

Hannah Bodmer, University of Toronto - Mississauga, supervisors Shannon J. McCauley & Rosalind L. Murray

Stormwater vs natural ponds: The importance of ecological heterogeneity in shaping local dragonfly communities.

Urbanization threatens aquatic life by eliminating habitats and increasing the amount of polluted stormwater runoff entering waterways. Stormwater ponds are designed to collect stormwater runoff to prevent flooding and improve water quality in downstream natural waterbodies. These ponds are therefore often polluted by urban contaminants and considered of low ecological value. However, recent research suggests stormwater ponds still function as important habitats for aquatic organisms in cities. My research aims to determine the role that stormwater ponds play in providing habitats for urban species across their life cycles. To achieve this, I compared insect communities, with a focus on juvenile and adult dragonflies, in stormwater and natural ponds across an urbanization gradient in the Twin Cities Metropolitan Region, Minnesota, USA. I found that stormwater and natural ponds had similar insect and dragonfly community composition, and that ecological heterogeneity among ponds improved overall biodiversity. My findings advance our understanding of stormwater ponds as freshwater ecosystems to improve management practices that promote the conservation of aquatic biodiversity in urban environments.

Audrey Khani, York University, supervisor Gordon Fitch

Long-term analysis of bee pollination benefit from curated wildflower plantations at urban roadside greenery patches

Urban roadsides can provide pollinators habitat, but may act as ecological traps. We compared bee communities at three habitat types across Toronto using a paired design: roadside habitats with management practices encouraging flower diversity and abundance, mowed grassy roadsides, and non-roadside green spaces with abundant flowers. We also measured abundance and diversity of flowering plants, traffic, and noise. We hypothesized that roadsides managed for higher flower volume and diversity will support higher bee abundance and diversity compared to nearby mowed roadsides, but fewer than non-roadside sites. Bee abundance and diversity were positively associated with floral abundance and diversity, regardless of habitat type. Floral abundance and diversity were lower at mowed roadsides and higher but indistinguishable between flower-rich roadsides and non-roadside sites. Our findings suggest there is value in improving urban roadside conditions for pollinators to provide them with greater resources, but this likely depends on local characteristics, primarily flower diversity.

Sofiia Usenko, University of Toronto - Scarborough, supervisor Ina Anreiter

Behavioural and Transcriptional Consequences of PFAS exposure in *Drosophila melanogaster*

Per- and polyfluoroalkyl substances (PFAS) are persistent environmental pollutants associated with neurological and developmental toxicity, yet the molecular mechanisms underlying these effects remain poorly understood. My project investigates how developmental PFAS exposure affects growth, behaviour and gene expression in *Drosophila melanogaster*. First, I will identify PFAS compounds and concentrations that alter developmental outcomes such as pupation timing and

adult eclosion. Compounds producing the strongest phenotypes will then be tested for effects on larval and adult behaviour. For larval behaviour, backwards crawling, which is an escape response, will be assessed under various stimuli (CO₂, ether and ice exposures). Adult flight behaviour will be studied using a closed-loop flight arena that measures visuomotor control. Finally, RNA sequencing of adult fly brains / larvae will be used to identify transcriptional changes associated with observed effects. Together, these experiments will link environmental exposure to behavioural and molecular outcomes at both larval and adult stages, providing insight into the effects and mechanisms of PFAS-induced neurotoxicity.

Fatemeh Shirshah, York University, supervisor Gordon Fitch

Impact of Digestive System of Common Eastern Bumble Bees (*Bombus impatiens*) on Thymol, Carvacrol and Linalool, Three Dominant Chemotypes of *Monarda fistulosa*

Nectar, the sweet liquid produced by flowers to attract pollinators, often contains plant-derived chemical compounds known as specialized metabolites, which serve roles beyond basic nutrition. While these compounds are widely recognized for their toxic or medicinal properties, little is known about how they are metabolized or modified after ingestion by pollinators. In this study, we investigated how three such compounds, thymol, carvacrol, and linalool, found in the nectar of wild bergamot (*Monarda fistulosa*), are transformed during digestion by the common eastern bumble bee (*Bombus impatiens*). This study is comprised of two parts: a field experiment comparing nectar chemistry before and after ingestion, and a laboratory feeding experiment analyzing gut segments to investigate the fate of these compounds inside the bee. Field-collected samples revealed that thymol and linalool consistently decreased in concentration from nectar to the nectar crop, the first gut compartment, suggesting early transformation or absorption. In contrast, carvacrol showed more variable patterns. Laboratory experiments further showed that carvacrol become concentrated in the nectar crop and are subsequently degraded, mirroring the pattern observed in the field.

Beckett Robertson, University of Guelph

Entomology field work in Costa Rica

In winter 2026, I participated in numerous entomology research projects in Costa Rica at the Piro Biological Station on the Osa Peninsula. These included:

- Examination of the abundance and distribution of coprophagous dung beetle species that specialize on certain groups of mammals. The goal is to use these dung beetles as bioindicators to understand the population sizes and distributions of the mammal groups on which they rely for dung. This is an ongoing project at the station.
- Data collection of soldiers, workers, and reproductive termites of an undescribed species of *Microcerotermes* termite was done for multiple colonies to measure the ratio of castes found in each nest. Termitophile species living in the nests were also recorded and collected to examine host specificity compared to arboreal *Nasutitermes* species.
- Photographs I took of a very large wandering spider (*Phoneutria* sp.) indicate that it is an undescribed species. Future work will include a description of this species and taxonomic revision of the genus.