019 employment as research assistant may be available for qualified students who are interested in BCHM 421/422 research beginning next Sept. in our lab (note the Feb. 8 application deadline for my 2019 SWEP position in 'plant biochem & molecular biology').

References:

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