Graduate student opportunity: MSc position

The Geddes-McAlister lab at the University of Guelph uses state-of-the-art mass spectrometry to explore the interplay between hosts and pathogens during infection. We are interested in defining changes to the proteome to uncover novel infection-associated proteins and identify opportunities to perturb interactions with the host to promote the clearance of infection. The ultimate goal is to discover novel anti-virulence strategies to reduce our reliance on antimicrobial agents and impede the evolution of antimicrobial resistance. We work in a variety of biological systems, including fungal and bacterial pathogens (e.g., Cryptococcus neoformans, Klebsiella pneumoniae, Fusarium graminearum) and different host environments (e.g., mammalian and plant).

Dr. Geddes-McAlister (in collaboration with Dr. Rebecca Shapiro) is recruiting an MSc student to lead an investigation of the interplay between the fungal pathogen Fusarium graminearum and its hosts, wheat and barley, during infection. The project will provide technical training in mass spectrometry-based proteomics, metabolomics, advanced bioinformatics, molecular biology and biochemistry, as well as other disciplines.

Project overview:
For Ontario’s most productive and lucrative crops (e.g. corn, wheat, soybean), Fusarium infection leads to losses of over $200 million/year through yield reduction and reduced crop quality associated with damaged grains and the accumulation of mycotoxins. In cereal crops, the disease of Fusarium head blight (FHB) is primarily caused by Fusarium graminearum where the production of mycotoxins and specifically, deoxynivalenol (DON), has severe consequences for the livestock and poultry industries through consumption of contaminated feed. Moreover, the seepage of mycotoxins into ground water and their presence in food manufacturing presents a significant threat to human health. Current management strategies for FHB include single-dose fungicide treatment at heading, which assists with reducing infection rates, but significantly increases the cost to growers and provides little to no protection against the accumulation of mycotoxins if infection occurs. This proposal aims to address the needs of farmers and industrial end-users by applying a systems biology approach to identify and characterize mechanisms of fungal clearance and mycotoxin degradation within wheat. This approach will increase our knowledge of the pathways associated with mycotoxin degradation and identify specific resistance-associated genetic markers for a selected breeding strategy to improve crop yield and quality.

Interested candidates should submit a cover letter, CV, unofficial transcripts, and contact information for three referees to Dr. Jennifer Geddes-McAlister: jegeddesm@uoguelph.ca by Tuesday, March 31st, 2020.