GEORGE MASON UNIVERSITY
COLLEGE OF SCIENCE
DEPARTMENT OF BIOLOGY SEMINAR
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"The impact of glucosinolates on the microbiota and host health in *Pieris rapae*"

Background: The microbiota plays various roles in host health, such as modulating non-specific immune defense and aiding in food digestion (Dillon and Dillon, 2004; Genta, et al., 2006; Apajalahti, et al., 2001). Diet is also a significant contributor to the structure of the gut microbiota (Apajalaht, et al., 2001). In this study, *Pieris rapae,* the cabbage white butterfly, was used as a model system to investigate the roles of diet and the gut microbiota in host health. More specifically, we investigated how the concentration of sinigrin, a glucosinolate in the natural diet of this insect, alters microbial community structure and host immune response to the insect pathogen *Serratia marcescens*. Colonization resistance, or the ability of a microbial community to prevent colonization by invaders, is a key component of host defense against pathogens; as is the host's immune response (Dillon and Dillon, 2004). Shifts in microbial composition can result in altered colonization resistance and the activity of the immune system in response to pathogens (Antonopoulos et al. 2009). *Methods:* Larvae were fed a sterile wheat germ diet alone or amended with 3.0 mg/ml, 6.0 mg/ml, or 9.0 mg/ml sinigrin. To determine shifts in the microbiota structure, the 16S rRNA genes from the larvae midgut were subjected to pyrosequencing and analyzed. To determine the impact of diet on the immune response, larvae were fed one of the sinigrin treatments and a 5µl inoculum of *Serratia marcescens* or 1X PBS as a negative control. Quantitative PCR was then used to determine the fold change in the genes, *Pierisin-1, PPO,* and *Lys*. *Results:* The predominant phyla in all treatment groups were Proteobacteria and Firmicutes. Significant difference in beta diversity was observed between communities in larvae fed sinigrin 6.0 mg/ml and those in larvae fed the no sinigrin control diet. *Lys* expression was significantly down-regulated in larvae fed sinigrin 6.0 mg/ml and infected with *Serratia marcescens. Conclusion:* The impact of sinigrin on the structure of the midgut microbiota is dependent on concentration. Changes in the microbiota in response to sinigrin are associated with changes in immune response to infection by *Serratia marcescens*.

TUESDAY October 4, 2016
3:00-4:15 PM
Innovation Hall Room 131