

Presentation Abstracts

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The uninvited dinner guests... and how to get rid of them

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German cockroaches are pests in human dwellings. We hypothesized that German cockroaches are strongly attracted to human foods. In laboratory experiments, we bioassayed the responses of the insects to many food types. In a field experiment, one particularly attractive food type proved as appealing to the cockroaches as the leading commercial bait.

Female black widow spiders respond to semiochemicals from conspecific females

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Females of many web-building spiders produce long-range semiochemicals (message-bearing chemicals). Males respond to them in their search for females, distinguishing between prospective mates that differ in feeding status (well-fed or starved) and sexual maturity (juvenile or adult).

Female spiders whose webs were destroyed often seek the presence of other females when they rebuild their webs. We tested the hypothesis that females respond to semiochemicals from other females when they select new web-building sites. We ran Y-tube olfactometer experiments with adult virgin females of the Western black widow spider (*Latrodectus hesperus*) and the redback spider (*L. hasselti*), offering them a choice between a blank control stimulus and a treatment stimulus consisting of a conspecific female. We found that *L. hesperus* females avoid sub-adult and adult conspecific females, whereas *L. hasselti* females avoid only adult conspecific females. Females of both species preferred starved to well-fed females. This is the first evidence for semiochemical-guided decision-making by female spiders and for semiochemicals produced by sub-adult females. Future work will focus on the identification of the semiochemicals that mediate the avoidance of well-fed females.

Communication between yellowjacket wasps and symbiotic yeast

Tamara Babcock, Department of Biological Sciences, Simon Fraser University, Burnaby, B.C., Canada

Recent studies suggest that yellowjackets may share a mutualistic relationship with fermentative yeast, but little is known about how these organisms find each other. Our research demonstrates that yeast from the digestive tract of yellowjackets produces attractive volatiles when grown on grape juice-infused agar.

Mosquitoes: nectar thieves or pollinators?

Dan Peach and Gerhard Gries, Department of Biological Sciences, Simon Fraser University, Burnaby, B.C., Canada

Outside of interactions with humans and pathogens, many aspects of mosquito ecology have severe knowledge gaps. While feeding on floral nectar is important to mosquitoes, they are traditionally thought to not pollinate the flowers they visit. Contradicting this, we report evidence that mosquitoes pollinate common tansy and yarrow.

A song of ants and fire: improving baiting methods for the European fire ant

Danielle Hoefele, Department of Biological Sciences, Simon Fraser University, Burnaby, B.C., Canada

The invasive European fire ant (*Myrmica rubra*) defends nests aggressively, rendering gardens, lawns and parks unusable. I tested various foods for foraging activity by European fire ants to determine whether they prefer specific carbohydrates and proteins. These results will be used in the future to develop a more effective insecticidal bait.

Evaluation of two passive horizontal transmission pathways for *Metarhizium brunneum* in *Agriotes obscurus* click beetles

J. P. S. Leung, J. S. Cory, J. T. Kabaluk, and A. F. Janmaat, Department of Biological Sciences, Simon Fraser University, Burnaby, B.C., Canada

Fungal pathogens are unique among entomopathogens in that ingestion is not required for transmission. They can be passively transferred to conspecifics through direct contact or through contact with contaminated substrates. We discuss the relative importance of these two pathways for *Metarhizium brunneum* in the control of *Agriotes obscurus* click beetles.

Filling in the gaps of the IMD immune pathway of the kissing bug *Rhodnius prolixus*

Nicolas Salcedo and Carl Lowenberger, Department of Biological Sciences, Simon Fraser University

Rhodnius prolixus is a hemathophagous hemipteran vector of the parasite *Trypanosoma cruzi*. Similar to other hemimetabolous insects, the genome of *R. prolixus* had no key components of the highly conserved IMD pathway. However, IMD-related effector immune genes are normally expressed. Using bioinformatics, I propose candidate genes completing the IMD pathway.

Population dynamics of the western tent caterpillar: the roles of fecundity, disease, and temperature

Paul MacDonald, Department of Biological Sciences, Simon Fraser University, Burnaby, B.C., Canada

Many populations of forest Lepidoptera exhibit regular periodic cycling in abundance, but mechanisms for such dynamics remain a subject of debate in ecology. I used annual field data (1977–2015) from a cyclical species, the western tent caterpillar (*Malacosoma californicum pluviale*), to elucidate how fecundity, viral disease, and temperature contribute to the cyclical dynamics of five field populations.

A selfish X chromosome in a mushroom-feeding *Drosophila*

Graeme Keais and Steve Perlman, Department of Biology, University of Victoria, Victoria, B.C., Canada

Selfish genetic elements are widespread and powerful forces in evolution. By increasing their transmission relative to the rest of the genome for each generation, they spread rapidly through populations, even if they carry a negative fitness cost. Driving X chromosomes are selfish genetic elements that kill Y-bearing sperm in a number of Dipterans. Because males that carry a driving X transmit almost exclusively X-bearing gametes, they produce predominantly female offspring. We provide the first evidence for a driving X chromosome in a common European mushroom-feeding *Drosophila* species. Males carrying the driving X sire between 80–100% female offspring, and most of their sons (of which there are few) are sterile and appear to lack a Y chromosome. Sperm bundles in driving X males develop abnormally, indicating that the driving X is acting during male gametogenesis.

Photosensitivity in developing mountain pine beetle (*Dendroctonus ponderosae*)

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This research explores the capacity for photosensitivity in developing mountain pine beetles (*Dendroctonus ponderosae*). The identification of a long-wavelength opsin and negative phototaxis in eyeless beetle larvae, as well as an effect of photoperiod on adult emergence, suggest that light may function in survival and life-cycle coordination in this species.

Earwigs (*Forficula auricularia*) as a biocontrol agent: deciphering a generalist predator

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The European Earwig (*Forficula auricularia*) has garnered scientific interest and public distrust due to its controversial status as both a beneficial predator and an urban pest. We investigate the potential for its use as a biocontrol agent through dietary gut-content analysis and the effects of temperature on its predation efficacy.

The role of pathogen diversity on the evolution of resistance in an insect

Leon Li, Department of Biological Sciences, Simon Fraser University, Burnaby, B.C., Canada

Our objective is to determine whether baculovirus diversity affects the rate and magnitude at which resistance evolves. Using *Trichoplusia ni* as a host, changes in resistance against single versus mixtures of AcMNPV were examined. We found evidence of reduced resistance, as well as increased life-history costs in diverse infections.

Response of epigaic arthropods to riparian habitat enhancement trials in Kinbasket Reservoir, British Columbia

Charlene M. Wood and Virgil C. Hawkes, LGL Limited Environmental Research Associates

We monitored the response of ground-dwelling spider and beetle assemblages (over 200 species) to habitat enhancement trials in Kinbasket Reservoir, British Columbia, from 2014–2015. Species differed one year post-treatment, with treatment assemblages initially dominated by bare-ground associated species. Monitoring is ongoing to evaluate the turnover in species assemblages as vegetation establishes over time.

Role of toxins in insect defensive symbiosis

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Insects are commonly infected with bacterial endosymbionts that are transmitted primarily from mothers to their offspring, often in the egg cytoplasm. These inherited symbionts play important roles in the ecology and evolution of their hosts, such as protecting them against a wide range of natural enemies, including predators, parasites, and pathogens. Little is known about the mechanism of protection by symbionts. Is there specificity? How do defensive symbionts target enemies without harming their host? We studied protection in a defensive symbiosis between the common mushroom-feeding fly, *Drosophila neotestacea*, and its bacterial endosymbiont, *Spiroplasma*, which protects its host against parasitic nematodes and wasps. We found that *Spiroplasma* encodes ribosome-inactivating proteins, related to Shiga toxins, and that nematode ribosomes show a strong signal of toxin-mediated attack. It is likely that symbiont-encoded toxins are common and versatile tools in defensive symbiosis.

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Scott Montague, Blackhole Collections

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