81st ANNUAL MEETING

Insects & Microbes: the good, the bad, the weird

24 October 2025
Canad Inns Destination Centre Fort Garry - 1824 Pembina Hwy.
25 October 2025
Department of Entomology (Room 219)
12 Dafoe Road, University of Manitoba

DAY 1, 24 OCTOBER

8:15 Parking, registration, refreshments

8:50 Welcome
Bryan Cassone, Scientific Chair

8:55 Greetings from ESM President
David Wade

Keynote address
Chair: Bryan Cassone

9:00 The Release of 1 Billion Male Mosquitoes and Counting: Impact and Lessons Learned. **B.J. White**; Debug Project, Google LLC.

10:00 Refreshment break and Poster session

Posters

Vaccines for Honey Bees: Cell Surface Display of Deformed Wing Virus Proteins in *Escherichia coli*. **D. Strelaeff**; Department of Entomology, University of Manitoba. [SC]

Mapping the Evolutionary Diversity of Prairie Bees in Southern Manitoba. **T. Hettiarachchi**; Department of Entomology, University of Manitoba. [SC]

Pictorial Dichotomous Key for Carabid Genera Found in Agricultural Fields of Manitoba. **E. Ott**[1], A. Zashev[1], Y. Lawley[2], and A.C. Costamagna[1]; [1]Department of Entomology and [2]Department of Plant Sciences, University of Manitoba. [SC]

How Do Disturbance-based Management Practices Influence Soil Properties and the Presence of Preferred Plant Species for Poweshiek Skipperling in Manitoba? **J.M.S. Jasso**[1], R. Westwood[2], and N. Koper[3]; [1]Department of Entomology, University of Manitoba, [2]Department of Biology, University of Winnipeg, [3]Department of Biology, University of Northern British Columbia. [SC]

The Effect of Arbuscular Mycorrhizal Fungi Colonization in Wheat on Wheat Midge Oviposition and Larval Performances. **D. Gamage**[1], C.D.S. Weeraddana[1], S. Wolfe[2], and A. C. Costamagna[1]; [1]Department of Entomology, University of Manitoba, [2]Morden Research and Development Centre, Agriculture and Agri-food Canada. [SC]

Submitted papers
Chair: Vince Hervet

10:30 Winter Biology of the Beach-dwelling Carabid Beetle, *Chlaenius Cordicollis* in Manitoba. **N.J. Holliday**[1]; Department of Entomology, University of Manitoba.

10:45 Spatial Distribution of Flea Beetles (Phyllotreta Spp.), Their Damage, and Predators in Canola Fields. **R.C. Talavera**[1], Yvonne Lawley[2], and Alejandro C. Costamagna[1]; [1]Department of Entomology, University of Manitoba, [2]Department of Plants Science, University of Manitoba. [SC]

11:00 Collecting Tabanidae with Multiple Traps Leads to the Detection of *Anaplasma marginale*. **M. Currie** and K. Rochon; Department of Entomology, University of Manitoba. [SC]

11:15 Hybridization in Three Species of Lasius Ants (Subgenus Acanthomyops) in Manitoba. **B. Krongold**; Department of Entomology, University of Manitoba. [SC]

11:30 The Effect of Abiotic and Biotic Factors on Oviposition and Larval Performance of Wheat Midge. **C.D.S. Weeraddana**[1], R. Wijesundara[1], S.A. Schmidt[2,3], S.L. Nam[2,3], C. McCartney[4], J.J. Harynuk[2,3], and A.C. Costamagna[1]; [1]Department of Entomology, University of Manitoba, [2]Department of Chemistry, University of Alberta; [3]Metabolomics Innovation Centre, Edmonton, [4]Department of Plant Science, University of Manitoba.

11:45 The Effect of Feeding Water, Sugar and Honey Solutions on the Longevity of Adult Wheat Midge. **A. Weeraddana**[1], **A. Weeraddana**[2], C.D.S. Weeraddana[3], and A.C. Costamagna[3]; [1]Acadia School, Winnipeg, [2]Bairdmore School, Winnipeg, [3]Department of Entomology, University of Manitoba

12:00 Lunch on your own

Submitted papers continued
Chair: Brad White

13:30 Landscape Drivers of Pathogen Spillover Between Honey Bees and Wild Bees. **K. Peters** and K. Bobiwash; Department of Entomology, University of Manitoba. [SC]

Bolded – presenting author; [SC] – Student competition participant; Please see abstracts for detailed affiliations

13:45 A Very Hungry Galleria mellonella: Polyethylene Biodegradation by Microbial Species and the Host. **L. Haubrick**, C.M.R. LeMoine, and B.J. Cassone; Department of Biology, Brandon University. [SC]

14:00 Neural Development and Cognition in the Greater Waxworm. **K. Shields** and Bryan J. Cassone; Department of Biology, Brandon University. [SC]

14:15 Investigating the Feasibility of Using Mycotoxin Contaminated Barley as Sustainable Feed for Yellow Mealworm Production. **H. Slobodian**; Department of Biosystems Engineering, University of Manitoba. [SC]

14:30 Refreshment break and Poster session

Submitted papers continued
Chair: David Wade

15:00 Cover Crops have Genera-Specific Effects for Carabids in Canola. **E. Ott**[1], A. Zashev[1], Y. Lawley[2], and A.C. Costamagna[1]; [1]Department of Entomology and [2]Department of Plant Sciences, University of Manitoba. [SC]

15:15 A. Chukwunta and B.J. Cassone. *De Novo* Transcriptome of *Hypnoidus abbreviatus* and *Limonius californicus*: Identifying Key Detoxification Genes. **A. Chukwunta** and Bryan J. Cassone; Department of Biology, Brandon University. [SC]

15:30 Beyond Nets and Pins: Non-invasive Macro Photography Reveals Rare and Range-Extended Sri Lankan Insects. **T. Hettiarachchi**; Department of Entomology, University of Manitoba. [SC]

15:45 Neotropical Bees of the Genus *Heriades Spinola*, 1808 (Hymenoptera: Megachilidae: Osmiini) With Description of Nine New Species. **L. Rojas-Arias**, T. Griswold, I. Hinojosa-Díaz, J.J. Morrone, and R.A. Barajas; Department of Entomology, University of Manitoba. [SC]

Mixer

20:00 You are invited to our mixer at Pat MacKay and Bob Lamb's home, where we can socialize and announce the winners of the student competition! Directions to their home are provided at the registration desk.

DAY 2, 25 OCTOBER

8:15 Parking, registration, refreshments

8:45 Welcome
Bryan Cassone, Scientific Chair

Symposium
Chair: Bryan Cassone

9:00 West Nile Virus Surveillance in Manitoba. **T. Carnelley**; Communicable Disease Prevention and Control Branch, Public Health Division, Manitoba Health, Seniors and Long-Term Care.

9:45 Beneath the Soil and Beyond the Genome: Linking Field Ecology, Cryptic Clades, and Bacteriome Structure in *Hypnoidus bicolor*. **I. Drahun**; Department of Biological Sciences, Brock University.

10:30 Refreshment break

11:00 Pathogen Specific Enrichment on Tick Microbiomes. **H. Coatsworth**[1], C. Loomer[1], C. Urfano[1], B. Waitt[1], C. Bonner[2], and Morag Graham[2]; [1]Mycobacteriology, Vector-borne and Prion Diseases Division and [2]Genomics Core, Science Technology Operations Division, National Microbiology Laboratory, Public Health Agency of Canada.

11:45 Weevils Gone Wild: An Update on Insects on Crops in Manitoba. **J. Gavloski**; Manitoba Agriculture.

12:25 Adjournment
Bryan Cassone

12:30 Lunch

Annual Business Meeting (Room 219, Entomology)
13:00 ESM Annual Business Meeting

REGISTRATION
Annual Membership Dues
Member - Regular: $25.00
Member - Student: $10.00

Conference Fees
Member - Regular: $30.00
Member - Student: $10.00
Non-member - Regular: $60.00
Non-member - Student: $25.00
Fees for online participants are the same.

Donations
We welcome donations to the Society, particularly to increase the value of student scholarships. Receipts are available upon request for tax purposes.

The ESM Thanks the following Sponsors for their Generous Support of the Meeting
Gold – Orkin Canada, North/South Consultants
Bronze – Canadian Centre for Mosquito Management, Cano Pest Control, City of Winnipeg, Taz Pest Control

2025 Organising Committee: Bryan Cassone (Chair), Lisa Capar , Kathy Cano, Vanessa Siemens, Sheila Wolfe, Justis Henault

ENTOMOLOGICAL SOCIETY OF MANITOBA

Bolded – presenting author; [SC] – Student competition participant; Please see abstracts for detailed affiliations

Abstracts in order of presentation
(bolded – presenting author)

Day 1 – October 24

Keynote

The Release of 1 Billion Male Mosquitoes and Counting: Impact and Lessons Learned

Bradley J. White

Debug Project, Google LLC, San Francisco, CA, USA

Dr. White will present the Debug program, an initiative aimed at suppressing populations of disease-carrying mosquitoes. The method involves releasing sterile, non-GMO male mosquitoes that have been infected with the *Wolbachia* bacterium. He will provide an overview of the manufacturing process, from egg production to the AI-based sex sorting of adult mosquitoes. Dr. White will also review findings from various global field deployments and conclude with future plans for scaling the project to help protect the more than four billion people at risk of contracting a mosquito-borne disease each year.

Student Competition - Poster

Vaccines for Honey Bees: Cell Surface Display of Deformed Wing Virus Proteins in *Escherichia coli*

Danika Strelaeff

Department of Entomology, University of Manitoba, Winnipeg, MB, Canada

Honey bees are essential pollinators for global food security, often contributing to nearly one-third of crop production. However, their populations face increasing threats from various pathogens, including deformed wing virus (DWV), a major contributor to colony decline that causes physical deformities, paralysis, and premature death. Currently, no antiviral treatments exist for DWV or similar honey bee viruses. In response, this study aims to develop a novel vaccine strategy targeting DWV using bacterial surface display technology.

We employed recombinant DNA techniques to express four structural proteins from DWV on the outer membrane of *Escherichia coli*. These engineered bacteria are designed to be orally delivered to bees, potentially stimulating their immune system. To ensure proper antigen presentation, the viral proteins were displayed on the bacterial surface. We accomplished this by incorporating histidine tags into the protein constructs, allowing for selective binding to NTAcoated magnetic beads. If proteins were displayed externally, whole cells would adhere to the beads.

Our findings demonstrated a significant increase in binding, ranging from 30- to 50-fold, between the recombinant E. coli and the magnetic beads compared to controls, confirming successful surface localization of the DWV proteins. With these promising results, the next phase involves testing in honey bees. These trials will focus on three primary questions: (1) Does the vaccine elicit an immune response in honey bees? (2) What are its effects on health and survival? and (3) Can it reduce mortality in bees challenged with DWV?

In summary, the confirmed surface expression of DWV proteins in *E. coli* offers a promising tool for honey bee vaccination. Moving into honey bee trials, this work has the potential to pave our approach against viral threats and how we design future treatments. This essential work will not only help to protect our pollinators but also the crops they pollinate.

Student Competition - Poster

Mapping the Evolutionary Diversity of Prairie Bees in Southern Manitoba

Thilina Hettiarachchi

Department of Entomology, University of Manitoba, Winnipeg, MB, Canada

Over 97% of native prairie has been lost, yet the remaining grasslands still support diverse bee communities. Because simple species counts miss how much evolutionary history a site contains, we combine standardized field sampling with genomics to map phylogenetic diversity (PD) and identify conservation priorities that protect irreplaceable lineages. In 2024–2025 we surveyed 38 grassland sites, most sampled twice, using a 10-station transect per site with raised pan traps (blue, yellow, white) and flower netting. Specimens are curated and identified as vouchers. For genomics, we extract DNA, break it into short pieces, and attach barcoded adapters to make Illumina libraries. We then enrich libraries for informative loci, sequence them on an Illumina platform, and assemble data to build a "bee family tree." From these trees we calculate PD and site complementarity to reveal places that conserve the greatest amount of evolutionary history per unit effort. By communicating the full pipeline—from fieldwork to phylogeny—this outreach poster explains why evolutionary diversity matters, how we measure it, and how DNA data can pinpoint which bees we cannot afford to lose and where conservation and restoration will yield the biggest evolutionary return.

Student Competition - Poster

Pictorial Dichotomous Key for Carabid Genera Found in Agricultural Fields of Manitoba

Ethan Ott[1], Aleksandar Zashev[1], Yvonne Lawley[2], and Alejandro C. Costamagna[1]

[1]Department of Entomology, University of Manitoba, Winnipeg, MB, Canada
[2]Department of Plant Sciences, University of Manitoba, Winnipeg, MB, Canada

Developing a pictorial carabid dichotomous key provides a clear process on how to effectively identify traits through visual images. Therefore, aiding in efficiency with the processing of pitfall traps. Most carabids are ground predators, thus knowing which are present in Manitoba crop fields may be useful in finding plausible carabids for testing if they can serve as an agent for conservation biological control against an agricultural pest of interest. The sequence of traits in this key were primarily based on a carabid key Carl Lindroth produced (Lindroth, 1961-1969), but updated with new branches in the dichotomous key to include updated taxonomy to include species of carabids that are now a part of their own genus, e.g., *Poecilus* (used to be *Pterostichus*). These new branches were created by using the subgenus traits mentioned by Lindroth (Lindroth, 1961-1969), a carabid key by Yves Bousquet (Bousquet, 2010) and some additional information was given to describe some genera, such as *Diplocheila*; this extra information came from a book published by Arthur V. Evans (Evans, 2014). Furthermore, a publication by Dr. Holliday *et al.* (2014) was used to verify which of these genera splits are present in Manitoba, before inclusion in the key. This key is based mainly on genera identified from 2024-2025 from pitfalls in Manitoba croplands. Most images were taken using a Canon EOS 7D Mark II camera from the J.B Wallis / R. E. Roughly Museum of Entomology and then stacked using Helicon Focus. These carabids photographed were of pinned museum specimens. The full written key (word document format) contains their museum code, references in each couplet and image descriptions.

Student Competition - Poster

How Do Disturbance-based Management Practices Influence Soil Properties and the Presence of Preferred Plant Species for Poweshiek Skipperling in Manitoba?

Jessica Mariana Sánchez Jasso[1], Richard Westwood[2], and Nicola Koper[3]

[1]Department of Entomology, University of Manitoba, Winnipeg, MB, Canada
[2]Department of Biology, University of Winnipeg, Winnipeg, MB, Canada
[3]Department of Biology, University of Northern British Columbia, Prince George, BC, Canada

The Canadian habitat recovery strategy for the endangered Skipper, *Oarisma poweshiek* promotes disturbance-based management practices (e.g., cattle grazing, prescribed burns and mowing). Soils are critical components of the prairie ecosystem, influencing the availability and quality of plants needed to support *O. poweshiek*. We analyzed soil properties to determine their effects on the presence and frequency of preferred plant species for the *O. poweshiek* across occupied and unoccupied sites, and under different management practices. Preferred nectar plants such as *Rudbeckia hirta* and *Dalea purpurea* were associated with high soil moisture and nutrient-rich environments. In contrast, species such as *Prunella vulgaris* and *Solidago ptarmicoides* appeared more tolerant of lower nutrient levels. Similarly, preferred larva host grasses such as *Muhlenbergia richardsonis* and *Andropogon gerardii* may tolerate lower soil fertility or moisture. Our results showed that vegetation patterns are reflected in different land management practices that influence soil quality and, in turn, plant diversity. By understanding how management practices affect soil conditions, land-managers can make informed decisions to maintain suitable habitat for *O. poweshiek*.

Student Competition - Poster

The Effect of Arbuscular Mycorrhizal Fungi Colonization in Wheat on Wheat Midge Oviposition and Larval Performances

Daham Gamage[1], Chaminda De Silva Weeraddana[1], S. Wolfe[2], and Alejandro C. Costamagna[1]

[1]Department of Entomology, University of Manitoba, Winnipeg, MB, Canada
[2]Morden Research and Development Centre, Agriculture and Agri-food Canada, Winnipeg MB, Canada

One of the most destructive insect pests upon wheat, grown in Canadian fields, is the orange wheat blossom midge, commonly known as wheat midge, *Sitodiplosis mosellana* (Géhin, 1857) (Diptera: Cecidomyiidae). Arbuscular mycorrhizae associations are present in two-thirds of all land plants and affect plant growth by increasing nutrient uptake, stress tolerance and inducing defences against pathogens. However, there is limited information on the impact of belowground arbuscular mycorrhizal colonization on aboveground insect infestation. In this study, we tested the hypothesis that arbuscular mycorrhizal colonization could increase plant defences and subsequently reduce wheat midge infestation. Susceptible wheat cultivar 'Roblin' was used for all experiments. Two different amounts of commercially available mycorrhizal inoculum (low: 1.7 g/pot; high: 5.1 g/pot) were mixed with the soil when planting one-week-old seedlings. Results showed that wheat midge females laid a similar number of eggs and developed a similar number of larvae in no-choice tests. A similar trend was observed in choice oviposition tests, comparing non-inoculated versus low mycorrhiza (n = 14 replicates) and non-inoculated versus high mycorrhiza (n = 17 replicates). In three-way choice tests (n = 18 replicates) between lowand high-mycorrhizal inoculated and non-inoculated plants, the lowest number of eggs was laid on plants that were inoculated with a higher amount of mycorrhiza, intermediate levels in low mycorrhizal inoculated plants and the highest number of eggs on non-inoculated plants (n = 18 biological replicates). However, mycorrhizal inoculated plants had similar aboveground and below-ground plant fresh weight. Further, mycorrhizal colonization was confirmed by trypan blue staining of plant roots. These results will improve our knowledge of tri-trophic interactions between arbuscular mycorrhizae, host plants, and insects. Future experiments should explore the effect of ectomycorrhiza on wheat midge oviposition and larvae performance on susceptible and deterrent wheat varieties

Submitted Paper

Winter Biology of the Beach-dwelling Carabid Beetle, *Chlaenius Cordicollis* in Manitoba

Neil J. Holliday

Department of Entomology, University of Manitoba, Winnipeg, MB, Canada

On stony beaches of Lake Winnipeg, *Chlaenius cordicollis* is nocturnally active from May–September. Adults overwinter in gravel at the top of the beaches, often in aggregations below accumulated leaf-litter. Adult survival is jeopardized at −7 °C or lower, and snow insulation is vital to winter survival: once the lake is ice-covered, snow blows from the ice surface and accumulates over the wintering sites, which can remain above −2 °C despite air temperatures below −30 °C. Adult mobility is reduced below +5 °C, so movement to the beach top well before snow falls can avoid lethal swamping by a wind-driven seiche on a cold September night. Based on peak numbers in fall and the following spring, winter mortality averages 60%. Winter mortality is increased by rainfall during the period of lake ice cover and by early spring rainfall and fluctuating lake levels between ice break-up and the spring peak of adults. Winter mortality is density dependent and may have a regulatory influence on populations.

Student Competition – Oral Presentation

Spatial Distribution of Flea Beetles (*Phyllotreta* Spp.), Their Damage, and Predators in Canola Fields

Raquel Chinchin Talavera[1], Yvonne Lawley[2], and Alejandro C. Costamagna[1]

[1]Department of Entomology, University of Manitoba, Winnipeg, Manitoba, Canada
[2]Department of Plants Science, University of Manitoba, Winnipeg, MB, Canada

Flea beetles from the genus *Phyllotreta* are among the most severe insect pests of Canola (*Brassica napus* L. and *B*. *rapa* L.) in North America. Crucifer (*P. cruciferae* Goeze, 1777) and striped (*P. striolata* Fabricius, 1803) flea beetles overwinter as adults and emerge and colonize crops in spring and early summer, causing severe damage at early growth stages in canola. Male-produced aggregation pheromones are suggested to drive clustering behaviors that can influence the impact of their damage and management, but their spatial distribution within fields remains unknown. We examined the spatial distribution of flea beetles and their damage in grids of 9 x 5 sampling points (n = 45 sampling points per date) in two canola field sites. Sampling points were arranged 5 and 10 m apart, depending on field size. Flea beetle and ground predator abundance were estimated with yellow sticky traps and pitfall traps, which were renewed weekly. Defoliation was assessed visually on transects of 10 contiguous plants per sampling point. Distribution and associations were analyzed using Spatial Analysis by Distance Indices (SADIE) to identify patch locations and generate clustering maps. Flea beetle abundance and damage were low, but flea beetles showed trends of aggregation at the scale tested. The relationships between flea beetle and patterns of defoliation, as well as between flea beetle and predator aggregation, will be discussed. Understanding spatial associations of clustering maps may allow for better flea beetle control by reducing sampling effort and minimizing pesticide use.

Student Competition – Oral Presentation

Collecting Tabanidae with Multiple Traps Leads to the Detection of *Anaplasma marginale*

Mabel Currie and Kateryn Rochon

Department of Entomology, University of Manitoba, Winnipeg, Manitoba, Canada

Anaplasma marginale is the causal agent of bovine anaplasmosis, a blood-transmittible bacterial disease that severely impacts cattle health. Horse flies (Diptera: Tabanidae) are suspected to transmit of *A. marginale* mechanically, but detecting the bacteria on their mouthparts has proved challenging. We used oil-based pan traps alongside Manitoba horse fly traps to increase the number of flies captured, suitable for molecular testing. Traps were deployed at three cattle farms in south-eastern Manitoba and sampled biweekly from June until September 2025. Flies were identified to species, their midguts dissected and tested for *A. marginale* using qualitative PCR. We successfully amplified *A. marginale* in three flies collected from pan traps and one from a Manitoba trap. We confirmed these results with DNA sequencing. This was the first detection in horse flies within Manitoba. This indicates that specimens captured with this technique maintain sufficient DNA quality for molecular study and suggests that pan traps are a suitable way to augment Manitoba horse fly traps while collecting flies for *A. marginale* surveillance.

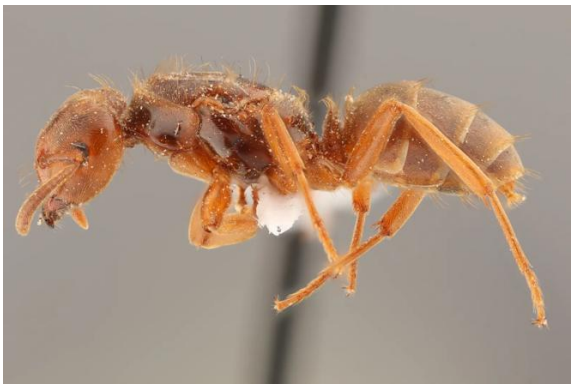
Student Competition – Oral Presentation

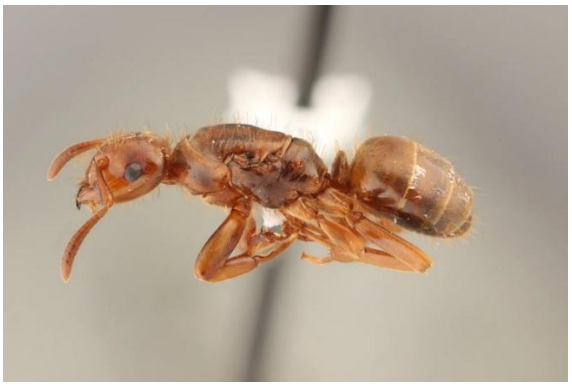
Hybridization in Three Species of *Lasius* Ants (Subgenus *Acanthomyops*) in Manitoba

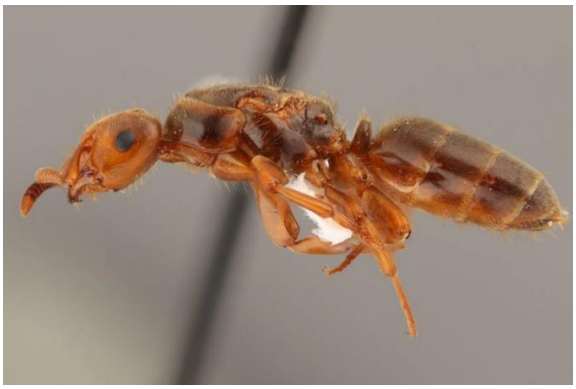
Benjamin Krongold

Department of Entomology, University of Manitoba, Winnipeg, MB, Canada

Ants of the subgenus *Acanthomyops* are well known for their tendency to hybridize, with five currently known hybrids out of a total of 15 described species. Here I report the discovery of three previously unknown hybrids, *Lasius interjectus* × *subglaber, Lasius interjectus* × *latipes* and *Lasius latipes* × *subglaber* from queen specimens collected at Bird's Hill Provincial Park, bringing the total up to eight. Hybridization was inferred based on the intermediate phenotype of these specimens, presence of certain defining characteristics and the abundance of the parent species at the collection locality. Morphometrical analyses were conducted between individuals of both parent species and individuals displaying hybrid morphology to further confirm the presence of intermediate features.







Submitted Paper

The Effect of Abiotic and Biotic Factors on Oviposition and Larval Performance of Wheat Midge

Chaminda De Silva Weeraddana[1], Ramya Wijesundara[1], Sheri A. Schmidt[2,3], Seo Lin Nam[2,3], Curt McCartney[4], James J. Harynuk[2,3], and Alejandro C. Costamagna[1]

[1]Department of Entomology, University of Manitoba, Winnipeg, MB, R3T 2N2, Canada
[2]Department of Chemistry, University of Alberta, Edmonton, AB, Canada.
[3]The Metabolomics Innovation Centre, Edmonton, Alberta, Canada.
[4] Department of Plant Science, University of Manitoba, Winnipeg, MB, R3T 2N2, Canada

The wheat midge, *Sitodiplosis mosellana* (Géhin) (Diptera: Cecidomyiidae), is a sporadic pest in the wheat-growing regions in Canada. Wheat crops are impacted by various abiotic and biotic factors that could directly or indirectly influence wheat midge oviposition and larval performance. In recent years, farmers have been facing increasingly extreme weather conditions, including droughts and floods. In this study, we investigated the impact of short-term drought and flooding treatments on wheat midge oviposition and larval development. Plants exposed to drought treatment had fewer eggs, resulting in small larvae with a low survival rate. In contrast, wheat midges preferred to lay more eggs on plants exposed to the flooding treatment and exhibited higher larval survival rates. The volatile organic compound (VOC) profiles of plants exposed to drought and flooding conditions were different from VOC profiles of control plants. Wheat midge oviposition may also be influenced by various biotic factors, such as wheat plants that have wheat midge eggs and larvae. Results showed that wheat midge adults could not distinguish between plants with eggs and larvae versus control plants. Taken together, these results indicate that various abiotic and biotic factors differentially influence the interactions between wheat midges and their host plant.

Submitted Paper

The Effect of Feeding Water, Sugar and Honey Solutions on the Longevity of Adult Wheat Midge

Abhitha Weeraddana[1], **Adhisha Weeraddana**[2], Chaminda De Silva Weeraddana[3], and Alejandro C. Costamagna[3]

[1]Acadia School, Pembina Trails School Division, 175 Killarney Ave, Winnipeg, MB, Canada
[2]Bairdmore School, Pembina Trails School Division, 700 Bairdmore Blvd, Winnipeg, MB, Canada
[3]Department of Entomology, University of Manitoba, Winnipeg, MB, Canada

The wheat midge, *Sitodiplosis mosellana* (Géhin), is a significant insect pest that feeds on wheat in Canada. Wheat midge adults are short-lived insects, and it is challenging to keep them alive for laboratory experiments and rearing purposes. We hypothesized that sugar and honey feeding may increase their longevity. In this study, we supplied wheat midge females and males with water, sugar, honey and a mix of sugar and honey solutions. We also included a treatment without water or any sugar/ honey solutions for treatment comparisons. All solutions were replenished every two days, and the adults were given new feeding solutions until they died. We recorded their mortality daily. Results showed that both wheat midge females and males nearly double their life span when fed with sugar, honey or a mix of sugar and honey solutions compared to the water alone treatment. Adults lived the shortest time when we did not provide any water, sugar or honey solutions. This information can be used to optimize lab experiments testing wheat resistance and to increase the viability of wheat midge colonies in the laboratory. Future studies will focus on testing whether these treatments increase wheat midge fecundity.

Student Competition – Oral Presentation

Landscape Drivers of Pathogen Spillover Between Honey Bees and Wild Bees

Kira Peters and Kyle Bobiwash

Department of Entomology, University of Manitoba, Winnipeg, MB, Canada

Managed and wild bees increasingly interact across agricultural landscapes in North America. Trends in honey bee (*Apis mellifera*) losses driven by increases in pest and pathogen prevalence may also affect wild pollinators should honey bees be competent viral vectors. Viruses in honey bees have been extensively studied, but there is still much unknown about the risks they pose and how they are transmitted to wild bees, especially outside of bumble bees. We sampled wild bees, honey bees, and pollen from wild bees from 20 sites varying in agricultural and honey bee density across Manitoba to better understand honey bee virus transmission. Samples were individually tested for five common honey bee viruses via RT-qPCR to help us better understand the role of various landscape factors, pollen, honey bee density and virus abundance, and various wild bee traits in virus transmission. We found that for commonly detected viruses, a variety of factors including agricultural land use, honey bee virus abundance, phylogenetic distance from honey bees, and date, were significant in predicting virus detection in wild bees, while honey bee density was not significant. These data can help us predict disease risk in wild bees and improves our understanding of viral transmission dynamics. This also could mean that employing effective disease management strategies in honey bee hives could also benefit wild bee health, and developments in colony disease treatments should be a priority.

Student Competition – Oral Presentation

A Very Hungry *Galleria mellonella*: Polyethylene Biodegradation by Microbial Species and the Host.

Linden Haubrick, Chris M.R. LeMoine, and Bryan J. Cassone

Department of Biology, Brandon University, Brandon, MB, Canada

Various insect "plastivores" have been discovered to demonstrate the ability to consume and biodegrade LDPE in particular, the caterpillar larvae of the greater wax moth, *Galleria mellonella*. These organisms demonstrate remarkable efficiency in breaking down plastics, a capability likely attributed to both the insect host and the diverse microorganisms residing in their intestinal tracts. To date, only enzymes contributed from the animal putatively involved in LDPE biodegradation have been identified, with little known about the microbial enzymes. Further, little known about the metabolic pathways involved in the breakdown of LDPE by *Galleria mellonella*. Previous research from our group has shown that several lipid oxidation enzymes are upregulated in larvae fed on plastic. We are now investigating the functional effects of gene knockdown on these upregulated enzymes and examining the impacts.

This presentation focuses on how we plan to uncover the enzymatic machinery responsible for LDPE biodegradation in cultivable and uncultivable microorganisms, and the host metabolic pathways involved in biodegradation of this synthetic polymer.

Student Competition – Oral Presentation

Neural Development and Cognition in the Greater Waxworm

Katie Shields and Bryan J. Cassone

Department of Biology, Brandon University, Brandon, MB, Canada

Metamorphosis in moths and butterflies has been broadly viewed as the breaking down of the caterpillar in its entirety. The goal of this presentation is to challenge this previously held belief by exploring behavioural and developmental observations in the greater waxworm (*Galleria mellonella*). Within this talk we will clarify what is occurring during lepidopteran metamorphosis, how it is being measured, and how these measures can be applied to our understanding of neural development in holometabolous organisms. We will share our current findings on the application of classical conditioning and our observations of developmental changes in the greater waxworm. Finally, we will explore what the next steps are towards bridging the gap in our knowledge of lepidopteran metamorphosis.

Student Competition – Oral Presentation

Investigating the Feasibility of Using Mycotoxin Contaminated Barley as Sustainable Feed for Yellow Mealworm Production

Hunter Slobodian

Department of Biosystems Engineering, University of Manitoba, Winnipeg, MB, Canada

This thesis project investigates the feasibility of using spoiled barley as a feed source for yellow mealworms (*Tenebrio molitor*), an edible insect species. This area of research is important because of the high amount of food waste, specifically grain, that occurs in Canada and worldwide. Using insects to convert waste into a food source can help address issues of food security and environmental sustainability. The project aims to address the following research questions:
• How does spoiled, mycotoxin contaminated barley affect mealworm growth performance, nutritional quality, and population dynamics?
• Can mealworms transform this grain into safe and nutritious animal feed?
• Could using spoiled barley to produce mealworms be economically viable and produce a lower carbon footprint than using clean grain?
To answer these questions, the research will evaluate the viability of yellow mealworms reared on spoiled barley that contains 3 contamination levels of Deoxynivalenol (DON) up to 50 ppm.

The project will also look at whether mealworms can metabolize DON into safe compounds and assess the nutritional composition of the mealworms reared on spoiled grain compared to those reared on good grain.
The methods used include:
• Rearing yellow mealworms in controlled conditions (temperature, relative humidity, mycotoxin concentration).
• Insect fitness assessed based on larval development time, pupal mass, and adult population growth.
• Analyzing mycotoxin concentrations in pupal mealworms and substrates using high-performance liquid chromatography (HPLC).
• Insect nutritional quality assessed based on nutrients such as proteins, fats, lipids, carbohydrates, and antioxidants in the mealworms.
• Conducting an economic analysis based on existing literature and project costs.
• Comparing the carbon footprint of using spoiled grain versus clean grain for insect feed production.

This project could provide a sustainable and economically viable method for managing spoiled grain, reducing food waste, and creating a valuable protein source. The results will provide a comprehensive evaluation of the feasibility of using spoiled grain to produce edible insects and will set guidelines for the safe and effective implementation of this process.

Student Competition – Oral Presentation

Cover Crops have Genera-Specific Effects for Carabids in Canola

Ethan Ott[1], Aleksandar Zashev[1], Yvonne Lawley[2], and Alejandro C. Costamagna[1]
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Cover crops have the potential to provide additional resources, increasing the abundance of beneficial insects in crops. We tested the effects of adding rye as a cover crop on canola on the abundance of carabid beetles. The experiment was run during three consecutive weeks by sampling carabids using pitfall traps renewed weekly at the U of M Ian Morrison Research Farm in Carman. The layout of the experiment consisted of 8 treatments in 8 x 8 m plots, randomly distributed in a completely randomized block design (n=4). The treatments were as follows: 1) Fall rye terminated seven days before planting; 2) Fall rye terminated one day after planting; 3) Fall rye terminated at cotyledon stage of canola; 4) Fall rye terminated at two-leaf stage of canola; 5) control with no fall rye; 6) control with no fall rye and no insecticides; 7) termination of fall rye at cotyledon stage of canola with no insecticides; and 8) termination of fall rye at two leaf stage of canola with no insecticides. The carabid genera counts over the three weeks were accumulated for analysis. Linear mixed models showed different effects of treatments for some genera. *Agonum* and *Pterostichus* had higher abundance when the fall rye was terminated at a later date. By contrast *Bembidion* numbers were the highest when fall rye was terminated early or lacking. Finally, a fourth genus *Harpalus* showed a difference between treatments 2 and 5. These results suggest that cover crop effects cannot be easily generalized for different carabids.

Student Competition – Oral Presentation

De Novo Transcriptome of *Hypnoidus abbreviatus* and *Limonius californicus:* Identifying Key Detoxification Genes

Augustine Chukwunta and Bryan J. Cassone

Department of Biology, Brandon University, MB, Canada

Wireworms are soil-dwelling larvae of click beetles (Coleoptera: Elateridae), with a worm-like appearance. They are among the most challenging agricultural pests to manage worldwide, especially in North America and Europe. Our study focuses on the biology of *Hypnoidus abbreviatus* and *Limonius californicus,* which are among the dominant species in Western Canada. The adult click beetles pose no significant threat to crops, but the larvae burrow the soil and feed on seeds, seedlings, roots and other below ground plants such as potatoes, grains, corn, and soybeans, causing significant damage to crops. Currently, control methods rely heavily on fungicides, yet the molecular mechanisms of these important agricultural pests remain poorly understood. To address this gap, we constructed the first high-quality transcriptome for both species. RNA-seq reads were assembled using Trinity, generating 34,594 transcripts for *H. abbreviatus* and 59,747 transcripts for *L. californicus*, with BUSCO scores of 97.6% and 97.7% respectively. Subsequent annotation and analysis identified high representation of cytochrome P450s, UDP-glucuronosyltransferases (UGTs), and glutathione S-transferases (GSTs), which are directly associated with metabolic resistance of exogenous substances, such as pesticides, across other pest species. This study provides genomic resources that will facilitate future studies of wireworm biology. The Identification of P450 genes and their associated gene families offer novel strategies to break through their defenses.

Student Competition – Oral Presentation

Beyond Nets and Pins: Non-invasive Macro Photography Reveals Rare and Range-Extended Sri Lankan Insects

Thilina Hettiarachchi
Department of Entomology, University of Manitoba, Winnipeg, MB, Canada

From April 5 to May 5, 2025, I documented Sri Lankan arthropods using day- and night-time macro photography and uploaded photographs to iNaturalist for identification and permanent archiving. This non-collecting survey produced several major results: the first confirmed Sri Lankan record of the anthidiine bee *Pachyanthidium lachrymosum* (Smith, 1879) based on a photographed male (a clear range extension); documentation of the rare lachryphagous stingless bee *Lisotrigona cacciae* (Nurse 1907); the first live images of the firefly *Gorhamia compressicornis* Pic, 1911 (confirmed against type specimens); the rediscovery of *Deltonotus subcucullatus* (Walker, 1871) and other rare pygmy grasshoppers; and the first live images of the ants *Tetramorium yerburyi* Forel, 1902 and *Calyptomyrmex singalensis* Baroni Urbani, 1975. Notable acridids photographed include *Ochlandriphaga xanthelytrana* Henry, 1933, *Rakwana ornata* Henry, 1933, *Eliya venusta* Henry, 1933, and *Zeylonacris* cf. *cingalensis* (Kirby, 1914). These findings show that high-quality photographic documentation combined with collaborative online identification platforms can facilitate important biodiversity discoveries in regions where specimen collection permits are difficult to obtain, highlighting the complementary role of in situ macro photography in modern biodiversity science.

Student Competition – Oral Presentation

Neotropical Bees of the Genus Heriades Spinola, 1808 (Hymenoptera: Megachilidae: Osmiini) With Description of Nine New Species.

L. Rojas-Arias, T. Griswold, I. Hinojosa-Díaz, J.J. Morrone, and R.A. Barajas;
Department of Entomology, University of Manitoba.

Heriades is a genus of solitary bees of the family Megachilidae. It is a monophyletic group divided into eight subgenera, of which Neotrypetes is the only one distributed in the Americas. The revisions by Michener (1938) and by Griswold (1984) are the only ones known for Heriades in the region. An updated revision of Heriades for the Neotropical region, based on external morphology and male genitalia, is presented here. 15 species recognized for the genus, nine of which are new to science. The species are: *Heriades amanda* **sp. nov**., *H. briceida* **sp. nov**., *H. viridiana* **sp. nov**., *H. danuncia* **sp. nov**., *H. cristina* **sp. nov.**, *H. vulcanica* **sp. nov.**, *H. nora* **sp.** nov., *H. mariana* **sp. nov.**, *H. luisa*. **sp. nov.***, H. bruneri* Titus, *H. crucifera* Cockerell, *H. currani* Michener, *H. leavitti* Crawford, *H. micheneri* Timberlake, and *H. texana* Michener. A new synonym is proposed, *Heriades tayrona* Gonzalez & Griswold as synonym of *H. currani* **syn. nov.** Diagnoses, descriptions, illustrations and distributional maps of the species are included, as well as identification keys for the group in the region.

Symposium

West Nile Virus Surveillance in Manitoba

Trevor Carnelley

Communicable Disease Prevention and Control Branch, Public Health Division, Manitoba Health, Seniors and Long-Term Care

West Nile virus (WNV) is a mosquito-borne zoonotic illness that is a reportable human disease in Manitoba and nationally in Canada. *Culex tarsalis* mosquitoes are the most important vector for WNV transmission to humans in Manitoba. The provincial West Nile Virus Program managed by Manitoba Health, Seniors and Long-Term Care is intended to reduce the incidence of WNV cases and includes: 1) cost-shared funding for municipal larviciding programs; 2) surveillance of adult *Culex tarsalis* mosquitoes across 21 communities in Manitoba; 3) risk assessment for human exposure to WNV; 4) adult mosquito control and related communications if a health emergency is declared; and 5) surveillance of human WNV cases and veterinary cases (birds, horses).

This talk will include an overview of West Nile virus and the provincial WNV program, a summary of 2025 WNV surveillance data (*Culex tarsalis* abundance and infection rate by health region, human and veterinary cases), and comparison to historical data trends in Manitoba.

Symposium

Beneath the Soil and Beyond the Genome: Linking Field Ecology, Cryptic Clades, and Bacteriome Structure in *Hypnoidus bicolor*

Ivan Drahun

Department of Biological Sciences, Brock University, St. Catharines, ON, L2S 3A1, Canada

Wireworms (Coleoptera: Elateridae) remain one of the most persistent and understudied subterranean crop pests in the Canadian Prairies. Over the past several years, we have developed a comprehensive understanding of wireworm population biology, feeding ecology, seasonal dynamics, and genetic structure, culminating in the first large-scale characterization of their bacteriomes. Long-term surveillance and bait trapping optimization studies established *Hypnoidus bicolor* as the predominant pest species across Manitoba, while also revealing shifts in species composition across seasons and agro-environmental gradients. These ecological datasets provided the foundation for genetic diagnostics, which unveiled cryptic clades within *H. bicolor* and suggested clade-specific dispersal and reproductive strategies, with one clade showing signatures of parthenogenetic reproduction.

Building on these ecological and evolutionary insights, our most recent metagenomic investigations revealed that wireworm bacteriomes are highly structured, clade-dependent, and developmentally regulated, with larvae and adults harbouring distinct microbial assemblages. Across major Prairie pest species, we identified >400 bacterial genera, yet each species—and even each *H. bicolor* clade—was dominated by a small core microbiome. Notably, putative reproductive-manipulating endosymbionts, including *Spiroplasma* and *Rickettsiella*, were enriched in one clade and almost absent in the other, linking microbiome composition to reproductive mode and cryptic speciation processes. These microbiome patterns integrate with earlier findings on overwintering physiology, seasonal migration within the soil column, and capacity for crop damage, supporting the hypothesis that endosymbiont-driven biology may underpin observed differences in feeding behaviour, cold tolerance, and population structure.

We show that microbiome composition and host genetics are deeply intertwined drivers of pest ecology. Understanding these microbial symbioses not only advances our ecological and evolutionary interpretation of wireworm biology but also opens avenues for next-generation IPM strategies leveraging microbiome disruption, endosymbiont targeting, and clade-specific surveillance.

Symposium

Pathogen Specific Enrichment on Tick Microbiomes

Heather Coatsworth[1], Courtney Loomer[1], Chantel Urfano[1], Brooks Waitt[1], Christine Bonner[2], and Morag Graham[2]

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Tick-borne diseases are largely understudied, due to their covert (i.e. vector-borne) and complex nature, and are responsible for 75% of vector-borne pathogen transmission to humans. In Canada, current endemic and amplifying tick-borne pathogens causing human disease include the bacteria, *Borrelia burgdorferi*, the causative agent of Lyme disease, *Anaplasma phagocytophilum*, the etiologic agent of Anaplasmosis, the parasite *Babesia microti*, the agent responsible for Babesiosis, and Powassan virus (POWV) which causes POWV disease. Worldwide, studies on non-*B. burgdorferi* sensu stricto tick-borne pathogens have only recently been initiated, and very few undertake modern genomic tools. Current molecular and serological tick-borne pathogen detection methods are based on reference genes derived from historical pathogens. While these perform functionally for dichotomous testing, they lack granularity. As such, any strain level specificity comes from additional targeted pathogen sequencing in known areas of genomic variability. This gene-by-gene approach has limited our understanding of the genetic relationship between pathogen strains. As such, we sought to complete whole genome sequencing (WGS) on banked pathogen positive tick, animal, and human samples from all Canadian provinces from 1990-2024. Non-biased sequencing techniques applied to ticks generate mostly genomic data from tick endosymbionts, and environmental microorganisms; pathogens make-up <5% of the total microbiome. To overcome this, we created an all-in-one, tick-borne pathogen, 120 nucleotide probe 39,753 bait enrichment panel (EP) with coverage for *Babesia microti*, *A. phagocytophilum*, *Borrelia* spp., *Ehrlichia chaffeensis*, *Francisella tularensis*, and POWV. Using this EP, we were able to increase pathogen sequence coverage from 2% in non-enriched samples to >65% after two rounds of enrichment using the EP. We obtained 300 whole genomes, representative of material from ½ ticks, animal blood and tissue, as well as human blood, serum, and synovial fluid. Together these represent the first Canadian genomes of *A. phagocytophilum*, *B. burgdorferi* sensu lato and POWV (lineage II). Phylodynamic modelling of these genomes is currently underway to elucidate pathogen entry, track spread, and evaluate the suitability of current diagnostic and surveillance targets.

Symposium

Weevils Gone Wild: An Update on Insects on Crops in Manitoba in 2025.

John Gavloski

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While some insects, such as grasshoppers, were overall of less concern in Manitoba in 2025 compared to recent years, some insects had substantial population increases. The cabbage seedpod weevil, *Ceutorhynchus obstrictus*, went from being at very low numbers in annual surveys to very noticeable and in some cases at economic levels in canola fields. Pea leaf weevil, *Sitona lineatus*, has been increasing in numbers in recent years, particularly in the western part of Manitoba. In 2025, pea leaf weevils were at very high levels in some pea and faba bean fields in western Manitoba, and continue to expand their range. Alfalfa weevil, *Hypera postica*, continues to be a concern to alfalfa growers in some areas in Manitoba. Other insects of concern on crops in Manitoba in 2025 include flea beetles *(Phyllotreta* spp.), bertha armyworm (*Mamestra configurata*) and diamondback moth (Plut*ella xylostella*) in canola, armyworms (*Mythimna unipuncta*) in cereals, and Lygus bugs (*Lygus* spp.) and cutworms in some crops. Twospotted spider mites (*Tetranychus urticae*) became a concern in some soybean fields late in the summer