2017 WSU Plant Sciences Retreat

Saturday, March 4th, CUE 202 with dinner and poster session, CUE

5th Floor

- 11:00 am Open poster session, CUE 5th Floor
- 1:00 pm Welcome and opening remarks: Prof. Michael Neff, MPS Program Director
- 1:15-2:45 Session I: Chair Andrei Smertenko

Prof. Cynthia Gleason: The battle underground: plant-nematode interactions. *Synopsis:* Root-knot nematodes are small, soil-borne pathogens that infect the roots of many crop plants and can cause significant agricultural losses. There are few naturally occurring resistant plants to root-knot nematodes. Therefore, our goal is to further our understanding of the susceptible response and use this information to help engineer novel nematode resistance. Our research identifies the genes encoding nematode secreted proteins and studies how the nematode proteins can manipulate the plant during infection. Here I will present our data on nematode proteins that are critical for successful parasitism.

Prof. Weidong Chen: Functions of non-host-selective phytotoxins: A case study of chickpea Ascochyta blight.

Synopsis: Phytotoxins are fungal secondary metabolites that are toxic to plants. Some phytotoxins are host-selective (toxic only to host plants) and function in host range and virulence, whereas others are non-host-selective (toxic to many plants), but have various assumed roles. The fungal pathogen *Ascochyta rabiei*, causal agent of chickpea Ascochyta blight, produces non-host-selective phytotoxin solanapyrones. Here I will show our experiments in assessing functions of the solanapyrone phytotoxins in disease and in competition and survival.

Dr. Florence Mus: Engineering synthetic symbioses between bacteria and plants to deliver nitrogen to crops.

Synopsis: Our lab develops technologies to enable symbiotic nitrogen fixation in non-legumes. We use synthetic biology to engineer nitrogen fixing organisms that will colonize plant roots and form new diazotroph-plant associations. These associations are expected to provide plants with additional nitrogen. Because the release of ammonium by soil diazotrophs, particularly those associated with roots, is of considerable agronomic interest, we have investigated possible mechanisms underlying ammonium release in the model diazotroph organism *A. vinelandii*.

Dr. Jeremy Jewell: Extracellular ATP signaling in plants.

Synopsis: In addition to being a central currency of cellular energy, ATP when perceived outside the cell is a near universal danger signal. This short presentation will review the recent discovery of the first plant extracellular ATP receptor, and will describe efforts by our lab to uncover roles and mechanisms of plant extracellular ATP signaling.

Dr. Meng Huang: Get you right there at right time for mapping genes of complex traits. *Synopsis*: We developed a novel computational tool named BLINK (Bayesian-information and Linkage-disequilibrium Iteratively Nested Keyway) for gene mapping. BLINK controls more effectively false positives caused by population structure and unequal relatedness among individuals than currently available tools. It also improves statistical power. However, BLINK is computationally very demanding. I will present results of our work on optimizing implementation of BLINK.

The WSU Plant Sciences Retreat is organized by the Molecular Plant Sciences Graduate Program with support from the Graduate School, the Agricultural Research Center, CAHNRS and the College of Sciences.

Rachel DeTar: Chloroplast K^+/H^+ antiporters: roles in photosynthesis and photomorphogenesis.

Synopsis: Potassium/proton antiporters in the chloroplast envelop are known to play a key role in the photosynthesis. My work reveals that loss of these transporters also disrupts the nucle-us-to-chloroplast signaling pathway that mediates the production of chlorophyll and components of the light harvesting machinery. These data underscore the link between ion homeostasis and chloroplast biogenesis.

2:30-3:15 Break

3:15-4:00 Session II: Chair Cynthia Gleason

Seanna Hewitt: Overcoming the challenges of determining genetic diversity in closely related genotypes that have undergone an evolutionary bottleneck.

Synopsis: Several outcrossing perennial species have undergone an evolutionary bottleneck due to artificial selection during breeding. One of the challenges in such genotypes is to determine the extent of diversity that can then be utilized for breeding decisions or accurate identification. I will discuss application of several techniques for determining genetic diversity using five closely related genotypes of an important Rosaceae member, sweet cherry (*Prunus avi-um*).

Shantel Martinez: Identifying the *ERA8* Locus in the Wheat Genome Through Bulk Segregant Analysis Exome Capture, RNA-Seq, and Traditional QTL Mapping.

Synopsis: Preharvest sprouting of wheat, germination of mature seeds on the mother plant when rain occurs before harvest, can greatly reduce flour quality. Higher seed dormancy and ABA sensitivity are both associated with preharvest sprouting tolerance. An induced mutant with Enhanced Response to ABA, ERA8, resulted in increased preharvest sprouting tolerance in the field. A locus associated with ERA8 was identified, providing a molecular breeding approach for increasing preharvest sprouting tolerance using ERA8.

Erika Kruse and Scott Carle: Snow mold & freezing cold: Identifying QTL for tolerance in winter wheat.

Synopsis: Winter wheat is under threat from numerous abiotic and biotic stresses. This study examined tolerance to freezing stress and snow mold in a winter wheat recombinant inbred line population, derived from tolerant and susceptible parents. We discovered four QTLs; one for both freezing and snow mold tolerance, two unique to freezing tolerance, and one unique to snow mold tolerance. This information will be used for breeding wheat with tolerance to these stresses.

4:00-4:10 Introduction of keynote speaker: Michael Neff, MPS Program Director

4:10-5:00 Dr Alisa Huffaker, UC San-Diego

Title: Identifying new components of the maize immune response through profiling of biotic stress-induced changes in phosphoproteome and metabolism

Synopsis: Plants encounter and interact with diverse species in their environment and fascinating biochemical processes underlie how they recognize invading organisms, activate immune responses and protect themselves. Using a combination of quantitative phosphoproteomics, metabolomics, forward and reverse genetics and comparative studies with model systems, we're working to unravel the mysteries of maize immune signaling and defenses.

5:15-9:30 Buffet dinner and poster viewing CUE 5th Floor.

The WSU Plant Sciences Retreat is organized by the Molecular Plant Sciences Graduate Program with support from the Graduate School, the Agricultural Research Center, CAHNRS and the College of Sciences.