OE3C 2024 Speakers

Keynote Speakers

*Keynote: Ecology*

Dr. Jessica Forrest (she/her/hers)

Dr. Forrest studies the evolutionary ecology of plant–pollinator interactions. She is interested in the causes and consequences of variation in species’ life histories and seasonal phenologies, particularly as these traits relate to species interactions. She explores how pollinators and animal-pollinated plants are coping in a world that is getting warmer and more densely populated by humans. A primary application of Dr. Forrest’s research is in understanding ways that climate change and other forms of global change affect pollinators (especially native solitary bees) and pollination. Her work has primarily focused on bees and plants in natural habitats, but she is also interested in how better knowledge of native bee ecology can benefit agriculture.

Dr. Forrest is currently an Associate Professor in the Department of Biology at the University of Ottawa. She completed her B.Sc. at McGill University, M.Sc. at Queen's University, her PhD at the University of Toronto in the department of Ecology and Evolutionary Biology, and a Postdoctoral Fellowship at the University of California, Davis.

Jessica’s Talk:

**Making sense of specialization in solitary bees**

Animals range in diet breadth from super-generalists to narrow specialists. Despite its evident disadvantages, dietary specialization has evolved frequently–likely because specialists are more efficient than generalists, or because specialization on low-quality or toxic food allows consumers to avoid competitors, predators, or parasites. In bees, specialization on particular host plants for pollen appears distinctly non-random: while specialists make up approximately 25% of the eastern North American bee fauna, these insects use pollen from only ~6% of plant genera and 3% of families. In this talk, I ask: why do some plant taxa appear to be popular hosts for specialist bees, while others are ignored? Specifically, I will present work from my lab testing two distinct hypotheses to explain patterns of host–plant use in specialist solitary bees. The first (the pollen quality hypothesis) proposes that specialists associate preferentially with plants whose pollen is undesirable or even noxious to generalist competitors and natural enemies; the second (the “predictable plethora”, or pollen quantity, hypothesis) proposes that specialists primarily exploit plant taxa that reliably provide large quantities of floral resources. Using laboratory rearing experiments, field surveys, and analysis of community-science data, we find limited support for the pollen quality hypothesis, but strong evidence for the pollen quantity hypothesis. While some plant taxa with low-quality pollen are avoided by generalists and favoured by specialists, not all host plants of specialists have low-quality pollen. In contrast, plant taxa with high regional abundance, as measured by community science observations, are far more likely than rare plants to host specialist bees. It remains to be seen whether host abundance predicts patterns of dietary specialization in taxa other than bees.

*Keynote: Ethology*

Dr. Hannah ter Hofstede (she/her/hers)

Dr. ter Hofstede conducts her research in the field of sensory ecology, specifically investigating how sensory systems encode environmental cues that are crucial for an animal’s survival and reproduction. She has always been fascinated by animals and their behaviour, particularly by the ways in which sensory system evolution interacts with the behaviour and ecology of animals. Her research investigates how animal sensory systems filter the information they obtain about their environment and how sensory systems coevolve with behaviour. Much of her work to date explores the acoustic world of bats and their insect prey.

Dr. ter Hofstede is currently an Assistant Professor at the University of Windsor in the Department of integrative Biology and the Chair of the Behaviour, Cognition and Neuroscience program. She also acts as an affiliate faculty member in the Ecology, Evolution, Environment and Society Graduate Program at Dartmouth College in the U.S. Dr. ter Hofstede completed her M.Sc. at York University, her PhD at the University of Toronto Mississauga, and postdoctoral positions in the U.K. at the University of Bristol, and Cambridge University.

Hannah’s Talk:

**The acoustic world of bats and insects**

As nocturnal animals, bats and their insect prey rely heavily on acoustic cues and signals to orient, communicate, find food, and avoid predators in the dark. Bats use echolocation to avoid obstacles and locate flying insects, and many insects have ears that allow them to detect the ultrasonic calls of bats. Differences between species in the production and responses to sounds are well-documented, but individual differences within species are less known. In this talk, I will describe three studies investigating individual variation and variation over time in the acoustic ecology of bats and insects.

We investigated individual variation in the acoustic properties of big brown bat echolocation calls and found that repeatable differences in call duration across individuals is correlated with the ratio of time spent in open or cluttered areas. We also used an acoustic camera to assign communication calls to bats in flight and document the variation seen in these types of calls. Finally, we looked at changes in anti-predator behaviour in katydids over their adult lives, finding that they become less cautious and spend more time singing as they age, but they continue to pause or cease singing in response to bat calls throughout the season.

*Keynote: Evolution*

Dr. Rebecca Doyle (she/her/hers)

Dr. Doyle is fascinated by the concept that we, as humans, host many folds more microbial cells than human cells, and that DNA in microbes can have profound impacts on their hosts. In the Doyle lab, experimental approaches in combination with sequencing and genomic analyses are often used to capture evolution occurring in real time. She works to quantify how microbial genomes within a population change in response to environmental change, and in turn, how such microbial evolution impacts their host's ability to survive and reproduce.

Dr. Doyle is an Assistant Professor in the Department of Biology at McMaster University. She completed her B.Sc. and M.Sc. at Memorial University of Newfoundland, her PhD in Ecology and Evolutionary Biology at the University of Toronto, and a Postdoctoral Fellowship through the Institute for Genomic Biology at the University of Illinois.

Rebecca’s Talk:

**Disentangling the selective drivers of mutualism decline of a keystone nutritional symbiosis**

Nutritional mutualisms, whereby unrelated species trade resources such as carbon (C) and nitrogen (N) to one another’s mutual benefit, form keystone interactions in many ecosystems and play critical roles in Earth’s nutrient cycles. Yet, the evolutionary persistence of these vital interactions is threatened by a rapidly changing environment. Previous work on the model legume-rhizobium mutualism, wherein N fixed by rhizobia is traded for C fixed by legumes, found that long-term N-supplementation in the form of mineral fertilizer caused an evolutionary decline in the benefits rhizobia provide to their legume hosts. However, the selective agents driving this evolutionary shift remained unclear.

To disentangle the drivers of mutualism decline, I experimentally evolved multiple populations of rhizobia (28 strains each) with or without legume hosts (plant+, plant-) under both N-supplementation (N+) or N-free (N-) conditions across four plant growing seasons, representing hundreds of rhizobium generations. At the end of the evolution experiment, I assessed how past exposure to N or plants impacted the rhizobia population’s ability to confer plant growth benefits. When plants had been present during experimental evolution, my results recapitulated what was observed in the field: plants grew smaller when they were inoculated with rhizobia that evolved under N+ compared to N- conditions. However, when plants had been absent during experimental evolution, the growth benefits rhizobia conferred were similar regardless of whether they were exposed to N or not. I explore the various mechanisms underlying the observed shift in quality, including changes in rhizobia population size and composition. Overall, these results suggest that the evolutionary shift towards less beneficial rhizobia under N-supplementation is mediated by the indirect effects of hosts rather than the direct effects of N itself.

Panel Speakers

Patricia Huynh (she/her/hers)

Patricia Huynh is the Sustainability Projects Manager, a PhD candidate, and a sessional instructor at the University of Waterloo. Patricia leads the coordination, development and implementation of projects that advance campus sustainability within the context of the Environmental Sustainability Strategy and Campus Climate Action Plan at the university. Patricia actively works to link academic research and learning opportunities with tangible, on-campus pilot, demonstration, and deployment projects with a focus on sustainability and climate action. Patricia has worked as a biologist, nature interpreter, and conservation engagement intern and is passionate about conservation, restoration, community building, and sustainable living.

Jean-Marc Daigle (he/him/his)

Jean-Marc Daigle is a licensed landscape architect with over 40 years industry experience as both a landscape architect and builder in a wide range of commercial, industrial, institutional and residential settings. He is a creative and versatile designer with an in-depth knowledge of landscape construction processes, with extensive experience in field construction, project management and construction supervision. Jean-Marc specializes in ecological landscaping, ecological restoration and naturalization, “xeriscaping”, natural habitat creation, natural swimming pool design and construction, low impact development, and shoreline stabilization and enhancement. He has a keen interest in the creation of ecologically sustainable landscapes and greenspaces that foster positive experiences of, and interaction with, the natural world. Jean-Marc was a co-author of Restoring Nature’s Place: A Guide to Naturalizing Ontario Parks and Greenspace, recognized as a preeminent guide on ecological restoration in Ontario.

Brendon Samuels (he/him/his)

Brendon Samuels is a PhD candidate in the Department of Biology at Western University where he studies solutions for preventing bird-window collisions. Brendon is active in London's environmental sector, advocating for public education programs and policies that conserve biodiversity and advance climate change adaptation. He also maintains a naturalized yard and organizes regular litter cleanups in the community. Brendon is interested in strategies for shifting public perception of urban habitats as undesirably messy or disposable, mitigating conflicts with wildlife, and cultivating intercultural awareness of humans as agents in ecosystems.