

Biology Seminar



Western
UNIVERSITY · CANADA

12:30 - 1:30 pm
Friday, November 18, 2022
BGS 0153



Heath MacMillan

Associate Professor
Department of Biology and
Institute of Biochemistry
Carleton University
Ottawa

The impacts of microplastics on crickets, and crickets on microplastics

Interactions between terrestrial insects and microplastics (MPs) are poorly documented and understood, despite an estimated 4900 megatons of plastics being directed to terrestrial systems and insects being the most diverse group of animals on the planet. Generalist insects like crickets, for example, are also abundant in agricultural settings where wastewater sludge containing plastics is used as fertilizer. Plastics ingested by insects may be toxic, and given that many insects eat a diet containing hard plant materials or other insects, their gut anatomy and physiology may make them particularly effective at transforming ingested plastics. In this seminar, I will discuss several ongoing lab- and field-based projects through which we hope to better understand insect-plastic interactions. In the lab, we have developed a ground-dwelling generalist insect (a cricket; *Gryllobates sigillatus*) as a model species to understand the effects of plastic ingestion. Our initial work in this area suggests that crickets growth rates are resilient to large quantities of plastic in their diet, but these effects depend on form (e.g. fibres or beads). Organ-specific gene expression hints at effects of plastic ingestion on the physiology of several tissues, including those physically isolated from the gut (e.g. fat body and ovaries). By developing a novel pipeline for tracking the fate of fluorescent plastics in animal digestive systems, we have also been able to describe the effects of the cricket gut on the plastics themselves. The cricket digestive system efficiently breaks down microplastics, even down to the level of nanoplastics that may cross the gut wall. Taken together, our findings reinforce that plastic form is important to understanding its impacts on animal fitness, and that at least some terrestrial insects have the ability to dramatically transform microplastics. Whether this ability is realized in the wild, however, remains unclear.

