Biology @ Acadia

WHAT'S THAT SMELL: THE EFFECTS OF PHEROMONE BLENDS ON ODOUR-MEDIATED BEHAVIOUR AND THE NEUROANATOMY OF THE EUROPEAN GYPSY MOTH, *LYMANTRIA DISPAR*

Deveau, Adam, Dr. Kirk Hillier
Department of Biology, Acadia University, Wolfville, NS

The European Gypsy moth, *Lymantria dispar* (*L. dispar*), is one of the world's most devastating forestry pests, feeding on more than 500 different species of plants. Since 1924 *L. dispar* have defoliated more than $34x10^6$ hectares of forest in the United States alone and is now the only forest pest under Federal Domestic Quarantine. *L. dispar* have invaded regions of Canada and are currently established within 50% of Nova Scotia, including the Annapolis Valley. This area is now part of a Canadian Food Inspection Agency quarantine zone, which places Acadia University a unique venue to study *L. dispar* without restrictions. Female *L. dispar* are flightless and therefore rely heavily on chemical signals to attract males for mating. This makes *L. dispar* mating especially susceptible to location disruption of females using pheromones as a control agent. However, (+) disparlure ((+) D), *L. dispar*'s pheromone, has an enantiomer (-) disparlure ((-) D) that is the primary component of the nun moth's (*Lymantria monacha*) pheromone. *L. monacha* is a sympatric species over much of the *L. dispar* distribution range. *L. dispar* males are deterred by too high a concentration of (-) D in female *L. monacha* pheromone, thus preventing interbreeding mistakes in the wild. In *L. dispar* there are two olfactory neurons in every pheromone-sensitive sensillum; one neuron responds to (+) D and the other to (-) D. The objective of this study was to measure the responses of olfactory receptor neurons to ratiometric blends of (+) D and (-) D via single sensillum recording to determine any inhibitory activity between these neurons through extracellular electric fields called ephaptic communication. Another objective was to examine if such an inhibitory effect of –D was modulated in a higher part of the insect brain, by imaging the antennal lobes, in both male and female *L. dispar*. Single sensillum recording suggested that there was some degree of inhibition of (+) D neurons at higher concentrations of (-) D. There were also synergistic responses from the (+) D neurons with blends that included a lower concentration of (-) D suggesting that the neurons may be more generalists and respond to both (+) D and (-) D. In contrast, there was little response from (-) D neurons when stimulated with (+) D and a greater response when stimulated with (-) D, suggesting that this neuron acted as a modulator and inhibited responses from (+) D neurons.

Adam Deveau graduated from Mt Blue High School in Farmington, ME in 2006. Upon arriving to Acadia, Adam quickly integrated himself into both the academic and campus life. He has been involved in the Sensory Motor Instructional Leadership Experience (S.M.I.L.E.) program at Acadia, which helps build personal and life skills for children with mental or physical disabilities. He has also volunteered and participated in the Relay for Life Organizing Committee for the past four years. Adam has also been a part Acadia's 'biobud' program, residence house council, and worked as teaching assistants for Intro to Chemistry and Anatomy & Physiology courses, but most notably has been a resident assistant for the past two years. Here, he was active in helping to build a community within Chase Court residence by organizing events, holding regular section meetings and using passive programming techniques to encourage group interactions. Next year Adam hopes to begin a Masters degree at Dalhousie University researching aspects of pediatric Acute Myeloid Leukemia. His ultimate goal is to one-day practice pediatric oncology here in the Maritimes.