

Department of Molecular and Cellular Biology
Graduate Seminar MCB*6500

Friday, February 16, 2024 @ 12:45 p.m.

presented by:

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(Advisor: Dr. Emma Allen-Vercoe)

**"The Role of the Microbiome in the Defence Against
Nosema Infection in Bumble Bees"**

Bumble bees (*Bombus* spp.) are highly beneficial insects whose pollination services are critical to environmental well-being and global food security. Alarmingly, bumble bee populations are in decline, in large part due to unsustainably high disease prevalence. One devastating disease contributing to these declines is nosemosis, which is an intestinal disease that leads to dysentery, lethargy, and, in many cases, mortality. Nosemosis is caused by infection with *Nosema* spp., a group of obligate intracellular microsporidian parasites. Infections are currently reaching pandemic levels, with up to 91% of commercial hives in Canadian regions being affected. Due to a unique life cycle and intracellular nature, *Nosema* spp. are notoriously difficult to treat, often evading the recommended antifungal treatments and necessitating alternative strategies. One potential alternative treatment strategy involves the use of healthy gut microbiome communities, which can act to both exclude pathogens and to modulate the host immune system. This study aims to assess the impact of gut microbiomes derived from several groups of bumble bees on health outcomes following infection with *Nosema* spp. Microbial community composition and function will be assessed using rRNA sequencing and metabolomics, host immune gene expression will be assessed using RT-PCR, and the presence of *Nosema* spp. will be assessed using qPCR and fluorescence microscopy. This research will contribute to the development of novel treatments for nosemosis to safeguard the health of both domestic and wild bees. Furthermore, this research will provide valuable insight into mutual exclusion and the roles of gut bacteria in health and disease.