UNIVERSITY of GUELPH

COLLEGE of BIOLOGICAL SCIENCE

DEPARTMENT OF MOLECULAR AND CELLULAR BIOLOGY

MCB Seminar

MAR **TUES** **5** **10:30 AM** | **SSC 1511**

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TOPIC: Digging up the phosphorylation patterns of starches

Julia Compart is member of the Biopolymer Analytics research group of Prof. Dr. habil. Joerg Fettke at the Institute of Biology and Biochemistry at the University of Potsdam, Germany. She obtained her Bachelor degree at the Freie University of Berlin and completed here Master at the University of Potsdam in Biochemistry and Molecular Biology. In addition, she worked at the University of Zurich in the field of genetics and molecular biology with the aim to establish a particular CRISPR/Cas-system. Currently, the major aspect of her PhD project is to investigate the starch phosphorylation processes in various plant species. Here she combines state of the art molecular biology, biochemistry, and analytical methods.

Starch is the main energy and carbon reservoir of plants to withstand times when photosynthesis is not feasible. Moreover, the starch metabolism is subject to a severe regulation which is not understand in depth even though research has been going on for several decades. This includes inter alia the phosphoesterification. The phosphoesterification has an enormous impact on the starch properties and is also the only known naturally occurring covalent modification of starch granules. The catalysis is mediated by two dikinases, the α-glucan, water dikinase (GWD) and the phosphoglucan, water dikinase (PWD). Both catalyse the formation of phosphate esters at the OH-C6 and OH-C3 respectively of glucosyl residues within amylopectin on the starch granule surface. This has major impact on overall starch breakdown and synthesis. Introducing the phosphate groups initiates the opening of the helical structures of the amylopectin molecules and results in a phase transition of glucans from a highly-ordered to a solubilized state, which in turn enables the action of enzymes as hydrolases as well as synthases and phosphorylases. It has already been demonstrated that the action of the dikinases leads to the formation of single and double phosphorylated glucan chains using native starch granules and even triple phosphorylated chains while utilizing highly crystalline maltodextrins. However, the position within the glucan chains - where the phosphate group is covalently attached - is still unknown including whether this occurs according to a specific or a random distribution pattern. Furthermore, it is uncertain whether this pattern is conserved for starches and dikinases of different origin. Single phosphorylated glucans were analysed using GWDs from a dicotyledonous and a monocotyledonous plant. The study revealed that both GWDs preferentially introduce the phosphate group in the proximity of the branching points of amylopectin regardless of the starch origin. This supports the hypothesis that GWD penetrates as deep as possible into the surface of the starch granules in order to phosphorylate and open the helices effectively.

All welcome to attend
Refreshments will be served

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