Ackert Hall, Room 120
Wednesday, September 4, 2024
4:00 P.M.

Coffee and Cookies
Chalmers Hall, Room 168
3:45 P.M.

Biochemistry & Molecular Biophysics Seminar

Host peptides modulate Bacterial Metabolism

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Despite the central role of symbiosis in most life forms, the molecular dynamics of the processes that maintain this harmonious relationship and how sometimes a host exploits this relationship to take control over the partner, remain largely unknown. During symbiosis with the leguminous plant *Medicago truncatula*, the nitrogen-fixing soil bacterium *Sinorhizobium meliloti* undergoes a terminal bacteroid differentiation (TBD) process characterized by genome endoreduplication (attain polyploidy), cell division inhibition, and ultimately are unable to survive outside the host plant. More than 700 Nodule-specific Cysteine-Rich (NCR) peptides produced by the host plant, orchestrate this process and enslave the bacteria. The exact mechanism of how this arsenal of host peptides tames the intracellular bacteria is unknown. My study of the detailed mechanism of one of the NCR peptides-NCR247 demonstrates that these peptides have evolved to fine-tune the cellular metabolism of bacteria. This opened up a broad area of investigation involving a large set of uncharacterized peptides that have evolved to manipulate bacterial metabolism. We intend to answer two fundamental questions on this exploitative relationship. First, how do NCR peptides alter various metabolic pathways of bacteria and drive them to TBD? Second, what are the molecular factors that make a bacterium amenable to TBD? We are taking global approaches such as sc-RNA seq analysis to obtain the expression landscape of both the plant and bacterial transcripts. Using this to narrow down on the significantly expressed peptides, we will perform molecular characterization of individual peptides and study how they affect the metabolism of bacteria. Our work will not only help us better understand the molecular basis of symbiotic relationships but also provide an opportunity to test new methods to systematically dissect this important biology.