

2025 Joint Annual Meeting of the Entomological Societies of Canada and Alberta

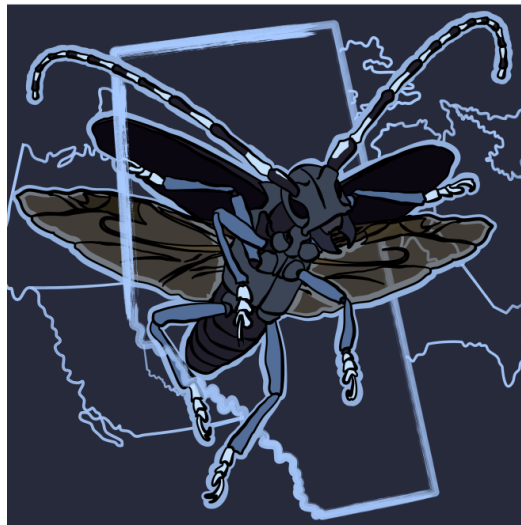
Calgary, Alberta

Sunday October 5 - Wednesday October 8, 2025

Best Western Premier Calgary Plaza Hotel and Conference Centre

NEW BUGS RISING

2025 ESC / SEC - ESAB JAM - CALGARY



NOUVELLES BESTIOLES À L'HORIZON

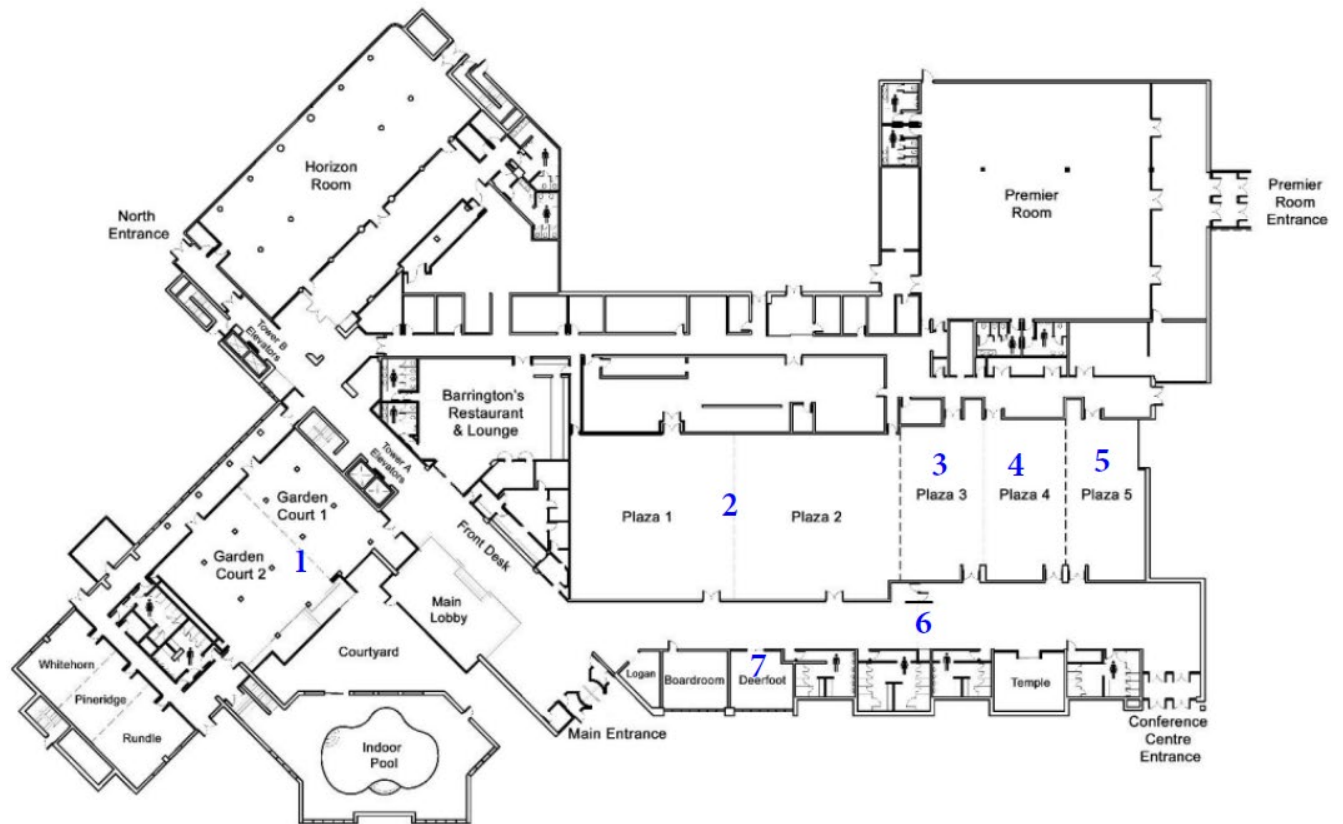
**Réunion annuelle conjointe des Sociétés
d'entomologie du Canada et de l'Alberta**

Calgary, Alberta

Dimanche 5 octobre - mercredi 8 octobre 2025

Best Western Premier Calgary Plaza Hotel and Conference Centre





Map of the main floor of the Best Western Premier Calgary Plaza Hotel and Conference Centre.

All events in the Scientific Program will take place on this floor./

Plan du niveau principal du Best Western Premier Calgary Plaza Hotel and Conference Centre.

Toutes les activités du programme scientifique se dérouleront à cet étage.

- 1= Garden Courts
- 2 = Plaza 1-2
- 3 = Plaza 3
- 4 = Plaza 4
- 5 = Plaza 5
- 6 = Foyer of Plaza 1-2
- 7 = Deerfoot Room

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Merci à nos partenaires financiers!

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Translation Services

Paul Abram, Anne-Sophie Caron, Colin Favret, Véronique Martel

Entomological Society of Canada Liaison

Christine Noronha

Welcome from the President of the Entomological Society of Canada

Mot de bienvenue de la présidente de la Société d'entomologie du Canada

Dear Friends and Colleagues:

On behalf of the Board of the Entomological Society of Canada, I am excited to welcome you to the 2025 Joint Annual Meeting of the Entomological Societies of Alberta and Canada.

This year is extra special as we celebrate the 75th anniversary of the ESC. For the past three-quarters of a century, our Society has been all about advancing entomological science, building connections across the country and beyond, and supporting generations of researchers and enthusiasts. It's a proud legacy, and one we continue to build together.

The organizing committee has put together an excellent program that highlights the depth and diversity of entomological research happening across Canada. Over the next three days you will see stimulating presentations, and hear about the diverse and excellent research being done by our students, early professionals, researchers and enthusiasts. I encourage you to step outside your comfort zone and chat with someone you don't know about their research. We all love talking about our

À mes amies, amis, et collègues,

Au nom du conseil d'administration de la Société d'entomologie du Canada, je suis ravie de vous accueillir à la réunion annuelle conjointe 2025 des sociétés d'entomologie de l'Alberta et du Canada.

Cette année est particulièrement spéciale, car nous célébrons le 75^e anniversaire de la SEC. Depuis trois quarts de siècle, notre société se consacre à l'avancement de la science entomologique, à l'établissement de liens à travers le pays et au-delà, et au soutien de générations de scientifiques et de gens passionnés. C'est un héritage dont nous sommes fiers et que nous continuons à construire ensemble.

Le comité organisateur a mis sur pied un excellent programme qui met en valeur la richesse et la diversité de la recherche entomologique menée partout au Canada. Au cours des trois prochains jours, vous assisterez à des présentations stimulantes et découvrirez les travaux de recherche variés et remarquables menés par notre communauté étudiante, les entomologistes en début de carrière, les scientifiques et les enthousiastes. Je vous encourage à sortir de votre zone de confort et à discuter avec des personnes que vous ne connaissez pas de leurs travaux de recherche. Nous aimons

research and maybe it could develop into a meaningful collaboration.

Putting together a Joint Annual Meeting is a huge job, and this one has been a real team effort. A special thank you goes to Carol Frost and her incredible team of volunteers from the Entomological Society of Alberta. Their commitment and hard work has ensured a rich program with engaging symposia, outstanding keynote speakers and plenty of opportunities to connect socially. When you see one of the many organizers over the next few days, please take a moment to thank them for their time and effort.

Thank you for being here to celebrate this milestone with us. I hope you enjoy the meeting, the science, and the company.

Christine Noronha, President
Entomological Society of Canada



tous parler de nos travaux et cela pourrait déboucher sur une collaboration fructueuse.

L'organisation d'une réunion annuelle conjointe est un travail colossal, et celle-ci a été le fruit d'un véritable effort d'équipe. Nous tenons à remercier tout particulièrement Carol Frost et son incroyable équipe de bénévoles de la Société d'entomologie de l'Alberta. Leur engagement et leur travail acharné ont permis de mettre sur pied un programme riche, avec des symposiums passionnants, des conférences de marque et de nombreuses occasions de nouer des liens sociaux. Si vous croisez l'un des nombreux membres du comité organisateur au cours des prochains jours, prenez le temps de les remercier pour leur temps et leurs efforts.

Merci d'être ici pour célébrer cette étape importante avec nous. J'espère que vous apprécierez la réunion, la science et la compagnie.

Christine Noronha, Présidente
Société d'entomologie du Canada

Welcome from the ESC-ESAB JAM 2025 Local Organizing Committee

Mot de bienvenue du comité organisateur local

The Local Organizing Committee of the Joint Annual Meeting of the Entomological Society of Canada and the Entomological Society of Alberta 2025 would like to welcome you to Calgary! We hope that while you are here you will have time to enjoy the surroundings, whether you venture as far as the nearby Rocky Mountains or badlands, or visit local attractions such as the Calgary Zoo, the Sam Centre that tells the story of the Calgary Stampede, or take a tour of the University of Calgary Invertebrate Collection. Check out the discounts offered by the ExploreMore Pass, which you can download from our conference website.

We have a packed and exciting program, traversing the theme “*New Bugs Rising*”. The submitted talks and presentations will cover everything from new species expanding their ranges into Canada, species rising newly to our attention, rising in their temperature or stress tolerance, or rising in our estimation of their ecological or economic importance. We will have four plenary lectures, three Excellence in Graduate Research Award talks, a Heritage Lecture by John Acorn, and a Gold Medal address by Dr. Kevin Floate. There will be 51 symposium talks, and 105 contributed talks, 55 of which are in the President’s Prize competition. The Monday evening poster session will display 30 posters, 13 of which are in the President’s Prize competition.

We hope that this conference will stand out in your year and your career as a gathering and sharing of time and space with other people fascinated by the study of

Mot de bienvenue du comité organisateur local :

Le comité organisateur local de la réunion annuelle conjointe de la Société d'entomologie du Canada et de la Société d'entomologie de l'Alberta 2025 vous souhaite la bienvenue à Calgary! Nous espérons que pendant votre séjour, vous aurez le temps de profiter des environs, que ce soit en vous aventurant jusqu'aux montagnes Rocheuses ou aux badlands toutes proches, ou en visitant des attractions locales telles que le zoo de Calgary, le Sam Centre qui retrace l'histoire du Stampede de Calgary, ou en faisant une excursion dans la collection d'invertébrés de l'Université de Calgary. Découvrez les réductions offertes par le laissez-passer ExploreMore que vous pouvez télécharger sur le site web de notre conférence.

Nous avons un programme riche et passionnant, axé sur le thème « Nouvelles bestioles à l'horizon ». Les exposés et présentations couvriront tous les aspects liés aux nouvelles espèces qui étendent leur répartition au Canada, aux espèces qui retiennent désormais notre attention, à l'augmentation de leur tolérance à la température ou au stress, ou à l'importance croissante que nous leur accordons sur le plan écologique ou économique. Nous aurons quatre conférences plénières, trois présentations dans le cadre du Prix d'excellence en recherche aux cycles supérieurs, une conférence sur le patrimoine par John Acorn et un discours du Dr Kevin Floate,

arthropods, and that you will make lasting connections, and gain inspiration. Let's make this a safe and respectful environment, to allow everyone to participate and benefit fully. We are providing lunches on Monday and Tuesday in the hope that you stay onsite and engage in conversation with other folks at the conference, to network and share ideas. Feel free to bring along your cowboy hat, jeans, and any rodeo belt buckles, because at the banquet on Tuesday we will all kick up our heels and do some country and western line dancing!

Carol Frost
and the other members of the LOC



lauréat de la médaille d'or. Il y aura 51 conférences dans le cadre du symposium et 105 présentations, dont 55 dans le cadre du concours du Prix de la présidence. La séance d'affichage du lundi soir présentera 30 affiches, dont 13 dans le cadre du concours du Prix de la présidence.

Nous espérons que cette conférence marquera votre année et votre carrière comme un moment privilégié de rencontre et de partage avec d'autres gens passionnés par l'étude des arthropodes, et que vous y nouerez des liens durables et y trouverez l'inspiration. Faisons en sorte que cet événement se déroule dans un environnement sûr et respectueux, afin que chacun puisse y participer et en tirer pleinement profit. Nous offrons les dîners du lundi et du mardi dans l'espoir que vous restiez sur place et que vous discutiez avec les autres congressistes afin de nouer des contacts et d'échanger des idées. N'hésitez pas à apporter votre chapeau de cow-boy, votre jean et votre boucle de ceinture de rodéo, car lors du banquet de mardi, nous nous déhancherons tous au rythme de la musique country et western !

Carol Frost
Et les autres membres du comité
organisateur local

2025 ESC-ESAB Joint Annual Meeting Theme and Logo

Thème et logo de la réunion annuelle conjointe 2025

The theme of the 2025 JAM is “**New Bugs Rising**”, referring to arthropod species that are expanding their existing ranges within Canada, that are newly established here, or that are on the horizon of becoming new inhabitants of this country. In 2024, the Entomological Society of Alberta held a logo design contest open to society members.

The winning logo was created in Affinity Designer by Hannah Stormer (University of Alberta) and features a stylized Asian long-horned beetle (*Anoplophora glabripennis*) leaping through an outline of Alberta superimposed on an outline of Canada. This beetle species is native to eastern Asia and can be introduced to new areas via movement of infested wood, including firewood. It is considered a potentially invasive pest species in Canada due to the severe damage it inflicts on a wide variety of trees, including economically-significant species. In the logo the beetle is centred on Alberta, the location of the 2025 ESC/SEC-ESAB JAM, and faces Ontario, which was the first and only location where it has been detected in Canada to date (it has since been eradicated). The dark color scheme and the menacing pose of the beetle emphasize the need for continued monitoring for this and other invasive arthro

NEW BUGS RISING

2025 ESC / SEC - ESAB JAM - CALGARY



**NOUVELLES BESTIOLES
À L'HORIZON**

Le thème de la réunion annuelle 2025 est « **Nouvelles bestioles à l'horizon** » (l'émergence de nouveaux insectes), en référence aux espèces d'arthropodes qui étendent leur aire de répartition au Canada, qui s'y sont récemment établies ou qui sont sur le point de devenir de nouveaux habitants de ce pays. En 2024, la Société d'entomologie de l'Alberta a organisé un concours de conception de logo ouvert à ses membres.

Le logo gagnant a été créé dans Affinity Designer par Hannah Stormer (Université de l'Alberta) et représente un longicorne étoilé stylisé (*Anoplophora glabripennis*) sautant à travers une silhouette de l'Alberta superposée à une silhouette du Canada. Cette espèce de coléoptère est originaire d'Asie orientale et peut être introduite dans de nouvelles régions par le transport de bois infesté, notamment du bois de chauffage. Il est considéré comme une espèce envahissante au Canada en raison des graves dommages qu'il inflige à une grande variété d'arbres, y compris des espèces importantes sur le plan économique. Dans le logo, le coléoptère est centré sur l'Alberta, lieu où se tiendra la SEC/SEAb-ESAB réunion annuelle conjointe 2025, et fait face à l'Ontario, qui est le premier et le seul endroit où il a été détecté au Canada à ce jour (il a été éradiqué depuis). Les couleurs sombres et la posture menaçante du coléoptère soulignent la nécessité d'une surveillance continue de cette espèce et d'autres espèces d'arthropodes envahissantes.

Entomological Society of Canada Meeting Code of Conduct

[Date code adopted: 21 April 2020]

This Code of Conduct applies to all meetings and events of the Entomological Society of Canada (ESC). By attending any ESC meeting or event you agree to abide by this Code of Conduct. This Code applies to all participants including, but not limited to: attendees, speakers, guests, staff, service providers, vendors and sponsors.

Authorship

All authors listed on a presentation or abstract must agree with all information that is contained in the presentation. Failure to agree will result in the presentation being withdrawn. Submission of a presentation to an ESC Joint Annual Meeting (JAM) indicates the intent of one of the listed authors to attend the meeting. Repeated or consecutive last-minute cancellations may result in the denial of future submissions.

Photography

The ESC requests that there be no photography or videography of presentations or posters without the explicit permission of the presenter.

Expected Behaviour

- Treat all other participants with kindness, respect and consideration.
- Communicate openly and with respect for others, and in the language of your choice.
- Personal attacks are not acceptable. Critique ideas, not people.
- Alert the meeting organizers or staff if you notice a dangerous situation or someone in distress.
- Respect the rules and policies of the venue.

Unacceptable behaviour

Violent or discriminatory behaviour or harassment in any form will not be tolerated. Harassment means engaging in a course of vexatious comment or conduct against another person that is known or ought reasonably to be known to be unwelcome. Note that it is possible for a single incident, if sufficiently serious, to constitute harassment.

Harassment includes, but is not limited to: offensive gestures or comments (verbal or written) related to a person's race, ancestry, place of origin, colour, ethnic origin, citizenship, creed, sex, sexual orientation, gender identity, gender expression, age, marital status, family status, or disability; deliberate intimidation; unwanted photography or recording; sustained disruption of presentations and events; or any form of unwelcome attention, including physical contact. Participants asked to stop harassing behaviour are expected to comply immediately.

Other examples of unacceptable behaviour include:

- Physical or verbal abuse of any participant.
- Use of sexual or discriminatory images in public spaces or in presentations.

- Bullying behaviour.
- Retaliation for reporting of unacceptable behaviour.

Immediate serious threat to personal or public safety

Anyone experiencing or witnessing behaviour that is an immediate threat to personal or public safety should contact local law enforcement (by calling 911) and immediately notify venue security.

Reporting Unacceptable Behaviour

If you are the subject of unacceptable behaviour or have witnessed such behaviour, please immediately notify a Code of Conduct Advocate. Code of Conduct Advocates will be wearing identification so as to assist you in identifying them.

Notification may be done on-site or by emailing your concern to Geoff Powell at ESCExecutiveDirector@esc-sec.ca or phoning Geoff Powell at (204) 793-2630.

Reporting should never be done via social media to protect the confidentiality and fairness of the reporting process, and to ensure that reports are received in a timely manner.

Regardless of whether a notification is made, you are encouraged to document the unacceptable behaviour in writing as soon as possible in the event that further investigation is required.

ESC Investigation and Response to Complaints

Investigations into alleged unacceptable behaviour pursuant to this Code of Conduct shall be the responsibility of a person or committee appointed by the ESC Board of Directors.

The person assigned to conduct the investigation may be internal or external to the organization. The investigator will interview and collect documents from the person who allegedly experienced the violence or harassment, the alleged harasser(s), and any other relevant witnesses.

Information that is provided about an incident or complaint will not be disclosed, except as necessary to investigate the complaint / incident, to take corrective action, or as otherwise required by law. While the investigation is ongoing, the person who has allegedly experienced harassment, the alleged harasser(s), and any witnesses should not discuss the incident or complaint or the investigation with each other or with other ESC members unless necessary to obtain advice about their rights.

Depending on the severity of the alleged incident(s), ESC may impose interim measures to ensure the health and safety of its members, staff and volunteers, including but not limited to suspension from employment with pay or suspension from board/committee duties, pending completion of an investigation.

At the conclusion of the investigation, ESC's Board of Directors will reach a decision as to whether there was violence or harassment and will report its findings, including any

corrective action that will be taken, to the person who allegedly experienced the violence or harassment and to the alleged harasser.

In addition to any interim measures taken, violators of this Code of Conduct will receive a written summary of actions taken in response to an investigation or incident report. The ESC Board of Directors shall be responsible for implementing all responses and sanctions that may result from an investigation of a complaint. ESC shall maintain all records relating to the investigation for at least one year from its conclusion.

Consequences

The ESC reserves the right to remove an individual from any meeting without warning or refund, prohibit attendance at future meetings and suspend or rescind membership in the ESC for failing to abide by this Code of Conduct.

ESC-ESAB JAM 2025 Advocates

Shea Giesbrecht (Chair)

Wei Han Lau

Carina Lopez

Lisa MacLeod

Huiqing Yeo

General Information

Registration Desk

The registration desk will be located in the Foyer outside the meeting rooms of the conference hotel, Best Western Premier Calgary Plaza Hotel & Conference Centre from 11:00 to 18:00 on Sunday (October 5) and 07:30 to 10:30 Monday (October 6).

Oral Presentations

Presentations in the Contributed Talks sessions and President's Prize Oral sessions will be limited to 12 minutes plus 3 minutes for questions. Moderators will be asked to strictly adhere to the 12-minute time limit for each speaker plus 3 minutes for questions as there will be concurrent sessions. Presenters will need to download their presentations (preferred in PPTX format) to a conference laptop in the Temple Room in advance of their presentation, at least two coffee/lunch breaks before their scheduled presentation time. Ideally, all presenters will upload their presentations when they pick up their registration packages from the Registration Desk. Using a USB stick or other portable device is advised. Please format file names as: "First Name_Last Name_Presentation Day and Time."

Posters

The maximum poster dimensions should be 91 cm high x 121 cm wide (3 feet wide x 4 feet high). Posters can be set up starting at 7:30 am on Monday, October 6 and must be set up by 1 pm on Monday, October 6. Posters are assigned a number (please see the Short Program) and should be set up in the space allocated. Pins or Velcro will be provided for setup, depending on the type of board. Poster presenters should be in attendance for the full duration of the poster session, from 17:30 to 18:30 h on Monday, October 6. The posters entered in the President's Prize competition will be judged during this time. Posters may be taken down at the presenter's discretion after the poster session is completed, but must be removed by 18:30 on Tuesday, October 7.

Conference Locations

All events in the Scientific Program will take place in rooms on the first floor at Best Western Premier Calgary Plaza Hotel & Conference Centre. A 'parents' space is available in the Business Centre Room. A safe space is available in the Boardroom. Room locations are noted in the Program at a Glance, in the Short Program, and in the Full Program.

Refreshment Breaks and Meals

Coffee breaks are included with meeting registration on Sunday, Monday, Tuesday and Wednesday and will be served in the Foyer. Lunches will be provided on Monday and Tuesday. ESC members are encouraged to collect lunch on Tuesday and then attend the ESC Annual General Meeting in Plaza 1&2, starting at 12:30.

Social Functions

- Welcome Reception in the Foyer at 18:00 on Sunday, October 5.
- Student Mixer, Monday, October 6, 19:00 at Tool Shed Brewing
- Banquet, Tuesday, October 7, Reception 18:30 in the foyer, Banquet 19:00 in Plaza 1&2

Business Meetings

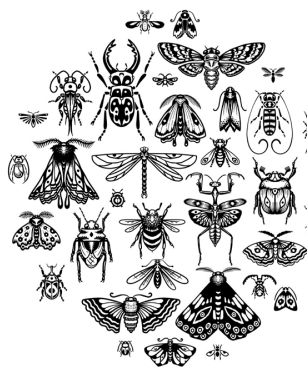
- Meeting of the Outgoing ESC Executive (BOD1), Sunday, October 5 at 08:00 in Deerfoot
- Entomological Society of Canada Annual General Meeting, Monday, October 6 at 12:30 in Plaza 1&2
- Meeting of the Incoming ESC Executive (BOD2), Monday, October 6 at 16:00 in Deerfoot
- TCE Editorial Board Meeting in Deerfoot, Tuesday, October 7 at 12:00
- British Columbia Entomologists Dutch Elm Disease Briefing in Plaza 5, Tuesday, October 7, at 12:00 noon
- ESAB AGM in Plaza 4, Tuesday, October 7 at 17:15

Silent Auction and Artists' Showcase

The Entomological Society of Alberta welcomes everyone to a silent auction and Artists' showcase in the Garden Courts 1&2. Auction items will be open for viewing during the day Monday, October 6 until 18:30 and Tuesday, October 7 until noon. The Artists' Showcase will occur during the poster sessions Monday, October 6 17:30 to 18:30 and Tuesday, October 7 17:30 to 18:30; artists may be present at other times depending on their own schedules.



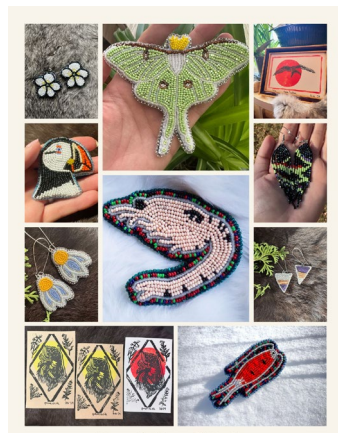
Dan Johnson



Ilan Domnich



Kirra Kent



Dani Beaditoba
WWW.DANIELLENOWOSAD.COM
INSTAGRAM: @DANI_BEADITOBA

Danielle Nowosad

ESC-ESAB Joint Annual Meeting 2025: Program at a Glance

Réunion annuelle de la SEC-SEAB 2025

Sunday / Dimanche, October 5

**08:00-13:30 - Entomological Society of Canada Board of Directors' Meeting (BoD1) /
Réunion du CA sortant de la SEC (BoD1) (Deerfoot)**

11:00-18:00 - Registration desk open / Inscriptions (Main Entrance Foyer)

Start Time Plaza 1-2

13:30 Opening Ceremony / Cérémonie d'ouverture

14:00 Gold Medal Address / Allocution de la médaille d'or: Kevin Floate

15:00 Coffee Break / Pause-café

15:30 Plenary 1 / Session plénière 1: Janet Sperling

16:30 Excellence in Graduate Research Award #1 / Présentation 1 des
prix d'excellence en recherche aux cycles supérieurs: Pizante

17:00 Excellence in Graduate Research Award #2 / Présentation 2 des
prix d'excellence en recherche aux cycles supérieurs: LaForest

17:30 Excellence in Graduate Research Award #3 / Présentation 3 des
prix d'excellence en recherche aux cycles supérieurs: Ritchie

**18:00-19:00 – Entomological Society of Alberta Executive Meeting / Réunion du conseil
exécutif de la SEAB (Deerfoot)**

19:00 - Welcome Reception and Mixer / Réception de bienvenue (Foyer Plaza 1-2)

Monday / Lundi AM, October 6

Start Time	Plaza 1-2: President's Prize talks: Agricultural entomology and pest control / Prix de la présidence, présentations orales: Entomologie agricole et lutte aux ravageurs	Plaza 3: President's Prize talks. Physiology, genetics, taxonomy and systematics / Prix de la présidence, présentations orales: Physiologie, génétique, taxonomie et systématique	Plaza 4: President's Prize talks - Behaviour, ecology and conservation / Prix de la présidence, présentations orales: Comportement, écologie et conservation	Plaza 5: President's Prize talks - Forest arthropods and population modeling / Prix de la présidence, présentations orales: Arthropodes forestiers et modélisation des populations
08:15	Kelly	De Nicola	Giesbrecht	Stone
08:30	Irvine	Kaufman	Van der Voort	Peng
08:45	Jacques	Barrot	Peters	Bailey
09:00	Demers	Kalboussi	Jimenez	White
09:15	Hung	Jackson	Avramov	Grabka
09:30	Donkor	Penno	Correa Ramos	Sheppard
09:45	Blanchette-Arnold	Chiu	Rodrigues	Thompson
10:00	Coffee Break / Pause-café	Coffee Break / Pause-café	Coffee Break / Pause-café	Coffee Break / Pause-café
10:30	Chinchin Talavera	Sasaguchi	Toor	Zhou
10:45	Liber	Raposo	Miller	Hover
11:00	Weppler	Ott	MacLeod	Wardman
11:15	Aguiar-Cordero	Wagner	Negraeff	Zheng
11:30	Symak	Furtado	Pan	Vinatier
11:45		Kruczalak	Seal	Acorn

Monday / Lundi PM, October 6

12:00-13:00 - Lunch provided in the Foyer of Plaza 1-2 / Diner fourni dans le foyer de Plaza 1-2

**12:30-13:30 – Entomological Society of Canada Annual General Meeting / AGA de la SEC
(Plaza 1-2)**

13:30-14:30 – Plenary 2 / Session plénière 2: Phil Lounibos (Plaza 1-2)

Start Time	Plaza 1-2: Symposium 1 - Gall Midges Rising / Montée des cécidomyies	Plaza 3: Symposium 2 - Advances in Honey Bee Research / Progrès de la recherche sur les abeilles mellifères	Plaza 4: Symposium 3 - Mountain Pine Beetle / Dencroctone du pin ponderosa	Plaza 5: Contributed Talks - Morphology, Physiology, Behaviour / Présentations régulières: Morphologie, physiologie et comportement
14:30	Bray	Foster	Musso	Ali
14:45	Bray cont...	Knowles	Klutsch	Holliday
15:00	Coffee Break / Pause- café	Coffee Break / Pause- café	Coffee Break / Pause- café	Coffee Break / Pause- café
15:15	Boquel	Coffee Break / Pause- café	Huber	Coffee Break / Pause- café
15:30	Lopez	Van Nest	Haider	Scott
15:45	Vankosky	Lai	Cullingham	McKay
16:00	Hallett	De la Mora	Shegelski	Owens
16:15	Blatt	Todoschuk	Evenden	Santos
16:30	Capko	Feng	Goodsman	Abraham
16:45	Tansey	Bahreini	Cooke	Kimitsuki
17:00	Weeraddana	Zayed	Cooke cont...	Acorn
17:15	Wist	Morfin	Musso (discussion)	

**16:00-17:00 – ESC incoming Board of Directors meeting / Réunion du CA entrant de la SEC
(Deerfoot)**

**17:30-18:30 – Poster session with presenters in attendance; judging of President's Prize
entries will take place during this time / Session d'affiche (Prix de la
présidence) (Garden Courts 1 & 2).**

**19:00-22:00 - Student Mixer at / Cocktail étudiant au Tool Shed Brewing
(<https://toolshedbrewing.com/>)**

Tuesday / Mardi AM, October 7

08:00-9:00 - Plenary 3 / Session plénière 3: Andrea Gloria-Soria (Plaza 1-2)

Start Time	Plaza 1-2: Symposium 4 - Biological Survey of Canada / Commission biologique du Canada	Plaza 3: Symposium 5 - Arthropod Invasions and 'Omics / Invasions d'arthropodes et 'omiques	Plaza 4: Contributed talks - Medical-veterinary Entomology and Vectors / Présentations régulières, Entomologie médicale et vétérinaire et biologie des vecteurs	Plaza 5: Contributed talks – Biocontrol / Présentations régulières, Lutte biologique
09:00	Abraham/Giberson (intro)	Boardman	Knight	Baici
09:15	Giberson	Dean	Snyman	Diyas
09:30	Kent	Stormer	Nowosad	Marshall
09:45	Pinzon	Picq	Soghigian	Labbé
10:00	Shorthouse	Roe	-	Skuse
10:15	Coffee Break / Pause-café	Coffee Break / Pause-café	Coffee Break / Pause-café	Coffee Break / Pause-café
10:30	Pohl	Yeo	Coffee Break / Pause-café	Coffee Break / Pause-café
10:45	Tebby	Morinaga		Saguez
11:00	Galloway	Grela		Acheampong
11:15	Galloway cont...	Balzer		Franklin
11:30	Abraham/Giberson (Disc.)	Senevirantha		McPike
11:45	(Discussion cont...)	Hamelin		

NOTE: Silent Auction ends at noon on Tuesday! (Garden Courts)

Tuesday / Mardi PM, October 7

12:00-13:00 - Lunch provided in the Foyer of Plaza 1-2 /

Diner fourni dans le foyer de Plaza 1-2

12:00-13:00 – Biological Survey of Canada meet-and-greet over lunch / CBC rencontre informelle pendant le diner (Plaza 1-2)

12:00-13:00 – The Canadian Entomologist Editorial Meeting / Réunion éditoriale de TCE(Deerfoot)

12:00-13:00 – B.C. Dutch Elm Disease Meeting / Réunion sur la maladie hollandaise de l'orme en C.-B. (Plaza 5)

13:00-14:00 – Plenary 4 / Session plénière 4: Heath MacMillan (Plaza 1-2)

Start Time	Plaza 1-2: Symposium 6 – Arthropod Conservation Tools / Outils de conservation des arthropodes	Plaza 3: Contributed talks – Forest Entomology / Session régulière, Entomologie forestière	Plaza 4: Contributed talks - Taxonomic Tools, Surveys and New Records / Session régulière, Outils taxonomiques, inventaires et nouveaux signalement
14:00	-	Keahey	Cobb
14:15	Lewthwaite	Wertman	Buck
14:30	Lewthwaite cont...	Wijerathna	van Herk
14:45	Glasier	Isitt	Lumley
15:00	Glasier cont..	Cale	Oram
15:15	Coffee Break / Pause-café	Coffee Break / Pause-café	Coffee Break / Pause-café
15:30	Coffee Break / Pause-café [Arthropod Conservation Tools cont... / Outils de conservation des arthropodes]	Coffee Break / Pause-café Contributed talks - Chemical and Physical Control / Session régulière, Lutte chimique et physique	Coffee Break / Pause-café [Taxonomic Tools, Surveys and New Records cont... / Outils taxonomiques, inventaires et nouveaux signalement]
15:45	Khelifa	Castro-Torres	Terzin
16:00	Khelifa cont...	Hervet	Sperling
16:15	Lau	McCann	Quick
16:30	Lau cont...	Catton	-
16:45	McCune	Beaudoin	
17:00	McCune cont...	Tabuchi	

17:15-18:15 – Entomological Society of Alberta Annual General Meeting / AGA de la SEAB (Plaza 4)

**17:30-18:30 – Artists' Showcase and Posters end at 18:30 – posters must be removed by
18:30 at the latest / Vitrine pour les artistes et session d'affiches - fin à
18h30 - les affiches doivent être retirées avant 18:30 (Garden Courts 1 & 2)**

18:30-19:00 – Reception for Banquet / Réception pré-banquet (Foyer of Plaza 1-2)

19:00-23:00 – Banquet (Plaza 1-2)

**20:00-23:00 – Heritage Lecture / Allocution du patrimoine (John Acorn), awards and
entertainment / suivie par la remise de prix et l'animation**

22:00 – Bar closes / Fermeture du bar

Wednesday / Mercredi AM, October 8

***NOTE: deadline for checking out of your hotel room is 11 am! /
Les chambres doivent être libérées à 11:00!***

Start Time	Plaza 1-2: From Egg to Adult - Careers in Entomology Round Table / De l'oeuf à l'adulte – Table-ronde sur les carrières en entomologie (09:00 – 11:30)	Plaza 4: Contributed talks - Pollinators, Conservation and Protected Areas / Présentations régulières, Pollinisateurs, conservation et aires protégées
09:00		Domnich
09:15		Sheffield
09:30		Des Marteaux
09:45		Vickruck
10:00		Jorgensen
10:15	Coffee Break / Pause-café	Coffee Break / Pause-café
10:30	Coffee Break / Pause-café	Coffee Break / Pause-café
10:45		Worthy
11:00		Buzunis-Delagneau
11:15		Johnson
11:30		Lewis
	End of Meeting	

2025 ESC Award Recipients / Récipiendaires des prix SEC

Gold Medal award

Dr. Kevin Floate has made outstanding contributions to entomology through his leadership, scientific research, and dedication to public education. A key figure in the Entomological Society of Canada (ESC), he served as President (2018–2019), Editor-in-Chief of *The Canadian Entomologist* (2014–2017), and played a pivotal role in transitioning its publication to Cambridge University Press—an achievement with lasting impact. He has also contributed extensively as an editor, committee member, and organizer for ESC and affiliated societies, including the Entomological Societies of Alberta and Saskatchewan.

Scientifically, Dr. Floate is a global authority on dung insects, having published extensively on their biodiversity, ecological roles, and sensitivity to veterinary pharmaceuticals. His efforts led to internationally adopted guidelines to minimize non-target impacts of parasiticides, and he founded the Dung Organism Toxicity Testing Standardization (DOTTS) Group. He has also conducted significant research on gall aphids, ground beetles, insect symbionts, and rearing techniques for pest management, contributing over 117 peer-reviewed papers and multiple books and chapters.

His public education efforts are equally remarkable. Dr. Floate has led outreach initiatives such as Alberta's Insect Discovery Day, developed training resources for schools and agencies, and provided expert advice to farmers, First Nations, and regulatory bodies. He is a committed educator, having taught at multiple universities and mentored graduate students.

Through a career marked by leadership, collaboration, and innovation, Dr. Floate has enriched Canadian and international entomology. His work has advanced ecological understanding, improved agricultural practices, and inspired future generations of scientists and naturalists.



Médaille d'or

Le Dr Kevin Floate a apporté une contribution exceptionnelle à l'entomologie grâce à son leadership, à ses recherches scientifiques et à son dévouement à l'éducation du public. Figure clé de la Société d'entomologie du Canada (SEC), il a été président (2018-2019) et éditeur en chef de *The Canadian Entomologist* (2014-2017) et a joué un rôle déterminant dans le transfert de cette publication vers les Presses de l'Université de Cambridge, une réalisation qui aura des répercussions durables. Il a également apporté une contribution considérable en tant qu'éditeur, membre de comité et organisateur pour la SEC et des sociétés affiliées, notamment les sociétés d'entomologie de l'Alberta et de la Saskatchewan.

Sur le plan scientifique, le Dr Floate est une autorité mondiale en matière d'insectes coprophages, ayant publié de nombreux articles sur leur biodiversité, leur rôle écologique et leur sensibilité aux médicaments vétérinaires. Ses efforts ont abouti à l'adoption de lignes directrices internationales visant à minimiser les effets non ciblés des parasitocides, et il a fondé le groupe DOTTS (Dung Organism Toxicity Testing Standardization). Il a également mené d'importantes recherches sur les pucerons gallicoles, les carabes, les insectes symbiotes et les techniques d'élevage pour la gestion des ravageurs, contribuant à plus de 117 articles évalués par des pairs et à plusieurs livres et chapitres.

Ses efforts en matière d'éducation publique sont tout aussi remarquables. Le Dr Floate a dirigé des initiatives de sensibilisation telles que la Journée de découverte des insectes de l'Alberta, élaboré des ressources de formation pour les écoles et les organismes, et fourni des conseils d'expert aux agriculteurs, aux Premières Nations et aux organismes de réglementation. Éducateur engagé, il a enseigné dans plusieurs universités et encadré des étudiants et étudiantes des cycles supérieurs.

Au cours d'une carrière marquée par le leadership, la collaboration et l'innovation, le Dr Floate a enrichi l'entomologie canadienne et internationale. Ses travaux ont fait progresser la compréhension écologique, amélioré les pratiques agricoles et inspiré les futures générations de scientifiques et de naturalistes.

C. Gordon Hewitt Award

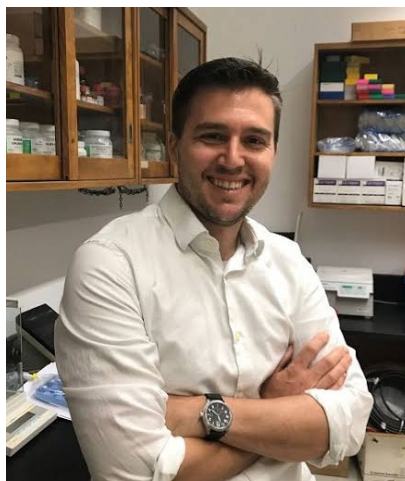
Dr. Heath A. MacMillan, Associate Professor at Carleton University, is an internationally recognized leader in insect physiology and an ideal recipient of the C. Gordon Hewitt Award. Since completing his PhD in 2013, Heath has built a groundbreaking research program focused on the physiology of insect cold tolerance, transforming our understanding of how insects respond to low temperatures. His pioneering work revealed the role of ion balance in cold tolerance across multiple biological levels—from cellular function to evolutionary adaptation—and has garnered widespread recognition, including over 350 citations on a single foundational review.

Dr. MacMillan is highly productive, with 44 publications since 2017 and more than \$3.5 million in external research funding. His research spans both fundamental and applied

entomology, including studies on microplastics, insect nutrition, and pest species such as the Mountain Pine Beetle. A gifted mentor and educator, he has received awards for both undergraduate teaching and graduate supervision, and his students consistently win prestigious scholarships and research awards.

Beyond research, Dr. MacMillan is a strong advocate for equity, diversity, and inclusion in science. He has led departmental and national initiatives to support underrepresented groups and early-career researchers. He also actively contributes to the scientific community through editorial roles, outreach, and service in professional societies.

Heath's scientific creativity, collaborative spirit, and mentorship make him a vital force in entomology today. With a rising international profile and a commitment to fostering future scientists, Dr. MacMillan exemplifies the values of the C. Gordon Hewitt Award.



Prix C. Gordon Hewitt

Le Dr Heath A. MacMillan, professeur agrégé à l'Université Carleton, est un leader mondialement reconnu dans le domaine de la physiologie des insectes et un lauréat idéal du prix C. Gordon Hewitt. Depuis l'obtention de son doctorat en 2013, Heath a mis sur pied un programme de recherche novateur axé sur la physiologie de la tolérance au froid chez les insectes, qui a transformé notre compréhension de la façon dont les insectes réagissent aux basses températures. Ses travaux pionniers ont révélé le rôle de l'équilibre ionique dans la tolérance au froid à plusieurs niveaux biologiques, de la fonction cellulaire à l'adaptation évolutive, et ont été largement reconnus, avec plus de 350 citations pour un seul article de synthèse fondamentale.

Le Dr MacMillan est très productif, avec 44 publications depuis 2017 et plus de 3,5 millions de dollars de financement externe pour la recherche. Ses recherches portent à la fois sur l'entomologie fondamentale et appliquée, notamment sur les microplastiques, la nutrition des insectes et les espèces nuisibles telles que le dendroctone du pin ponderosa. Mentor et éducateur doué, il a reçu des prix pour son enseignement au premier cycle et pour la supervision de ses étudiantes et étudiants des cycles supérieurs, qui remportent régulièrement des bourses et des prix de recherche prestigieux.

Au-delà de la recherche, le Dr MacMillan est un fervent défenseur de l'équité, de la diversité et de l'inclusion dans le domaine scientifique. Il a dirigé des initiatives départementales et nationales visant à soutenir les groupes sous-représentés et les scientifiques en début de carrière. Il contribue également activement à la communauté scientifique par le biais de fonctions éditoriales, d'activités de sensibilisation et de services au sein d'associations professionnelles.

La créativité scientifique, l'esprit collaboratif et le mentorat de Heath font de lui une figure incontournable de l'entomologie actuelle. Avec une renommée internationale croissante et un engagement envers la formation des scientifiques de demain, le Dr MacMillan incarne parfaitement les valeurs du prix C. Gordon Hewitt.

Norman Criddle Award

Bette Beswick is a dedicated amateur entomologist who has made lasting contributions to entomology in Alberta through outreach, education, and leadership. At Beauvais Lake Provincial Park, she has led insect collection and educational programs that promote public understanding of entomology. Within the Entomological Society of Alberta, Bette has served as Vice-President, President, Past-President, and Proceedings Editor, and was co-chair of the 2020 ESC-ESAB Joint Annual Meeting. Her commitment, enthusiasm, and leadership have had a significant impact on both the Society and the broader public. Bette embodies the spirit of the Criddle Award and is a highly deserving awardee.



Prix Norman Criddle

Bette Beswick est une entomologiste amatrice dévouée qui a apporté une contribution durable à l'entomologie en Alberta grâce à ses activités de sensibilisation, d'éducation et de leadership. Au parc provincial Beauvais Lake, elle a dirigé des programmes de collecte d'insectes et d'éducation qui favorisent la compréhension de l'entomologie par le public. Au sein de la Société d'entomologie de l'Alberta, Bette a occupé les fonctions de vice-présidente, présidente, présidente sortante et rédactrice en chef des actes, et a coprésidé

la réunion annuelle conjointe 2020 de la SEC et de SEAb. Son engagement, son enthousiasme et son leadership ont eu un impact significatif tant sur la société que sur le grand public. Bette incarne l'esprit du prix Criddle et mérite amplement cette distinction.

Fellow

Dr. William G. (Bill) Riel is a model of long-term, behind-the-scenes dedication to the Entomological Societies of Canada (ESC) and British Columbia (ESBC). Over a 30-year career with the Canadian Forest Service and through extensive volunteer service, Bill made foundational contributions to the operation, governance, and success of both Societies. His work began informally in the 1990s, supporting Annual General Meetings (AGMs) and Joint Annual Meetings (JAMs), including photography and fundraising for the 1995 JAM, which helped launch the ESBC's awards program.

From 2002 to 2022, Bill held a variety of formal roles. As ESBC website editor (2002–2011), he guided the Society into the digital era. He served as Regional Director to the ESC (2007–2018), chaired the ESC By-Laws Committee, and played a crucial role in modernizing ESC governance to meet the federal Not-for-Profit Corporations Act. His contributions included revising by-laws, drafting a meeting code of conduct, and co-leading a complete overhaul of electoral procedures. Bill served as ESC President during the challenging COVID-19 years (2018–2021), earning two ESC Service Awards for his leadership and commitment.

He was also instrumental in organizing and supporting numerous AGMs and JAMs, including the 2010 and 2018 meetings, ensuring these events were scientifically enriching and socially engaging. Bill's hallmark traits—cheerfulness, optimism, and a collaborative spirit—were key to the Societies' success. For his sustained and exemplary service, Dr. Riel is highly deserving of recognition as a Fellow of the Entomological Society of Canada.



Membre associé

Le Dr William G. (Bill) Riel est un modèle d'engagement à long terme et en coulisses envers les Sociétés d'entomologie du Canada (SEC) et de la Colombie-Britannique (SECB). Au cours

de ses 30 années de carrière au Service canadien des forêts et grâce à ses nombreuses activités bénévoles, Bill a apporté une contribution fondamentale au fonctionnement, à la gouvernance et au succès des deux sociétés. Son travail a commencé de manière informelle dans les années 1990, lorsqu'il a apporté son soutien aux assemblées générales annuelles (AGA) et aux réunions annuelles conjointes, notamment en tant que photographe et collecteur de fonds pour la réunion annuelle de 1995, qui a contribué au lancement du programme de prix de la SCEB.

De 2002 à 2022, Bill a occupé divers postes officiels. En tant que responsable du site web de la SECB (2002-2011), il a guidé la société vers l'ère numérique. Il a occupé le poste de directeur régional de la SEC (2007-2018), a présidé le comité des règlements de la SEC et a joué un rôle crucial dans la modernisation de la gouvernance de la SEC afin de se conformer à la loi fédérale sur les organisations à but non lucratif. Il a notamment contribué à la révision des règlements, à la rédaction d'un code de conduite pour les réunions et à la refonte complète des procédures électorales. Bill a occupé le poste de président de la SEC pendant les années difficiles de la COVID-19 (2018-2021), ce qui lui a valu deux prix pour services rendus à la SEC en reconnaissance de son leadership et de son engagement.

Il a également joué un rôle déterminant dans l'organisation et le soutien de nombreuses assemblées générales annuelles et réunions annuelles conjointes, notamment celles de 2010 et 2018, en veillant à ce que ces événements soient enrichissants sur le plan scientifique et stimulants sur le plan social. Les traits caractéristiques de Bill – sa gaieté, son optimisme et son esprit de collaboration – ont été essentiels au succès des sociétés. Pour ses services soutenus et exemplaires, le Dr Riel mérite amplement d'être nommé membre associé de la Société d'entomologie du Canada.

Abstracts, ESC-ESAB Joint Annual Meeting 2025/ Les résumés

***NOTE: abstracts for Plenaries, President's Prize talks and Symposia are listed on the relevant days; abstracts for contributed talks and posters are listed alphabetically in the last section of this program.**

Sunday, October 5

Plenary 1: Janet Sperling: Lyme, CanLyme and entomologists in action.

Entomologists can find themselves in a contentious environment when biological, political and social factors conflict. One example is the complex challenge of Lyme disease diagnosis and treatment. The current paradigm of Lyme disease covers multiple different *Borrelia* pathogen strains, tick vector species, vertebrate host species, co-infections and limits to detection. Diverging perspectives are provided by ecology, molecular biology, public health and politics, with debate particularly revolving around chronic Lyme infection. Improved technologies such as high-throughput sequencing have bridged knowledge gaps but there is less understanding of the limitations of these technologies. However, determination to push boundaries drives progress, and the Canadian Lyme Disease Foundation (CanLyme) remains committed to such progress by supporting increased understanding of tick biology, including the role of tick endosymbionts, tracking tick population spread, exposure to novel hosts, and constraints on transmission. The history of insecticide resistance provides perspective for a parallel discussion on the overuse and misuse of antibiotics. The history of Lyme patient advocacy is also instructive, particularly in distinguishing evidence from assumptions, and understanding the human costs of delaying investigation into co-infections and novel treatments. As we work toward improved public dialogue on adaptable evidence-based treatment protocols, entomologists have remained integral to translating science into action.

Excellence in Graduate Research Awards / Présentation 1 des prix d'excellence en recherche aux cycles supérieurs

Plenty of flowers in the field: the roles of resource availability and habitat type in the conservation of flower-visiting insects

Rachel Pizante (1)

1. University of Alberta, pizante@ualberta.ca

Building wildflower gardens for flower-visiting insects has become a popular restoration practice. However, the resources used to establish wildflower plantings are often lacking (e.g., lack of available locally-adapted seed, unclear and incorrect information on insect-flower preferences). Furthermore, most studies only examine the response of bees (Apoidea) to these restoration efforts, but the flower-visiting insect assemblage includes many other taxa that also contribute to pollination. My thesis examines the role of floral resources in supporting flower-visiting insect assemblages with the goal of improving methods used to conserve these economically and ecologically important insects. First, I will briefly discuss how flower-visitor interaction data can be used to determine insect-flower preferences. I

found that insect-flower preferences can be easily determined from flower-visitor interaction data, such that the effect of flower abundance and neutral processes do not overwhelm the insect-flower preference signal in the data. Instead, I found that abundant flowers are preferred regardless of their abundance. Second, I will discuss how flower-visiting insects use floral resources in field borders adjacent to canola crops. I will also discuss the importance of hoverflies in canola crops in central Alberta, and how hoverfly movement in and out of canola crops changes with field border type, canola bloom, and field border floral resources. I found that field border vegetation type was more important in increasing flower-visiting insect diversity and hoverfly movement than floral resources. Altogether, my thesis found that habitat type was more important than floral resources in shaping and supporting insect-flower visitation and flower-visiting insect diversity.

Ground beetle assemblages dominated by *Pterostichus melanarius* in central Alberta; A two-year study on the diversity and abundance of ground beetles in the interior and edge of spring wheat (*Triticum aestivum*) and industrial hemp (*Cannabis sativa*)

Natalie LaForest (1) and Boyd Mori (1)

¹Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB; nlafores@ualberta.ca

Ground beetles (Coleoptera: Carabidae) are a diverse group of beneficial insects that consume various pests and weed seeds in agroecosystems. There are many ecological and agronomic factors which can influence the species of ground beetles present as well as their abundance. Here we investigate the potential impact of crop type, and distance to non-crop habitat on ground beetle assemblages across two years in central Alberta. Pitfall traps (n = 5) were used in transects placed along the field edge (1 m) and interior (100 m) of wheat (n = 6 both years) and industrial hemp (n = 4 in 2021; n = 6 in 2022) during three sampling periods in 2021 and four sampling periods in 2022. Across both years, crop type, and transect location, the assemblage was dominated by *Pterostichus melanarius*, followed by *Amara littoralis*, and *Pterostichus adstrictus*. The high abundance of *P. melanarius* resulted in a Berger-Parker Dominance Index ranging from 0.64 in the hemp interior in 2021 to 0.91 for the wheat edge in 2021. Hemp interiors supported the greatest species richness, Shannon Diversity, and Pielou's evenness. Species co-occurrence analyses showed negative correlations between *P. melanarius*, and both *A. littoralis* and *P. adstrictus*. The ground beetle assemblage composition was significantly different between crops, with wheat sites being more similar, compared to hemp sites which were more variable. More research is needed on how *P. melanarius* is impacting ground beetle assemblages, the consequences for diversity, and how this dominant species contributes to pest suppression in agroecosystems.

How crickets turn microplastics into nanoplastics, one bite at a time

Marshall Ritchie (1) Marshallritchie@cmail.carleton.ca, Jennifer Provencher (2), Emily McColville (1), Emma Brown (1), Jennie Mills (1), Sophie Kasdorf (1), Jackie Lebenzon (3), Heath MacMillan (1)

1. Department of Biology, Carleton University, Ottawa, ON, Canada ; 2. National Wildlife Research Centre, Environment Canada, Ottawa, ON, Canada ; 3. Department of Biological Sciences, University of Calgary, Calgary, AB, Canada

Microplastics (MPs; 5mm-1 μ m), have been quietly accumulating globally over the past century, yet the environmental consequences of this pollution remain largely unknown. In particular, interactions between MPs and terrestrial organisms like insects have been understudied despite an estimated 9,000 megatons of plastics being directed toward terrestrial ecosystems. I discovered that the tropical house cricket (*Gryllodes sigillatus*) can break down MPs into even smaller particles known as nanoplastics (smaller than 1 μ m). This finding marks the first documented insect that can fragment plastics to the nanoscale. I then fed crickets a range of microplastic particles (38 to 500 μ m) throughout development, and found low mortality rates and equal growth rates compared to crickets fed a plastic-free diet. Crickets were effective at breaking all sizes of plastics down to nanoplastics. I next examined how body size limits the ability of crickets to ingest and retain MPs, and in what form MPs are excreted back into the environment. I found that adult crickets that ingest tiny MP particles can retain them for over 15 days after ingestion. Due to the tolerance and long-term retention of MPs in crickets, I started to examine how plastics could enter the epithelial cells of the gut and whether translocation of these plastics is occurring. Taken together, our findings suggest that insects may contribute to the plastic pollution problem by increasing the number and decreasing the size of particles while also serving as potential vectors of trophic transfer of plastic pollution.

Monday, October 6

President's Prize oral presentations: Agricultural Entomology and Pest Control / / Prix de la présidence, présentations orales: Entomologie agricole et lutte aux ravageurs.

Twenty years of Bt corn in Canada: Understanding adoption, compliance, and challenges from growers' surveys conducted by the Canadian Corn Pest Coalition.

Josée Kelly (1), Tracey Baute (2), Greg Dunlop (3), and Jocelyn Smith (1)

1. University of Guelph Ridgetown Campus, jkelly33@uoguelph.ca. 2. Ontario Ministry of Agriculture, Food and Agribusiness, 3. iFusion Research.

The Canadian Corn Pest Coalition (CCPC) was formed in 1997 as a collaborative group of experts from government, academia, industry, and growers' associations to promote the stewardship of genetically modified corn. Modified corn produces proteins derived from the bacterium *Bacillus thuringiensis* Berliner (Bt). Widespread

adoption of Bt corn has resulted in reduced pest populations, insecticide reliance, and yield losses, and now represents >80% of Canadian corn planted annually. The CCPC has coordinated bi-annual surveys of Canadian corn growers to monitor trends in Bt adoption, awareness and compliance with insect resistance management (IRM) requirements (including planting non-Bt refuge, record keeping, scouting, crop rotation), pests of concern, sources of information, and challenges and suggestions to improve IRM compliance levels. Data presented will focus on county-wide and inter-provincial trends between 2001-2023 that involved Ontario, Quebec, and Manitoba growers; the survey was expanded to the Atlantic and Prairie provinces in 2021 and 2023, respectively. Findings will reflect on the range expansion or resistance development of significant corn insect pests in the Bt corn era.

Targeting pests, not pollinators: Developing selective lures for *Hypera nigrirostris*.

Jeremy Irvine (1), Sean Prager (1).

1. University of Saskatchewan, jeremy.irvine@usask.ca

The lesser clover leaf weevil (*Hypera nigrirostris*) is a persistent pest of red clover (*Trifolium pratense*) seed production. Current management strategies rely heavily on insecticides, which negatively affect beneficial arthropods, including pollinators and natural enemies. This research explores a sustainable alternative by developing a volatile-based integrated pest management strategy for *H. nigrirostris*. The objective is to disrupt reproduction by exploiting volatile organic compounds (VOCs) involved in mating and host-plant location. Using olfactometer bioassays, insect responses to red clover plant structures and conspecific volatiles will be quantified. VOCs responsible for behavioural attraction will be extracted via headspace solid-phase microextraction and identified using gas chromatography-mass spectrometry (GC-MS). Candidate compounds will be acquired and tested in blends using olfactometry and electroantennographic detection (GC-EAD) to assess physiological relevance. Compounds eliciting strong behavioural and antennal responses will be formulated into lures for field trials and compared to conventional control methods. This research aims to deliver a selective control method that preserves beneficial insect communities and aligns with the increasing demand for environmentally sustainable agricultural practices.

Uncovering leafhopper-parasitoid dynamics in Québec's strawberry fields.

Jordanne Jacques (1,5), Abraão Almeida Santos (1,5), Joshua Molligan (1,5), Florent Sylvestre (1,5), Nicolas Plante (1,5), Valérie Fournier (1,2,4,5), Edel Pérez-Lopez (1,5)

1. Département de phytologie, Faculté des sciences de l'agriculture et de l'alimentation, Université Laval, JOJAC54@ulaval.ca 2. Centre de recherche et d'innovation sur les végétaux (CRIV), Université Laval, 3. Institut de Biologie Intégrative et des Systèmes (IBIS), Université Laval, 4. Réseau québécois de recherche en agriculture durable, 5. Centre Sève, Université de Sherbrooke.

Strawberries are a key crop in Québec, accounting for over 50% of Canada's production. However, they face phytosanitary threats from migratory leafhoppers *Empoasca fabae* and *Macrostelus quadrilineatus*, which transmit phytoplasmas causing plant diseases. This 2023-2024 study assessed the abundance and diversity of migratory and local leafhoppers, as well as the effects of climate and parasitism. Surveys were conducted in 11 strawberry farms using yellow sticky traps. Over

82,000 leafhoppers were captured, representing more than 60 genera. A key finding was the first official detection in Canada of *Dalbulus maidis*, a major maize pest. Temperature increased the abundance of migratory species, while local species were unaffected. Precipitation reduced the abundance of *E. fabae* and local species, but not *M. quadrilineatus*. Regarding parasitism, *M. quadrilineatus* had the highest rate, followed by local species, with *E. fabae* showing the lowest. The parasitoid *Gonatopus clavipes* was identified, along with two other putative species, highlighting their potential for biological control. This work lays the foundation for future biological control efforts and sustainable pest management.

Determining the preferred host plant for oviposition of three Canadian *Dicyphus* species and the adventive *Nesidiocoris tenuis* (Hemiptera: Miridae).

Carly. A. Demers (1,2), R. Hallett (1), R. L. Labbé (2)

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Canada's robust greenhouse industry is under constant pressure from arthropod pests. Resistance to pesticides makes the development of new biological control agents (BCAs) crucial. Many mirid species are available for use as BCAs around the world, but some phytophagous species cause damage. Banker plants can bolster BCA populations, while trap plants can reduce draw pests away from crops. Over 60% of omnivorous mirids are polyphagous, giving them diverse host plant prospects, yet show high fidelity for preferential host plants. Determining the host preferences of beneficial and detrimental mirid species can elucidate potential banker and trap plants for management. We assessed the oviposition preference of four brycorine mirids—*Dicyphus hesperus*, *D. famelicus* and *D. discrepans*, and plant pest *Nesidiocoris tenuis*—on an array of host plants in a choice-based assay: mullein, strawberry, tomato, cucumber, sesame, and alyssum. Nymphal emergence was used to indicate host preferences. Mirids were assessed on multiple host plant combinations. Preliminary results are presented and discussed.

Bacterial egg symbiont-derived odors inform stable fly oviposition decisions.

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Stable flies, *Stomoxys calcitrans*, are blood-feeding pests of livestock that are of worldwide veterinary importance. They are frequently found near livestock production facilities, with larvae developing in ephemeral sites composed of decaying organic matter. Gravid female stable flies orient towards odors and gases emanating from substrates that are optimal for larval development. Some olfactory cues may be produced by fly bacterial symbionts and indicate conspecific presence, the effect of which is unknown. Subsequently, we investigated the effects of egg bacterial symbionts on female oviposition site preferences. We collected, isolated, and identified eight bacterial isolates from surface-rinses of stable fly eggs. We then tested the behavioural responses of females to each isolate. Our results demonstrate that egg-laying and mid-ranged attraction is elicited by odours produced by *Serratia marcescens* and *Sporosarcina* sp. Identification of the semiochemicals which mediate

this interaction is underway (presented by Anya Gould) and may aid in the development of new olfactory lures which target gravid female stable flies.

The impact of pea (*Lathyrus oleraceus*)-canola (*Brassica napus*) intercrop on pea leaf weevil (*Sitona lineatus*) host location and feeding behavior under field and laboratory conditions.

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Intercropping, the practice of growing two or more crops together in the same space, is gaining attention for its potential to enhance agricultural sustainability and pest management. With pulses and oilseeds contributing significantly to the economy of Western Canada, we hypothesize that pea–canola intercropping can disrupt pea leaf weevil (PLW) host location and feeding behavior. Weevil feeding damage and abundance was assessed in field experiments conducted on commercial farms and in a plot study in Alberta. Laboratory assays compared feeding damage, above-ground biomass N, and leaf area between intercrop and monoculture peas. Preliminary results show significant site by crop treatment interactions on adult feeding damage, with canola presence likely interfering with PLW host colonization. Laboratory findings suggest that intercropping can reduce the proportion of leaf area affected by adult PLW feeding through moderating leaf size compared to monoculture peas.

Investigation of insecticide susceptibility of select weevil species (Coleoptera: Curculionidae) on the Canadian Prairies.

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Insecticide resistance is an increasing concern worldwide with the intensive use of chemical insecticides in insect pest management. On the Canadian prairies, few pest species have confirmed resistance, but this may reflect a lack of testing rather than true absence. This is concerning as there are reports of resistance in the native European ranges of some invasive agricultural pests. We evaluated the current pyrethroid susceptibility in *Ceutorhynchus obstrictus* (Marsham) and *Sitona lineatus* L. on the Canadian prairies, using laboratory bioassays to determine susceptibility levels. We also examined the effectiveness of select field pea seed treatments for management of *S. lineatus*. No resistance was noted to the synthetic pyrethroids in either species. In our laboratory assays, Deltamethrin works as on label for suppression in *S. lineatus*. Seed treatments reduced damage and increased mortality of *S. lineatus*. These findings establish updated insecticide susceptibility baselines and highlight the importance of ongoing monitoring to detect and manage resistance before it becomes a significant threat.

Can cover crops reduce the impacts of flea beetles on canola establishment? An experimental assessment on commercial farms in Manitoba.

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Flea beetles from the genus *Phyllotreta*, crucifer (*P. cruciferae* Goeze, 1777) and striped (*P. striolata* Fabricius, 1803), can cause severe damage during early growth stages of spring canola (*Brassica napus* L. and *B. rapa* L.) in North America. Cover crops, a cultural control practice, could be considered for managing flea beetles, as

they have the potential to reduce canola plant location by flea beetles and increase natural enemies by enhancing plant diversity. We examined the effect of cover crops (oats and wheat) on flea beetle abundance and their damage in a total of 4 commercial fields in 2025. In each field, 36 m wide strips had either canola or canola + cover crop (n = 3 - 4 strips/treatment/field). Defoliation was assessed visually in sampling points (n = 3 points/date, arranged 15 m) of ten consecutive canola plants. Flea beetle abundance was measure with yellow sticky traps. Flea beetle abundance and damage were low overall; however, flea beetle counts and damage showed a declining trend in the cover crop treatment in some experiments.

Assessment of commercially available allyl isothiocyanate lures and traps to attract and retain flea beetles (*Phyllotreta*) to predict feeding damage on canola.

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Flea beetles, *Phyllotreta* spp., pose a serious economic threat to Canada's canola industry. Early season monitoring is essential to provide decision-making for the foundation of integrated pest management. Allyl isothiocyanate (AITC), a volatile, defensive compound released by canola, attracts adult flea beetles. Here we test the attractiveness of commercially available AITC lures in two commercially available traps. We also compare the number of flea beetles caught in baited traps to subsequent canola feeding damage to determine the predictive capacity of trap capture. Two commercially available AITC lures and traps were compared to non-baited control traps in all possible combinations in commercial canola fields in central Alberta. Flea beetle feeding damage was assessed on cotyledons sampled at the same field sites. Baited traps captured more *P. cruciferae* and *P. striolata* than unbaited control traps. More *P. Cruciferae* were retained on KLP+ traps, whereas *P. striolata* were caught equally between trap types. Flea beetle capture in AITC-baited traps weakly predicts feeding damage. These results inform future flea beetle monitoring and trapping practices.

Recipe for Resilience: optimizing the artificial diet of western bean cutworm, *Striacosta albicosta*, for laboratory rearing and *Bacillus thuringiensis* susceptibility monitoring.

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Western bean cutworm (*Striacosta albicosta* (Smith; Lepidoptera: Noctuidae)) is a native pest of Zea mays and *Phaseolus vulgaris* in North America. The sole effective *Bacillus thuringiensis* (Bt) protein at controlling *S. albicosta* is Vip3A. *S. albicosta* are highly mobile moving from plant-to-plant resulting in sub-lethal exposures of Bt in integrated refuges. Monitoring for Vip3A resistance is critical to Bt corn technology stewardship. This research aimed to optimize artificial diets for *S. albicosta* rearing and Bt susceptibility monitoring. In the first experiment *S. albicosta*

were placed onto artificial diet of various protein-to-carbohydrate (P:C) ratios (0.5P:1.0C, 1.0P:1.0C, 1.5P:1.0C, and 2.0P:1.0C), with daily assessments of survival and development. In the second experiment, minor modifications of micronutrients were implemented across three treatments (0.5P:1.0C, 1.5P:1.0C), and a treatment mimicking the P:C ratio experienced by *S. albicosta* in corn where 1st-3rd instars consume mainly protein (1.5P:1C), to greater carbohydrate intake (0.5P:1.0C) as 4th 6th instars. Optimizing the larval diet of *S. albicosta* facilitates further research aiming to monitor the susceptibility of control mechanisms and mitigate economic losses.

Predators vs. pests: evaluating natural control of *Lygus* in lentils using field cages and eDNA.

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This study explores the role of natural predators in controlling *Lygus* spp. populations in lentil crops through a field cage experiment. Using a randomized complete block design with eight treatments varying in *Lygus* and predator densities, we assess predator impact on pest survival, and crop yield. Predators include green lacewings, ladybugs, and damsel bugs, introduced at different densities. Bi-weekly monitoring tracks insect dynamics, with final counts taken at plant maturity (R7 - R8) and yield measured at harvest. To complement field observations, we will perform environmental DNA (eDNA) analysis on collected predators to identify prey species consumed. This molecular approach will clarify predator feeding behavior and their potential as biocontrol agents. By integrating fieldwork with eDNA techniques, our research aims to inform sustainable pest management strategies that leverage natural predator-prey interactions.

From fields to forecasts: Exploring leafhopper (Hemiptera: Cicadellidae) population patterns in the Canadian Prairies.

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Canola is an economic driver of Canadian prairie agriculture. Aster Yellows disease (AY) outbreaks in canola have become more frequent and devastating since the first symptomatic plant was recorded in Saskatchewan in 1953, yet it remains largely unpredictable. Over 20 species of leafhoppers (Hemiptera: Cicadellidae), mainly *Macrostelus quadrilineatus* (Forbes), can carry Aster Yellows phytoplasma, the causal agent of AY. However, canola growers have limited tools to manage this pest as its population dynamics are poorly understood. This study provides the ecological foundation for developing a leafhopper population prediction model using artificial intelligence as part of the “LeafHope” project, a Canada-wide initiative. This first sampling year uses sticky cards along the edge of canola fields throughout Alberta, Saskatchewan, and Manitoba to trap leafhoppers. Species population dynamics are analyzed according to time, space, agricultural practices, and climatic factors. By understanding leafhopper population dynamics in canola crops, growers can better prepare for AY outbreaks in their fields. This study system can be expanded to cover other affected crops, like cereals, in the future.

President's Prize oral presentations: Physiology, genetics, taxonomy, and systematics // Prix de la présidence, présentations orales: Physiologie, génétique, taxonomie et systématique

Environmental cues regulate thermal plasticity and dormancy related traits in the yellow fever mosquito, *Aedes aegypti*.

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The yellow fever mosquito, *Aedes aegypti*, historically confined to tropical regions, is expanding into poleward climates where photoperiods and temperatures differ significantly. These novel seasonal cues may affect their thermal plasticity. *Ae. aegypti* can cold acclimate, enhancing low-temperature survival and reducing female blood-feeding – hallmarks of mosquito dormancy. While photoperiod regulates dormancy in other species, its effect on *Ae. aegypti* thermal plasticity is understudied. Here, we present the first evidence for a photosensitive acclimation phenotype in *Ae. aegypti*. Cold acclimation was attempted under an extreme photoperiod of 20h:4h L:D, introduced at three life stages. A chill coma onset (CCO) assay confirmed cold acclimation. Extreme photoperiod significantly influenced CCO temperature, with the magnitude of change in plasticity dependent on when the extreme photoperiod was introduced. Expression of circadian genes, *timeless* and *period*, shifted in response to photoperiod and temperature, indicating disruption of the biological clock under changing conditions. These findings improve our understanding of the relationship between photoperiod and thermal plasticity, and how they may facilitate the species' expansion into temperate environments.

Studying honey bee caste based differences in Black queen cell virus infection response.

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Since its discovery 50 years ago, Black queen cell virus (BQCV) has remained a poorly studied honey bee (*Apis mellifera*) virus. Although only developing queens are commonly known to turn a distinctive black color and experience death due to BQCV, developing worker mortality is also described by some authors. The empirical evidence is scarce but necessary to understand the nature of BQCV virulence.

Therefore, we conducted comparative experimental infections of both honey bee castes during larval and pupal development. Based on the hypothesis that honey bee queen developmental characteristics could compromise individual immune functions, we predicted higher virus titres and mortality, and the presence of classic BQCV symptoms, in developing queens rather than workers. While we confirmed a higher virus-induced death rate in queens, classic symptoms were not observed, and the virus titre results produced unanticipated but interesting patterns. Potential explanations of our findings and their implications for future research and our general understanding of host-dependent pathogenicity of viruses will be discussed.

Diverse strains of Aster Yellows Phytoplasma are associated with Potato Leafhopper (*Empoasca*

fabae) in Eastern Canada.

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Phytoplasmas are cell wall-less bacteria transmitted by phloem-feeding insects, primarily leafhoppers, and are responsible for significant economic losses in Canada. As climate change alters the composition and movement of insect communities, migratory species such as the potato leafhopper (*Empoasca fabae*), one of the most abundant leafhoppers in Quebec, may play an emerging role in phytoplasma epidemiology. Although *E. fabae* has not yet been confirmed as a vector, its frequent detection in fields and potential to acquire and transmit phytoplasmas warrant further investigation. In this study, we screened DNA from *E. fabae* specimens collected in strawberry fields for the presence of 'Candidatus Phytoplasma' using PCR. Positive samples were cloned and sequenced to identify phytoplasma groups and subgroups. Our results confirmed the presence of multiple Aster Yellows phytoplasma strains in *E. fabae* based on phylogenetic analyses and restriction fragment length polymorphism profiling. However, vector competence has yet to be demonstrated. This study lays the groundwork for assessing the vector potential of *E. fabae* and the diversity of phytoplasmas in Eastern Canadian agroecosystems.

Quantitative DNA metabarcoding to evaluate the effect of flower strips on natural enemy diversity in Quebec lettuce fields.

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Given the harmful effects of insecticides on the environment and human health, developing sustainable pest control alternatives is essential. Conservation biological control, such as planting flower strips to support natural enemies of pests, is a promising strategy. These beneficial insects can disperse into fields and reduce pest populations. However, its effectiveness remains understudied in Canada. We assessed how different flower strip affect the attraction of natural enemies in lettuce crops grown on Quebec histosols. Due to the large number of insect specimens collected, traditional morphological identification was impractical. We instead used a quantitative DNA metabarcoding method called *spikepipe*, which includes a calibrated DNA sample to improve abundance estimates and reduce bias. Our results showed that spikepipe correction significantly increased the accuracy of abundance estimates ($R^2 = 0.85$) compared to uncorrected metabarcoding ($R^2 = 0.37$) from samples of known composition. This method enables rapid and reliable quantification of species in bulk samples. The findings will help identify flower strips that best attract biological control agents, promoting more sustainable pest management practices.

Genomics of the *Culex pipiens* mosquito, including new chromosome-level assemblies of *Cx. p.*

pipiens and *Cx. p. molestus*.

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Culex pipiens is a critical disease vector mosquito that is globally invasive, with two major bioforms. The above-ground bioform, *Cx. p. pipiens*, primarily feeds on birds, requires a blood meal to lay eggs, undergoes diapause, and seasonally mates in swarms. The subterranean bioform, *Cx. p. molestus*, feeds on humans and other mammals and is often found in man-made infrastructure like sewers and underground rail systems. Unlike its counterpart, *Cx. p. molestus* does not require a blood meal for its first batch of eggs, breeds year-round without diapause, and mates in confined spaces. These bioforms are identical morphologically, but there is evidence for genetic distinctiveness between them. However, the genomics underlying their life histories has been limited by available genomes. We produced chromosome-level genome assemblies of both bioforms using PacBio whole-genome sequencing and Hi-C scaffolding. We performed genome-wide assessments of these assemblies with each other and with other *Culex* chromosome-level genomes to identify gene family evolution and understand how genes and their functions differ between the bioforms.

The first record of *Apatania comosa* Denning 1949 or *Apatania chasica* Denning 1954 (Trichoptera: Apataniidae) in Canada raises identification questions.

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A larval Trichoptera specimen collected from Tenakihi Creek, British Columbia, in 2016, returned a close genetic barcode match to two Apataniidae species: a 99.46% match to *Apatania comosa* and a 98.57% match to *Apatania chasica*. This close match raises questions regarding the identification of this specimen, the identification of the specimens it was compared to during genetic sequencing, and the taxonomic status of these species. DNA barcoding was used to determine the identification due to larvae of these species – as well as of Apataniidae in general – being under-described and minimally defined in published morphological keys. This specimen was collected over 1000 km from the nearest previously reported *A. comosa* and *A. chasica* records, representing a large known range expansion, as well the possible need for a conservation status reassessment for *A. comosa*, which are considered imperiled (NatureServe). The questions surrounding this specimen highlight the need for increased sampling and identification efforts to define the diagnostic morphological characteristics of this group.

Introgression, adaptation, and speciation in the spruce budworm species complex (Lepidoptera:

Tortricidae: Choristoneura).

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Introgression describes gene flow between previously diverged species, a process which can enhance genetic variation that enables adaptation and even speciation.

Such introgression may have shaped the evolution of the spruce budworm species complex (Lepidoptera: Tortricidae: Choristoneura) which is Canada's most important defoliator of conifer trees. Using whole-genome sequences, we are assessing the role of introgression in adaptive divergence, focussing on the origin of the two-year-cycle spruce budworm (*Choristoneura occidentalis biennis*). We are also comparing the genomes of interacting species in the complex to find signatures of adaptive introgression and reproductive barriers using a sliding window approach. In addition to providing better understanding of evolutionary processes, this work aims to inform future control measures and outbreak modelling of these forest pests.

Bugs on a mudstone windshield: Paleocene insect compression fossils from the Paskapoo Formation of Alberta.

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The fossil record provides direct evidence of past biodiversity, offering critical context for interpreting patterns of diversification, extinction, and recovery. However, Paleocene insect assemblages in North America remain significantly understudied, despite representing a transitional period between the end-Cretaceous extinction and the onset of the Paleocene–Eocene Thermal Maximum. Insects have played essential roles in shaping terrestrial ecosystems through their interactions with plants and animals. The Paleocene-aged Paskapoo Formation of central Alberta (62.5–58.5 Ma), provides a window into early post-extinction ecosystems in western Canada.

Compression fossils, formed in shallow, stagnant freshwater environments, have yielded diverse insect taxa, including representatives from the Odonata, Orthoptera, Diptera, Coleoptera, and Hymenoptera. Here, we review all previously described taxa and report on undescribed specimens, including the larvae of *Paralichas* sp. (Coleoptera: Ptilodactylidae), other as-yet unidentified adult beetles, and naucorid bugs. This work sets the stage for future ecological, evolutionary, and biogeographic analyses.

The size of hoverfly mimics relative to their models and its implications for the evolution of mimicry.

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Many hoverfly species are Batesian mimics of stinging hymenopterans, although their similarity to their putative models can vary considerably. Previous research shows that larger hoverfly species are often better mimics, possibly because there is

stronger selection for mimetic fidelity in larger, more profitable prey. However, predators can use body size to discriminate between mimics and models. Therefore, an alternative hypothesis is that mimetic hoverflies that differ in size from their hymenopteran models are more readily identified as mimics and so face weaker selection to improve colour pattern similarity. To compare these hypotheses, we tested whether mimetic fidelity was better explained by the absolute body size of the mimic or by the size of the mimic relative to its model. We found that mimic body size was positively correlated with model body size and that the fidelity of the mimic was positively associated with the size of its model. However, we found no evidence of a relationship between mimetic fidelity and hoverfly body size or its size relative to its model.

Gene family evolution in the eastern tree hole mosquito, *Aedes triseriatus*.

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The eastern tree hole mosquito, *Aedes triseriatus* (Say), is the primary vector and overwintering reservoir for La Crosse orthobunyavirus (LACV), a California serogroup (CSG) virus and the leading cause of pediatric vector-borne viral encephalitis in the United States. CSG viruses are transovarially transmitted by mosquitoes to their offspring, and trans-seasonally persist in the diapausing embryo. Notably, while most other CSG overwintering vectors are univoltine groundpool species, *Ae. triseriatus* is a multivoltine container mosquito well-suited to colony maintenance, making it a uniquely tractable, classical model system for temperate vector biology and CSG virus-vector interactions. Using the newly assembled *Ae. triseriatus* reference genome, we conducted a comparative analysis of gene sequence divergence and copy number variation in gene families with known roles in reproduction, development, diapause, and antiviral immunity. We identify the location of a previously reported female autosomal paralog of Nix, a dominant male-determining factor in other *Aedes* species. These results will inform further studies of population biology and vector-virus interactions in this important temperate disease vector.

Subspecies delimitation of *Tharsalea mariposa*: an integrative approach.

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Subspecies are frequently used as operational units in taxonomy and conservation, yet they are often poorly defined and based on limited evidence. To address this, this study examines subspecific boundaries within the North American lycaenid butterfly *Tharsalea mariposa* using an integrative approach that combines both double-digest restriction-site associated DNA sequencing (ddRADseq) and morphological analyses. Our results provide strong support for the distinctiveness and validity of several subspecies, including *T. m. makah*, which has recently garnered conservation interest, while casting doubt on the legitimacy of others. In doing so, this study underscores

the value of genomic data in evaluating subspecific classifications and offers critical insights to guide conservation efforts.

Wormplex: Development of novel qPCR multiplex assays for species-specific identification of major click beetle (Coleoptera: Elateridae) pests in British Columbia.

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Wireworms, the larval form of click beetles (Coleoptera: Elateridae), are pests of staple agricultural crops. Accurately distinguishing between pest and non-pest species is challenging, lengthy, and requires expertise. This can result in overuse of pesticides, as a crop “insurance”, regardless of the presence or economic levels of pest species. Our study aimed to design Wormplex, a novel real-time PCR multiplex assays using species-specific primers and probes. Of these, the two-species Wormplex-*Agriotes* assay detected *Agriotes lineatus* and *A. obscurus* in a single reaction with 100% accuracy in 40 samples tested, and the three-species Wormplex-*Limoni* assay detected *Limoni* *canus* and *L. infuscatus* with 100% accuracy (in 40 samples tested); however, *L. californicus* was only detected with 63% accuracy. Although more testing is required, this result is likely due to competition between the *L. californicus* and *L. infuscatus* reverse primers and will require redesigning. Using Wormplex for reliable and accurate identification of these pests can provide substantial economic and environmental benefits.

Identifying Candidate Genes Potentially Involved in Tick Paralysis in *Dermacentor andersoni* from Canada.

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The Rocky Mountain wood tick (*Dermacentor andersoni*) is responsible for most tick paralysis cases in North America. Tick paralysis is a neurological disorder speculated to be caused by neurotoxins in the tick’s saliva, leading to ascending paralysis, lethargy, and muscle weakness in humans and other animals. In Canada, *D. andersoni* are found between the mountains of British Columbia to the prairies of central Saskatchewan. Interestingly, ticks from British Columbia are capable of causing tick paralysis, whereas prairie populations cannot. To investigate whether tick paralysis has a genetic basis, we conducted a genome-wide association study (GWAS) to identify candidate genes associated with the trait. From 30 tick individuals, we identified 145 significant sites potentially linked to tick paralysis. Five candidate genes were annotated with functions possibly related to mechanisms for paralysis. These genes were then compared with those from venomous organisms and other paralytic tick species. Our results suggest that *D. andersoni* shares paralytic genes with other medically relevant arthropods, indicating possible convergent evolution in the genetic basis of tick paralysis.

President's Prize oral presentations: Behaviour, ecology and conservation / Prix de la présidence, présentations orales: Comportement, écologie et conservation

Why did the bee cross the road? How shelterbelts and roadside floral abundance influence bee travel along and across highways in an agricultural landscape.

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Highways pose a mortality risk to bees from highspeed traffic. Additionally, nesting habitat and flowers are limiting resources for native bees in agricultural landscapes. These threats may be mitigated with changes in landscape features. Shelterbelts may provide a variety of undisturbed nesting sites. High floral abundance in roadsides may lead to increased pollinator roadkill by increasing local pollinator abundance, but previous studies have demonstrated that butterflies are less likely to cross roads when there are sufficient flowers on their side of the road. I hypothesized that shelterbelts and high floral abundance would individually increase bee abundance, with the highest abundance occurring when both resources cooccur. Additionally, proportionally more bees should be found traveling along versus to and from highways when floral abundance is high. To test this, I installed Malaise traps at 22 sites along Alberta highways to collect insects flying along, to, and from highways. Shelterbelts were present at half of the sites and floral surveys were conducted throughout the summer. I will be presenting initial directional count data.

Wetland pollinator networks in central British Columbia.

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Wetlands are vital habitats because of the ecosystem services they provide and biodiversity they sustain. Wetland habitats support unique flowering plant species adapted to aquatic environments along with unique pollinator networks. However, these networks are rarely characterized in wetland habitats, and particularly in British Columbia's central interior, despite their utility for understanding plant-pollinator dynamics and guiding conservation decisions. We aimed to characterise these networks and assess how they may differ from surrounding forested habitats. For example, how dependent are wetland plants on forest-associated insects residing in surrounding habitats? A total of 16 networks were characterized from June to August 2025 in lacustrine wetlands and peatlands, along with adjacent forests near to Ft. St. James, BC. Our long-term goal is to improve natural historical knowledge gaps for in these understudied habitats to improve the preservation of important ecological interactions for more effective biodiversity conservation.

Transmission risk factors influencing pathogen spillover between honey bees and wild bees.
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Managed and wild bees increasingly interact across agricultural landscapes in North America. Trends in honey bee 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 various wild bee traits in virus transmission. We found that for commonly detected viruses, a variety of factors including honey bee virus abundance, phylogenetic distance from honey bees, and agricultural land use were significant in predicting virus detection in wild bees.

The complex temporal relationship between natural enemies and plants in temperate grasslands: a network perspective.

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How species interactions change through time is fundamental to community structure. We investigated how temporal scale influences detection of trait-based versus neutral processes in plant-natural enemy networks in Canadian mixed-grass prairie. We compared a season-long aggregated network with 33 phenonet networks representing interactions during each plant's flowering period. We tested how floral traits and abundance related to network centrality for 33 plant species, visited by 136 natural enemy species. Season-long networks showed abundance-driven interactions, supporting neutral theory. However, phenonets revealed strong trait effects on network structure, varying seasonally. Flower type, corolla shape, and display size significantly influenced species' network positions only when phenological context was considered. Key plants (*Symphoricarpos occidentalis*, *Achillea millefolium*) consistently supported diverse natural enemy assemblages across scales. Results demonstrate that ecological networks are scale-dependent, with trait-based and neutral processes detectable at different temporal resolutions. For natural enemy conservation, maintaining plant communities with complementary floral traits and phenological diversity is essential to support predator and parasitoid assemblages in grassland ecosystems.

Vectors, biotopes, and seasonality of endemic mosquito-borne arboviruses in Eastern Ontario, Canada.

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Mosquito arboviruses are prevalent across Canada, yet comprehensive lists of vector and reservoir species remain inadequate for optimizing public health surveillance strategies. We tested a total of 12,413 species-specific pools from 121,042 mosquitoes captured in eastern Ontario, Canada (2017-2021), revealing the yearly presence of California serogroup viruses (CSGv) in 610 pools (14 species) and West Nile virus (WNV) in 22 pools (six species). Month-of-year and biotopes with natural features were strongly positively associated with CSGv prevalence. We detected CSGv-positive pools in *Ochlerotatus provocans* and *Ochlerotatus stimulans* in all sampling years, with infection rates (total infections per 1000 mosquitoes) up to 22.1 (95% CI: 17.9-27.1) and 7.4 (95% CI: 6.2-8.9), respectively. WNV infections originated mainly from *Culex pipiens-restuanus* pools (77%) in sites with high agricultural activity. These findings emphasize the need for 1) targeted vector competency assays and 2) genomic sequencing to characterize and validate circulating arboviral strains and variants.

The effect of canola and field-pea intercrops on the oviposition and development of the diamondback moth, *Plutella xylostella*, in laboratory studies.

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The diamondback moth (*Plutella xylostella*) is a significant pest of brassica crops, including canola (*Brassica napus*). Current management relies on insecticides and biological control, but resistance and ineffective biological control during outbreaks are challenges. Intercropping, growing multiple crops together, can provide agronomic and pest management benefits. This research explores the effect of intercropping canola (host) and field pea (non-host) (*Lathyrus oleraceus*) on *P. xylostella* oviposition and development. *Plutella xylostella* larval feeding was lowest on pea and not different between canola and intercrop treatments. Development was fastest in intercrops, intermediate in canola and slowest in pea. Moths oviposited a similar number of eggs in intercrops and canola treatments, but laid significantly fewer eggs on pea. *Plutella xylostella* were induced to lay eggs on peas in the presence of canola volatiles. A small number of *P. xylostella* developed to adults on non-host pea plants. Understanding the impact of canola and field pea intercrops on *P. xylostella* is important in determining the potential of intercropping as a sustainable management strategy.

Biochar effects on oviposition and development in *Aedes aegypti*.

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Aedes aegypti, an invasive mosquito and vector of dengue, Zika, and yellow fever, was first detected in California in 2013 and continues to expand its range. At the same time, intensifying California wildfires produce biochar, carbon-rich material formed by burning organic matter under low oxygen, which can leach into aquatic habitats.

This study examines the effects of wood-derived biochar on *Aedes aegypti* oviposition and larval development. In laboratory choice assays, gravid females were offered oviposition sites containing hay infusion, wood biochar infusion, unburned wood infusion, or rearing water. Biochar-infused water received the highest proportion of eggs laid, indicating strong preference. Larvae reared in biochar water pupated ~24 hours earlier than controls, suggesting accelerated development. Ongoing work includes assessing biochar's effects on the mosquito microbiome and metabolome, as well as field trials in Madera, California, deploying BG-GAT oviposition traps with and without biochar to evaluate attraction under natural conditions. Understanding how biochar influences *Aedes aegypti* behavior and development may inform the design of more effective surveillance tools and attract-and-kill strategies.

Imidacloprid susceptibility is linked to life history regulation in honey bees (*Apis mellifera*).

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The Western honey bee (*Apis mellifera*) faces many external threats, including pesticides. Exposure can disrupt worker life history, triggering precocious foraging and early death. However, variation in neonicotinoid susceptibility and its connection to behavioral maturation of workers are poorly understood. We hypothesized that susceptibility and life history are linked through constitutive patterns of gene expression. We confirmed that survival to imidacloprid correlates with the inherent rate of the fundamental life history transition from in-hive tasks to foraging. We also compared whole-body transcriptomes of adult workers at different stages within a single cohort colony. These analyses identified age- and behavior-related transcriptome changes consistent with life history models, but also revealed that age strongly shapes whole-body gene expression. General age and behavioral effects were correlated, while transcriptome differences by imidacloprid susceptibility reflected age-specific patterns. Significant overlap in differentially expressed genes between low- and high-susceptibility workers persisted across age and behavior. These genes represent strong candidates for studying imidacloprid resistance and may reveal mechanistic links between pesticides and life history regulation.

You Are Where You Eat: Using Hydrogen Isotopes to Verify the Migration of Odonates.

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Understanding and tracking insect migration presents unique challenges not present invertebrates. For example, many insects are too small to use radio telemetry, have movement too poorly understood for mark-recapture, and do not move in large enough groups to be tracked by radar, among other challenges. My work uses stable isotope analysis as a tool to overcome these challenges. Using isotopic analysis we can verify latitudinal migration and determine the approximate natal origins of a dragonfly. My model organism, the red veined darter (*Sympetrum fonscolombii*), is

suspected of seasonal latitudinal migrations but this had yet to be confirmed in Europe. To address this, we created an odonate calibrated isotopic prediction model (isoscaples) of Afro-Eurasia using archived specimens then applied these isoscaples to *S. fonscolombii* isotopic data. This method confirmed the seasonal latitudinal migration of *S. onscolombii*. We believe this odonate calibrated isoscape has the potential to be applied to other migratory or dispersing odonates like the Migrant Hawker (*Aeshna mixta*) and the vagrant emperor (*Hemianax ephippiger*).

A history of exposure: parasite mediated carry-over effects.

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Parasite-induced fear can cause non-consumptive effects (NCEs) such as morphological, physiological, and/or behavioural changes in hosts. These changes have broader population and community level impacts that are collectively known as the ecology of fear. Among hosts that undergo major metamorphic change, it is not clear if NCEs carry over through developmental stages. Using the ectoparasite *Macrocheles subbadius* and host *Drosophila nigrospiracula*, we investigated whether parasite exposure history (sans infection) has carry-over effects. We tested two hypotheses: (1) exposure history impacts host life-history traits, and (2) exposure history impacts adult host immune function and response. The host cuticle melanization, susceptibility and resistance to infection, as well as development, fecundity, and longevity were recorded. Our preliminary findings suggest that exposure history can impact host physiology, and as such we are likely greatly underestimating the total cost of parasites.

Trust your gut: Bacteria identified in stable fly feces inform foraging decisions of conspecific flies.

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Blood-feeding stable flies, *Stomoxys calcitrans*, are reportedly attracted to conspecific feces. We tested the hypotheses that (1) stable flies are attracted to semiochemicals of feces-derived bacteria, (2) attraction to bacterial semiochemicals varies with composition of bacterial strains and growth substrate, and (3) attraction to bacterial semiochemicals varies with fly sex and physiological status. We isolated and identified seven bacterial strains in stable fly feces. Two-choice bioassays with paired traps baited with sterile agar or agar inoculated with one or more isolates revealed that two isolates, *Serratia marcescens* and *S. surfactantfaciens*, attracted flies. Analyses of fly-attracting isolates' headspace volatiles by gas chromatography-mass spectrometry revealed near-identical odor profiles, explaining their comparable attractiveness to flies. Bacterial attractiveness to foraging flies was dependent upon growth medium. Attraction to bacterial semiochemicals was also contingent upon elevated CO₂ levels activating foraging behaviours. Our interpretation that semiochemicals of feces-dwelling bacteria function in the context of foraging was

further supported by data showing that *S. marcescens* attracted flies regardless of sex or physiological status.

Exploring the western limits of the range of *Wyeomyia smithii*, the non-biting pitcher plant mosquito.

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The pitcher-plant mosquito, *Wyeomyia smithii*, has populations that do not exhibit blood feeding north of the 43° north latitude. This contrasts with the southern populations which can produce their first clutch of eggs without a blood meal, but require blood meals for following clutches. The larvae of *Wy. smithii* develop in the leaves of the purple pitcher plant, *Sarracenia purpurea*, and *Wy. smithii*'s population distribution is closely associated with the distribution of *S. purpurea*. Current distribution maps of *Wy. smithii* only extend to the western edge of Saskatchewan despite the presence of *S. purpurea* in Alberta. Based on previous publications, I expect that the distribution of *Wy. smithii* actually extends into the northern peatlands of Alberta coinciding with Alberta's *S. purpurea*'s distribution. I traveled across northern Alberta identifying *S. purpurea* habitat in order to survey for *Wy. smithii* populations. In addition to detailing new results on the distribution of this species, I discuss future directions related to genetics and conservation of this species.

Investigating the invasive ecology of mosquito species *Culex pipiens* (Diptera: Culicidae) in Alberta.

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Climate change is increasing the range of mosquito species that pose a threat to wildlife and public health through pathogen introduction and spread. *Culex pipiens* is a globally widespread invasive mosquito species that is considered an important vector for several pathogens of concern. *Cx. pipiens* was detected for the first time in Alberta in 2018. It is important to understand the ecology of *Cx. pipiens* within an Alberta context to anticipate its risk to wildlife and human health. Here, I will present preliminary results from my first field season. I will describe differences in diversity of native and invasive mosquitoes across habitats in Calgary, Alberta. I will also describe if *Cx. pipiens* poses an increased transmission of West Nile virus, avian malaria, and California serogroup viruses based on the pathogen detection from collected specimens. The findings of my research will guide local preventative measures in response to *Cx. pipiens* and will have broader implications for building resilience and competence in response to future invasive mosquito introductions.

President's Prize oral presentations: Forest arthropods and population modeling / Prix de la présidence, présentations orales: Arthropodes forestiers et modélisation des populations

Silent Signals: Using eDNA to Detect Red Pine Scale Early in Canadian Forests.

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The red pine scale (RPS; *Matsucoccus matsumurae*) is a highly invasive insect native to Asia that is rapidly killing red pine (*Pinus resinosa*) trees across the northeastern United States, with infestations within 50 km of southern New Brunswick. To support early detection, we developed and validated a species-specific qPCR assay to detect RPS DNA from environmental DNA (eDNA) samples collected in canopy funnel traps. The assay's probe and primers were developed in silico to target a 242bp section of the COI region. The assay reliably differentiated RPS from its main sympatric congener in vitro, the white pine bark scale (*Matsucoccus macrocicatrices*), demonstrating high specificity. The limit of detection was one copy/ reaction, determined using a gBlock-based standard-curve, making it a sensitive and powerful tool for early surveillance. Molecular testing across four weeks of eDNA samples from two RPS-positive sites and one negative control site validated the assay's accuracy with known RPS infestation correlating to positive eDNA detections. These findings offer critical advancements in forest health monitoring and invasive species management.

Searching for endemic mountain pine beetle habitat: exploring the predictive capacity of conventional forest inventory data.

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Intermittent mountain pine beetle outbreaks (*Dendroctonus ponderosae*; MPB) cause extensive tree mortality across mature pine forests in western North America. During the most recent outbreak, MPB spread eastward across the boreal forest in Alberta. As outbreaks collapse, MPB typically returns to its endemic phase where low-density populations are restricted to relatively rare, vigor-impaired trees. However, it is unknown whether the boreal forests of Alberta are suitable to support endemic MPB populations due to differences in stand structure and landscape composition. Recent research suggests that stand density index (SDI), an index of inter-tree competition and the occurrence of vigour-impaired trees within stands, can be used to predict the likelihood that endemic MPB can persist following outbreak collapse. To accurately project suitable endemic MPB habitat across landscapes, we developed models predicting SDI based on conventional forest inventory data. We evaluated the potential sources of variation among prediction results and provided insights for forest inventory data use in modelling. Results will be discussed within the context of data collection, processing, and predictive capacity.

Niche differentiation of mountain pine beetle (MPB) in jack pine: identifying the performance of MPB, bark beetle competitors, and associated fungi in jack pine under a warming climate.

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Mountain pine beetle (MPB; *Dendroctonus ponderosae*) populations in NE Alberta recently crashed following their expansion into jack pine (*Pinus banksiana*), a novel host. However, the vulnerability of jack pine to future threats of MPB remains uncertain, especially in the context of a warming climate and the altered community interactions that typically regulate MPB populations. To examine whether the interactions between *Ips pini*, a competing bark beetle, and MPB are impacted by jack pine defences and warming temperatures, we conducted lab bioassays using *Ophiostoma ips*, the symbiotic fungus associated with *I. pini*, and *Grosmannia clavigera*, a fast-growing symbiotic fungus associated with MBP. The fungi were grown separately and together on media amended with monoterpenes representing constitutive and induced jack pine defences at three temperatures: 15°C, 20°C, and 28°C. Our results suggest that temperature may interact with jack pine defence chemicals to alter the effect of *O. ips* presence on the growth of *G. clavigera*, potentially improving the ability of MPB to maintain populations in jack pine.

Echoes of an outbreak: Ground Beetle (Coleoptera: Carabidae) Responses to Mountain Pine Beetle, *Dendroctonus ponderosae* (Coleoptera: Curculionidae: Scolytinae), Disturbance in Western Alberta.

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Natural and anthropogenic disturbances impact forest ecosystems. Disturbance caused by the Mountain Pine Beetle (MPB), *Dendroctonus ponderosae* (Coleoptera: Curculionidae: Scolytinae), has altered ecosystems due to stand-level mortality in lodgepole pine, *Pinus contorta*, forests. Post MPB-disturbed forests have reduced canopy cover and increased understory growth and diversity, which affect higher trophic levels within the lodgepole pine-dominated ecosystem. Previous studies illustrate that MPB disturbance affects target vertebrate species, but little is known about its impact on arthropod community structure. This study compares the abundance and diversity of ground beetle (Coleoptera: Carabidae) communities sampled in lodgepole pine forest stands with and without previous MPB disturbance. Sixteen species were recorded from undisturbed sites and 17 from disturbed sites. *Scaphinotus marginatus* was most common in undisturbed forests, while *Pterostichus riparius* was most common in disturbed forests. Carabid community composition between stand types will be compared along with measured habitat variables. The results will determine the effect of MPB disturbance on arthropod communities and provide information on biodiversity and ecosystem health in the expanded range of MPB in Alberta.

Keeping it simplex: the pheromone ecology of eastern larch beetle in eastern Canada.

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Tree-killing beetles of the genus *Dendroctonus* use pheromone-mediated aggregation to overcome the defences of trees and locate mates. The eastern larch beetle (*Dendroctonus simplex*) infests tamarack, (*Larix* spp.) across North America. While no outbreaks are currently reported in Canada, severe mortality in the midwestern United States raises concern about its outbreak potential elsewhere. In New Brunswick, *D. simplex* is sympatric with the spruce beetle, *D. rufipennis*. We are investigating the pheromone ecology of *D. simplex* in relation to its interactions with *D. rufipennis*, generalist predators and its outbreak potential in this region. We analyzed volatiles from beetles at different mating stages using gas chromatography-mass spectrometry and characterized phloem volatiles of spruce and tamarack from three locations. Female *D. simplex* primarily produced frontalin, while female *D. rufipennis* produced seudenol, and lacked frontalin. Larch phloem contained mostly α -pinene, 3-carene, manool, and β -pinene. We are using these to formulations in field experiments to test predictions on the interactions of *D. simplex*, with congeners and predators in the forest.

Budworm days of summer: Elevated temperatures accelerate tree phenology and insect development, improving fitness in an outbreaking defoliator.

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Canadian forests are being impacted by climate warming, with increases in the frequency and severity of natural disturbances such as fire, drought, and pest outbreaks. In eastern Canada, there are periodic outbreaks of *Choristoneura fumiferana* (eastern spruce budworm, SBW), a defoliating moth that causes large scale tree mortality of balsam fir and spruce. We employed a novel in situ warming experiment in the Acadia Research Forest in New Brunswick to determine the effects of warming on spruce budworm and its host trees. We exposed seedlings to three warming treatments and introduced spruce budworm larvae to half of the seedlings in each treatment. During the growing season we measured tree phenology and spruce budworm development. We found a strong correlation between elevated temperatures and female pupal weight, insect survival, and time to pupation. Phenology of heated trees were more advanced than controls. Our study suggests that climate warming could increase the severity of SBW disturbance, with negative consequences for Canadian timber supply.

Effect of mountain pine beetle (*Dendroctonus ponderosae*) disturbance to lodgepole pine forests on spider abundance and diversity.

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Range expansion by mountain pine beetle (*Dendroctonus ponderosae*) into northwestern Alberta has changed habitat in disturbed areas due to effects on canopy cover, coarse woody debris, and forest understory growth. Spiders are important generalist predators in forested ecosystems that respond to other forest disturbance regimes. We investigate variation in spider community composition and abundance between lodgepole pine stands at undisturbed sites and at sites that experienced mountain pine beetle disturbance. Disturbed sites have on average more spiders than undisturbed sites across all 15 unique families identified. Across both disturbed and undisturbed sites, Linyphiidae and Lycosidae are the most abundant taxa, accounting for 83.9% of all identified spiders. No significant difference in spider community composition at the family level occurred between disturbed and undisturbed sites. Future research aims to identify spiders to the species and reassess changes in community composition between disturbed and undisturbed sites.

Red alder decline in coastal British Columbia forests: impacts of native and non-native ambrosia beetles (Coleoptera: Curculionidae).

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Red alder, *Alnus rubra*, is a critical nitrogen-fixing, early seral tree species in western North American coastal temperate rain forests. Recent evidence indicates unusually high rates of red alder mortality associated with a complex of scolytine bark and ambrosia beetles (Coleoptera: Curculionidae: Scolytinae); however, the composition of this complex is currently unknown. In 2024, we trapped foraging and attacking ambrosia beetles in red alder ecosystems across the Lower Mainland of British Columbia. Their diversity and abundance were far greater than what was previously known for red alder ecosystems with 11 species discovered versus 3 species known. Of the eleven species found, 7 were introduced, and 4 were native. Furthermore, the abundance of introduced species outnumbered the natives by several orders of magnitude. We further assessed species occurrence patterns in relation to host condition and site characteristics. This study provides the first detailed assessment of ambrosia beetle communities in coastal red alder forests. It establishes a critical baseline for monitoring amidst continued host decline and increasing risk of biological invasions.

Can aerial surveys of defoliation predict forest growth loss? Considering the western spruce budworm, Relating mapped *Choristoneura freemani* Freeman (Lepidoptera: Tortricidae), in dry interior forests.

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Choristoneura freemani Freeman is a widespread defoliator in western North America that primarily targets Douglas-fir, *Pseudotsuga menziesii*. Periodic outbreaks

can cause impacts over many thousands of hectares. In British Columbia (BC), defoliation is detected, delineated, and assigned a severity rating through the Aerial Overview Survey. Survey information is subsequently used to determine treatment areas and calculate impacts to timber supply. Although dendrochronological studies have linked *C. freemani* outbreaks with Douglas-fir growth loss, it's currently unknown whether defoliation severities estimated during Aerial Overview Surveys can predict variation in Douglas-fir growth. Using tree core data collected from 46 sites across BC, we sought to identify and quantify the growth reduction associated with the different levels of mapped defoliation, providing a more accurate estimate for timber volume loss.

To stay or grow: thermal regimes associated with facultative diapause in *Dendroctonus ponderosae* Hopkins (Coleoptera: Curculionidae: Scolytinae).

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Dendroctonus ponderosae Hopkins is a subcortical insect native to western North America, capable of landscape level disturbance events. Recent investigations suggest a temperature-regulated facultative diapause as the mechanism enabling *D. ponderosae* to overwinter in the appropriate life stage, contrary to the previous assumption of quiescence. However, existing developmental models for northern populations assume quiescence, possibly leading to biased projections. Using infested logs reared across an elevational gradient in southern British Columbia, we sought to identify thermal regimes leading to pupation within the same growing season, which is assumed to be detrimental to beetle survival and fitness. Comparisons of observed development to existing growth rate models failed to capture pupation on historically suitable sites for mountain pine beetle. Plausible diapause inducing mechanisms are explored.

Effects of Non-Native Flowers on Pollinator Visitation to Native Flowers in Aspen Parkland Grassland and Restoration Sites.

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In revegetated grasslands, planting native flowers is often recommended to promote pollinator habitat. However, existing non-native flowers may also provide floral resources reduce visitation to native plants through competition, often due to larger or more rewarding floral traits. Similarity in floral traits may ameliorate or exacerbate interactions between native and non-native species. We examined flower visitor preference between paired native and non-native flowers of similar color and structure in an intact and a revegetated grassland in the Aspen Parkland. Using potted plant trials, we recorded all insect flower-visitor species to both potted and existing flowers before and after placement of the potted plants, and evaluated the effect of non-native flower cover on visitation to native plants. Results indicated that some non-native species diverted visitors from native species, suggesting competitive effects, whereas others increased visitation to native flowers, indicating potential facilitation. This demonstrates that the effect of non-native flowers on plant-visitor

interactions is complex, with important implications for revegetation planning and pollinator conservation.

Harnessing AI to study leafhoppers dynamics: a valuable tool for chronobiology.

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Circadian clocks drive physiological and behavioral responses of insects to environmental variations. Their study is mainly restricted to laboratory conditions as conventional insect monitoring often only provides phenological data. AI-based traps recently emerged as a valuable tool to extend chronobiology studies to the ecosystem scale. LEAFHSCOPE is a project aimed at developing a camera-based trap integrated with cascading deep learning models for automatic detection and classification of leafhoppers in the field. Our primary goal is to achieve highly accurate leafhoppers classification using our model. We then aim to characterize the daily activity patterns of leafhoppers in relation to climatic data and insecticide use. Given the ecological heterogeneity of Canadian leafhopper populations, we expect to observe several distinct patterns, even within the same region. The contribution of high-resolution behavioral data collected in the field will provide valuable insights into their dynamics. Combined with accurate climate forecasting models, this knowledge will enable us to predict leafhopper population trends and improve control schedules and reduce the use of pesticides in Canada.

Homing in on hairstreak habitat - identifying the habitat preferences of a curiously isolated and endangered butterfly.

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The Curiously Isolated Hairstreak (*Satyrrium curiosolus*) is one of the only butterfly species known to be endemic to Canada, and is one of the most spatially restricted butterfly species in the world. Found within a small area of Waterton Lakes National Park, this offers a rare opportunity for the study of an insect species across its entire range. Conservation efforts for this rare butterfly species will require a robust understanding of habitat needs. We performed 1343 ground-cover surveys within 1 m² quadrats, examining 32 components, including the cover of plant species, plant functional groups, mineral and abiotic components, and environmental variables such as humidity and temperature. These data were analyzed using random forest classification tree analysis to create a model which identified the most important cover components for the presence of *S. curiosolus* larvae, which we believe to be the limiting life stage for the species. This model has approximately 90% accuracy based on R-squared values for identifying undesirable habitat, and approximately 70% accuracy for identifying desirable habitat.

Symposium 1: Gall Midges Rising/ Montée des cécidomyies

Identification of sex pheromones for monitoring of emerging midge pests of field crops.

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The threat of midge pests to cereal production in the Americas and Europe is increasing at the same time as insecticide treatments are being withdrawn. New tools are urgently required to monitor the spread of these emerging pests, and to time pest management strategies accordingly. In horticulture, sex pheromone-baited traps are established technologies for monitoring gall-midge pests. Here, we describe the identification and synthesis of the female-produced sex pheromone of *Contarinia brassicola*, a recently described gall-midge identified from fields of Canadian canola. We also outline ongoing work to identify the sex pheromone of the yellow wheat blossom midge, *Contarinia tritici*, and to investigate whether a sex pheromone is used by the switchgrass midge, *Chilophaga virgati*.

Ecology and management of swede midge in Quebec.

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Canola accounts for a significant proportion of field crop acreage in cold regions of Quebec, specifically Abitibi-Témiscamingue, Saguenay-Lac-Saint-Jean, Bas-Saint-Laurent. Swede midge, an invasive exotic insect first detected in Quebec in cruciferous vegetables in 2003 and in canola in 2006, is one of its principal pests. Surveys carried out as part of the *Réseau d'avertissements phytosanitaires* show that swede midge is present in all canola-growing regions of Quebec and often in high densities, suggesting that it has the potential to cause significant yield and economic losses that could threaten interest in this crop. Since 2017, several projects have been conducted to study the status of this insect in the province and evaluate control methods. These have included studies on refining the action threshold, insecticide efficacy and surveys on the occurrence of a parasitoid wasp, *Synopeas myles*. Winter canola was also assessed as an alternative to spring types to determine its potential to reduce swede midge problems. This presentation will provide an overview of the results obtained in recent years in Quebec.

The life(cycle) of swede midge.

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Insects that manipulate their host plants to create galls are understudied and the mechanisms driving these insect-plant interactions are not fully understood. The gall midge *Contarinia nasturtii* (Diptera: Cecidomyiidae) has emerged as a significant crop pest. Establishing a model system for gall-inducing insects is crucial for investigating the mechanisms of gall formation and the development of effective management strategies. Here, we investigated the development time of *C. nasturtii* on *Arabidopsis thaliana* and Rapid Cycling *Brassica rapa* (RCBr). We recorded time to pupation and adult emergence. Larval development was significantly faster on RCBr than on *A. thaliana* when comparing the time of 50% of larvae moving to pupate. No significant difference was found in the time of adult emergence between *A. thaliana* and RCBr. This research will further our understanding of the ontogeny of *C. nasturtii* on *A. thaliana* and contribute to a deeper understanding of its life cycle and host interactions.

Ecology and distribution of the canola flower midge.

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Canola flower midge, *Contarinia brassicola*, was discovered in association with canola in western Canada, where larvae primarily damage canola plants by transforming flower buds into galls. First described in the scientific literature in 2019, research in western Canada has focused on determining its distribution, ecology, and impact on canola yields. An initial transect-based survey showed that *C. brassicola* is present in most of the canola-growing areas of Alberta, Saskatchewan, and Manitoba, with densities decreasing from north to south. A pheromone-based monitoring program is now being used to track the distribution and density of *C. brassicola*. *Contarinia brassicola* has at least two generations per year, with the first peak adult flight occurring in late June to early July and the second peak flight taking place in August. In samples collected from 2017-2019, eggs and larvae were only found on flower buds. Each galled flower represents a pod that does not produce seed, however, the relationship between *C. brassicola* density and seed yield loss has yet to be determined.

Where's Waldo?: Looking for canola flower midge in Ontario.

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Since the discovery of *Contarinia brassicola* (canola flower midge, CFM), an apparently native species, in western Canada in 2016, we have been monitoring spring canola (*Brassica napus* L.) fields in Ontario for CFM to understand its spatiotemporal population distribution and interactions with *Contarinia nasturtii* (swede midge, SM), an invasive pest of brassicaceous crops. We have used field surveys, pheromone-baited traps, and morphological and molecular identification of larvae and adults collected from host plants to monitor and identify CFM. Although we have not observed CFM-like flower galls in Ontario, we have captured relatively high numbers of CFM males on traps, the identity of which we confirmed through DNA barcoding. Initially, we also identified adults that emerged from canola plants as CFM based on morphological traits; however, these were subsequently identified as SM via barcoding. Similarly, all larvae we collected from host plants have been identified as SM by molecular methods. We discuss the challenges of documenting an apparently rare midge species in an environment dominated by a morphologically similar congener.

Apple leaf-curling midge in Canada: ecology and management.

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Apple leaf-curling midge, *Dasineura mali* (Diptera: Cecidomyiidae), is an invasive species which was recorded for the first time in New Brunswick in 1964, in Nova Scotia and British Columbia in the 1990s and in Ontario and Quebec in the early 2000s. Ecology, genetics and parasitism of apple leaf-curling midge was studied in Nova Scotia, Ontario and British Columbia in 2014-2016. We confirmed three generations in each province. A degree-day model was developed to facilitate timing of control options for growers. Biocontrol of *D. mali* is recognized in Europe and *Platygaster demades* (Hymenoptera: Platygasteridae) was released in Nova Scotia in 1993. Larvae collected from the field within each province disclosed varying rates of parasitism by parasitoids from 5 different Hymenopteran wasps belonging to the Pteromalidae, Platygasteridae and Ceraphronidae families. Molecular analysis of apple leaf-curling midge larvae indicated that populations in Nova Scotia are genetically different from Ontario and British Columbia populations. Challenges with management of apple leaf-curling midge and utility of biocontrol agents is discussed.

Phenology and yield impact of the switchgrass gall midge (*Chilophaga virgati* Gagné) in Ontario.

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Switchgrass (*Panicum virgatum* L.) is a perennial biomass crop grown in Ontario for livestock bedding, feed, and biofuel. In 2020, the switchgrass gall midge (SGM, *Chilophaga virgati* Gagné; Diptera: Cecidomyiidae) was discovered in Ontario and now threatens ~1,000 ha of switchgrass. Knowledge of SGM biology is limited to two studies from South Dakota, where damage was shown to cause ~100% seed loss and reduce biomass. Information regarding SGM biology and phenology in Ontario is critical to understanding its potential for economic impact, and for the development of IPM practices. SGM phenology was determined by sampling switchgrass tillers for presence and timing of all life stages. Laboratory observations revealed adult activity patterns and mating behaviours which supported in-field observations to determine oviposition locations. SGM distribution, density in the field, and yield impacts were determined with quadrat sampling at crop maturity. This research increases knowledge of the biology and ecology of SGM and will inform the development of pest management strategies to minimize the impact of this newly discovered pest.

The rise of Hessian fly on the Canadian prairies.

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Hessian fly (HF), *Mayetiola destructor* (Diptera: Cecidomyiidae) is a major pest of wheat worldwide but has been historically intermittent in western Canada. Reports of damage were absent from 2015 to 2022, but in 2023 and 2024, significant lodging was reported in spring wheat from several regions of Saskatchewan. Periodic outbreaks have been documented in neighbouring US States and attributed to longer growing seasons, surface residues, reduced tillage, and greater prevalence of winter wheat. However, winter wheat remains a minor crop in Alberta and Saskatchewan. Spring wheat is preeminent on the Prairies and much more heavily attacked in the US Pacific Northwest. Parasitoids can regulate populations but rearing efforts from field collected HF in Saskatchewan have yielded very few. HF biology as it pertains to spring wheat, parasitism and other potential regulating factors, and monitoring in Alberta and Saskatchewan are presented.

Volatile organic compounds mediate host selection of wheat midge.

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The wheat midge, *Sitodiplosis mosellana* (Géhin) (Diptera: Cecidomyiidae), is a significant pest in the wheat agroecosystem. Wheat is impacted by various abiotic stressors that could directly influence wheat midge or indirectly influence the performance of wheat midge through volatile organic compounds (VOCs). In this study, we tested various levels of fertilization and water treatment on subsequent host use by wheat midge. Plant fertilization increased plant growth, nitrogen levels, and influenced the VOC profile, resulting in more midge eggs laid on plants treated with moderate than with high fertilization, with intermediate levels observed under low fertilization. Wheat plants exposed to short-term drought conditions reduced oviposition and larval performance, whereas under flooding conditions, wheat midges laid more eggs with increased larval performance. VOC analysis on plants stressed with water treatment is ongoing. Taken together, these results show that abiotic factors differentially influence oviposition and larval performances of wheat midge, possibly due to changes in the VOC profile.

Midge busters: Integrated pest management of wheat midge on the prairies.

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Orange blossom wheat midge, *Sitodiplosis mosellana*, is a pest of spring and durum wheat across the Canadian prairies. Traditional fall monitoring of overwintering 3rd instar larvae provides outbreak predictions, but timely validation of actual emergent populations has been challenging. To address this gap, #midgebusters was established as a collaborative monitoring network between AAFC and SeCan, deploying pheromone traps operated by seed growers and agronomists across Western Canada. This network enables real-time validation of outbreak predictions and identification of population hotspots during critical flight periods. Beyond basic trap counts, the program collects data on wheat midge parasitoids, larval pressure, and crop damage from monitoring sites. Integration of traditional fall sampling with real-time adult monitoring provides a comprehensive view of midge population dynamics, informing targeted management decisions. Digital tools are being developed to facilitate real-time data sharing and visualization, making monitoring results immediately accessible to producers and advisors. Collaborative pest monitoring networks can enhance integrated pest management strategies and we discuss the potential for expanding this approach to other prairie pest systems.

Symposium 2: Advances in Honey Bee Research / Progrès de la recherche sur les abeilles mellifères

Outlook for modern 'omic tools in honey bee biology.

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Honey bees (*Apis mellifera* L.) are a very well-studied insect but the fundamental research into this insect has largely focused on behaviour, chemical ecology, and, more recently, big-G Genomics (i.e., sequencing-based studies). Mass spectrometry is the key technology for probing the last phase of the Central Dogma, proteomics, as well as the output of proteins, the metabolome. In this presentation I will discuss the outlook for using proteomics to build protein interaction networks among honey bee proteins, protein expression atlases across stages and tissues. I will also discuss how mass spectrometry can be used to discover new pheromones and to measure changes in pheromones as honey bee queens develop. Finally, I will discuss mass spectrometry-based imaging methods and how we are applying these to investigate the host-pathogen interactions occurring in the honey bee gut when infected by microsporidia.

Brood presence and age influences worker retinue response in queenless honey bee (*Apis mellifera*) colonies.

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To maintain colony productivity, beekeepers often replace aging honey bee (*Apis mellifera*) queens. However, even young, healthy queens are sometimes rejected without clear cause. While previous research has focused on queen fertility and pheromone signals, less is known about how colony conditions, especially brood presence, can influence queen acceptance. This study examined how the worker retinue response (workers attending the queen) changes over time in queenless colonies. Twelve queenright colonies with similar brood composition were made queenless and observed for 21 days. Workers were sampled from central brood frames on days 0, 3, 6, 9 and 21, and used for retinue assays. These time points match the loss of specific brood stages (eggs, larvae, pupae) from the colony. Workers were exposed to a 9-component synthetic queen pheromone strip, and their contacts over a 5-minute period recorded to calculate average retinue response strength. This study is the first to track worker retinue behaviour over time in queenless colonies. The findings offer insights into how colony-level factors affect queen replacement success.

The electrical component of the honey bee waggle dance acts as a recruitment beacon on the dance floor of the beehive

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Electric fields produced during the honey bee (*Apis mellifera*) waggle dance may serve as nonvisual cues on the dance floor. While studies suggest that follower bees can perceive these signals, tools for probing electric field communication remain limited. We introduce an electric field generator capable of mimicking natural waggle-dance signals with high temporal and amplitude precision—enabling, for the first time, systematic and controlled studies of this modality. We validated the device across three behavioural assays. First, tethered bees on an air-supported treadmill increased walking speed in response to the signal. Second, restrained bees were classically conditioned to associate the signal with a sucrose reward. Third, antenna movement significantly slowed in response to the signal. These results confirm the artificial signals are detectable and behaviourally relevant. While the findings broadly support the hypothesis that electric fields are a component of the dance language, the major advance is the development of a configurable platform for studying electric field communication. Preparations are underway to install the device in a functioning observation hive.

Comparing effects of the honey bee ectoparasitic mite *Tropilaelaps mercedesae* on gene expression in a native (*Apis dorsata*) and novel (*Apis mellifera*) host.

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Parasites and the pathogens they transmit are the leading threat to the Western honey bee (*Apis mellifera*) and present a significant economic challenge to the beekeeping industry. *Tropilaelaps mercedesae* is an ectoparasitic mite native to Asia that has previously undergone a successful host shift to *A. mellifera*, with growing concerns about its possible establishment in North America. Here, we present the results of a transcriptomic study examining gene expression in *T. mercedesae* samples collected from both *Apis dorsata* (giant honey bee) and *A. mellifera* colonies in Thailand. We also quantified differences in gene expression in *A. dorsata* and *A. mellifera* bees from *T. mercedesae*-infested and non-infested Thai colonies. Furthermore, we sequenced RNA extracted from *T. mercedesae* samples using Oxford Nanopore (ONT) Sequencing to screen for novel RNA viruses that could pose a threat to honey bee health. These findings will provide valuable insight into how *T. mercedesae* infestations impact honey bee health and may reveal new potential viruses vectored by this novel parasite.

Transcriptomes and potential resistance mechanisms in honey bees (*Apis mellifera*) selected for low and high rates of *Varroa destructor* population growth.

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The ectoparasite *Varroa destructor* is the main biotic stressor of honey bees (*Apis mellifera*). One sustainable approach to managing *Varroa* is breeding bees for resistance. Selection of honey bee colonies for low (resistant) and high (susceptible) *Varroa* population growth (LVG and HVG, respectively) was conducted. After three generations of selection, LVG bees exhibited traits potentially associated with *Varroa* resistance, including lower mortality and mite infestation levels, and higher social (hygienic and grooming behaviors), cellular (haemocyte concentration), and humoral (hymenoptaecin 2 and defensin 2 antimicrobial peptide gene expression and lower DWV levels) immunity compared to HVG bees. Additionally, transcriptome analysis of selected bees resulted in differentially expressed genes (DEGs). *Varroa* parasitism caused differential energy and protein needs in the selected genotypes. Compared to parasitized HVG bees, parasitized LVG bees had more DEGs associated with lower energy and protein demands, with lower immunosuppression, and higher detoxification processes. Overall, this work shows that selecting colonies for LVG indirectly selects for bees with multiple resistance mechanisms and molecular responses against *Varroa*.

The young and stressed making bad decisions: Effects of *Vairimorpha ceranae* on worker honey bee (*Apis mellifera*) foraging behaviours.

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Vairimorpha ceranae is a microsporidian parasite of the Western honey bee (*Apis mellifera*). In the laboratory, *V. ceranae*-infected worker bees consume more carbohydrates and respond by extending their proboscis more to lower-quality food than non-infected workers. However, these effects on feeding behaviour have not been observed in the field. Furthermore, it is unclear how changes in worker feeding behaviours affect foraging decisions. We investigated the effects of *V. ceranae* infection and spore load on honey bee foraging behaviours in the field by inoculating and marking newly emerged worker bees. Inoculated worker bees were released into experimental colonies. Foraging age was evaluated by observing each experimental colony every day when the inoculated bees were 7-27 days old. Foraging decisions were determined by collecting marked returning foragers, and subsequent laboratory analyses. Our results demonstrate that *V. ceranae*-infected worker honey bees start foraging at a younger age than non-infected workers, and that infected

foragers forage for nectar that is significantly lower in sugar concentration than do non-infected workers.

Monitoring residues and vapors of the acaricide 1-allyloxy-4-propoxybenzene in beehives.

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The mite *Varroa destructor* parasitizes pupal and adult honeybees, *Apis mellifera*, causing high levels of colony loss. However, mites have developed resistance to most synthetic acaricides used in North America, driving the need for new treatments. Our group is developing a promising acaricide, 1-allyloxy-4-propoxybenzene, known as **3c{3,6}**, which has high efficacy against mites tested in fields across Canada and the US. It is essential to monitor the molecular behaviour and environmental persistence of **3c{3,6}** within beehives. We developed validated methods for airborne monitoring of **3c{3,6}** within the hive and also for residues in beeswax using GC-MS. Compound **3c{3,6}** evaporated within two to three weeks after application in hives. These hydrophobic **3c{3,6}** vapours condense and contaminate the beeswax. The average residue in wax samples taken immediately after a 6-week treatment in the fall was 6 ppm, but this level dissipated over 80% over the winter, indicating that **3c{3,6}** does not persist in beeswax over time, presenting a low risk of honey contamination in the following season.

Toxicity profiles of two synthetic miticides in mature and immature *Apis mellifera*.

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Effective control of *Varroa destructor*, an ectoparasitic mite of the honey bee (*Apis mellifera*), is essential to slow resistance development to existing miticides and reduce colony losses. In this laboratory study, we evaluated the acute and chronic toxicity of two synthetic miticides on both mature and immature honey bees. Previous work indicated promising potential for these novel compounds in *V. destructor* control. Following OECD guidelines, topical and oral toxicity assays were performed on newly emerged adult bees, while larvae were exposed through single and repeated feeding regimes. Serial dilutions of each compound were tested alongside dimethoate as a positive control, which caused 100% mortality in both life stages. Overall, “Compound A” exhibited lower acute and chronic toxicity to bees than “Compound B” across both administration routes. These results provide important insights into the relative safety of candidate Varroacides for *A. mellifera* and highlight the need for field-scale evaluations of these compounds, individually and in combination, under realistic colony conditions.

Seasonal stressors and the hierarchical drivers of honey bee colony mortality.

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Honey bee colonies play a critical role in global food systems through pollination and honey production, yet they continue to experience high mortality, particularly during winter. To better understand the factors underlying colony losses, we tracked a large cohort of colonies over multiple years and quantified a suite of biotic and environmental stressors. Using explanatory and predictive modeling, we examined how exposures throughout the active season relate to overwintering outcomes. Our work underscores the importance of considering temporal patterns and interactions among stressors when developing strategies to support honey bee health and improve colony survival.

Dissecting stress responses in honey bee brains using ‘omic’ tools.

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Honey bees (*Apis mellifera*) serve as model organisms for studying how stressors affect health and behaviour. However, we understand little of the mechanisms by which abiotic stressors—such as neurotoxic insecticides or temperature fluctuation— affect brain health and behaviour. We analyzed the bee brain metabolome of newly emerged, 14-day-old, and 28-day-old summer bees, as well as brood nest bees across seasons using NMR spectroscopy and untargeted lipidomics. Metabolomic profiling identified nine key metabolites, mainly amino acids and choline derivatives, that displayed significant changes across ages and seasons. Additionally, we characterized the brain lipidome of middle-aged workers, including those exposed to a neurotoxic insecticide, and found an unusually high proportion of alkyl-ether linked (plasmalogen) phospholipids and very low levels of plasmalogens (plasmalogen phospholipids)—a composition that may increase vulnerability to environmental toxins. Exposure to a neurotoxic insecticide altered levels of several lipid species. Our findings reveal age-, season-, and toxin-related shifts and highlight the potential of omic tools to identify the molecular signatures linked neurophysiological responses to stress.

Symposium 3: Mountain Pine Beetle: not exactly new, not exactly rising: what we have learned from its range expansion into Alberta / Dendroctone du pin ponderosa

Mountain pine beetle pheromone production in the initial host switch from lodgepole to jack pine.

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During outbreaks, mountain pine beetles (MPB) use aggregation pheromones to mass attack well-defended host trees. The female aggregation pheromone, *trans*-verbenol, requires host-produced α -pinene as a precursor. Females obtain α -pinene during feeding in their natal host and after entering the new host. To determine if α -pinene content in the natal host affects *trans*-verbenol production, we reared MPB in jack pine (high α -pinene content) and lodgepole pine (low α -pinene content) and measured *trans*-verbenol production of female beetles while they entered logs of either the same or opposite species. Females that emerged from lodgepole pine released relatively low amounts of *trans*-verbenol while entering either lodgepole or jack pine and females that emerged from jack pine released relatively high amounts while entering jack pine, and intermediate amounts while entering lodgepole pine. This demonstrates that MPB females that develop in a high α -pinene content host likely acquire and store more precursor and utilize it immediately upon colonizing a new host, which has implications for the initial host switch between lodgepole and jack pine.

Detecting endemic and emerging MPB populations in Alberta and British Columbia.

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The collapse of the mountain pine beetle (MPB, *Dendroctonus ponderosae*) outbreak in western Canada has raised questions about where endemic populations persist. To start identifying patterns at tree, stand, and regional scales, we trapped MPB in AB and BC that differed in stand-level susceptibilities to MPB and MPB population levels (2023-2025). Using a series of pheromone lure formulations allowed us to also test improved tools for MPB detection for low populations. As expected, we caught a greater number of MPB in stands near where aerial survey showed local MPB. MPB was also caught in stands with and without susceptible pine and in all regions except for Prince George, BC area. These findings suggests that MPB has access to stands that are not susceptible in both provinces and that the use of lures with greater release rates of pheromone may be a useful tool for endemic beetle

monitoring. We will discuss our preliminary findings from at least two years of trapping of improved lure performance for endemic populations.

North of the Yellowhead - the mountain pine beetle's overwintering physiology and survival in Alberta's boreal forest.

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Mountain pine beetle populations exploded across British Columbia's central interior in the early- to mid-2000s, and then crossed the Rocky Mountains between BC and Alberta in the mid- to late-2000s. These events, and the mostly endemic current infestations of the insect in Alberta and parts of BC, were largely influenced by climate – especially by warmer winters leading to better larval (and potentially overwintering adult) survival. One theme that has emerged from research on this beetle's overwintering physiology and ecology has been its substantial adaptability to variable winter conditions across its range – allowing it to continue to establish itself north of the Yellowhead in both provinces, particularly as climate warming continues unabated.

Physiological consequences of early winter exposure in overwintering mountain pine beetle.

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Mountain pine beetle (MPB, *Dendroctonus ponderosae*) is a destructive bark beetle causing major ecological and economic losses in Canada. Native to western regions, it has spread east across the Rocky Mountains into Alberta, where it encounters long, harsh winters. MPB rely on physiological plasticity, cryoprotectant accumulation, feeding cessation, and dormancy, to survive cold conditions; but the effect of winter onset timing on overwintering success is poorly understood. We examined how natural overwintering and simulated early winter onset influence MPB larval energy reserves (supply), mitochondrial complex I activity (demand), and cryoprotectant profiles (glycerol, sorbitol, trehalose, proline). Larvae were collected from lodgepole pine in fall, winter, and spring. In the fall, a subset was subjected to stepwise cooling to test the effects of early winter onset. Naturally overwintering larvae accumulated lipids and proteins early, supporting later survival, whereas early cold exposure depleted reserves. Regardless of timing, MPB produced cryoprotectants in response to stress. These results suggest MPB benefit from prolonged warm falls, but premature cold can deplete energy and reduce overwinter survival.

Insights on range expansion routes of mountain pine beetle from genetic and genomic data.

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Mountain pine beetle (*Dendroctonus ponderosae*) is a wood boring insect that infests several pine species native to western North America. With more than 20 M hectares of forests impacted by the beetle over the past 20 years, there has been considerable investment in studying this species. Part of this investment has been the development of genetic and genomic resources. With these resources several research groups, primarily associated with the TRIA consortium, have investigated population genetic structure to understand routes of range expansion. Here we highlight previous key findings and present new data using single-nucleotide polymorphisms derived from whole-genome sequences collected from individuals across spatial and temporal scales. With this high-resolution data, we found genetic differentiation is strong over spatial, but not temporal scales. We also found island populations from Cypress Hills and Vancouver Island show varied connectivity with the core range. The work contributes both to the management of mountain pine beetle by defining primary dispersal routes, and contributes to our understanding of the genetic consequences of range expansion.

Mountain pine beetle dispersal: morphology, genetics and range expansion.

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Flight-based dispersal of insect pests can have severe environmental and economic consequences. Such dispersal is a complex process that is subject to many environmental conditions as well as intrinsic factors such as morphology, physiology and genetic predisposition; understanding these factors can help inform control efforts. Here we investigated dispersal of mountain pine beetle (*Dendroctonus ponderosae*) from a micro to macro scale; we compared flight performance - measured using computer-linked flight mill bioassays - to beetle morphology, gene expression and specific genetic markers. We also used genetic data from beetles collected throughout Alberta to infer intraprovincial spread dynamics. We found that: (1) the observed morphology explains ~20% of the variance seen in flight performance; (2) we identified trade-offs between several genetic systems as well as four genetic markers associated with strong flight capacity; and (3) we were able to infer mountain pine beetle spread dynamics by identifying source populations for infestations throughout Alberta. These findings may be used to inform predictive models and future control efforts.

Mountain pine beetle population phase but not density influences adult dispersal by flight in its expanded range.

Antonia Musso (1), Allan Carroll (2), **Maya Evenden** (3).

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The mountain pine beetle, *Dendroctonus ponderosae*, exists in different population phases in its historic and expanded range in Western North America. Mountain pine beetle in the epidemic population phase mass attack and kill healthy pine trees, whereas endemic phase beetles use weakened tree hosts. In this study, we separately measure the effects of population density and population phase on dispersal using computer-linked flight mills. Beetles that emerged from lodgepole pine trees naturally attacked at different densities had similar flight capacity. When population phase was manipulated through lab rearing, beetles from endemic simulation bolts flew further than beetles from epidemic simulation and naturally infested bolts. Endemic beetles weighed the same and had similar lipid reserves as beetles from naturally mass attacked trees, suggesting that the endemic phase itself promotes dispersal. This might be adaptive for endemic beetles that require rare, weakened hosts for reproduction. It is essential to understand the impact of population phase on mountain pine beetle dispersal to predict the potential for further range expansion through the boreal forest.

Management implications of leap-frog dispersal events in mountain pine beetles.

Devin Goodsman (1).

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The dominant slow-the-spread paradigm for managing forest insects focuses management efforts at and just behind the invasion front. When strong Allee effects are present, this allows researchers to exploit them to drive populations at the front locally extinct—a cost effective strategy. However, for mountain pine beetles, it is not known whether focusing management efforts at the fronts of invasions is an optimal strategy. It may be possible that managing large behind the invasion front might slow invasion more than management at the front. I will address this question with a case study of a lesser known (moderate) long-distance dispersal event in Alberta. In this case study, intense management of larger populations behind the invasion front slowed the rate of invasion more than management at the front would have. I will discuss to what extent this finding can be generalized to other cases and other species.

Speaker #9: Dr. Barry Cooke, Barry.Cooke@nrcan-rncan.gc.ca (30 minutes)

(9) The mountain pine beetle in a marginal boreal landscape: Cross-scale collapse triggered by population removal.

Barry Cooke (1), Allan Carroll (2).

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The mountain pine beetle in British Columbia epitomizes the “cross-scale” disturbance agent, with nonlinear population dynamics interacting across temporal and spatial scales. While positive feedbacks drive outbreaks, a cross-scale collapse in Alberta (2006–2023) suggests dynamics can reverse, through targeted population removals. The collapse is best understood as a syndrome involving three interacting variables operating at three spatial scales. We propose that large-scale removal of beetles from freshly attacked trees explains how R values (annual change in colonized trees) became decoupled from r values (seasonal recruitment rates) between 2010–2015, with the two measures showing strong anti-correlation. Collapse began in 2015–2016, when R and r both declined, despite a prior decade of warming winters and rising r . This demonstrates that cross-scale outbreak collapse can be induced via early and sustained removals, contingent on a mechanistic understanding of outbreak dynamics. This places the beetle within a broader category of species vulnerable to Allee effects, where population viability thresholds define the critical point below which densities may collapse to local extinction.

President's Prize Poster Abstracts/ Prix de la présidence, session d'affiches

Assessing the impact of human land use on bee counts in an agricultural landscape.

Quinn Burns (1), L. Shea Giesbrecht (1), Tyler Cobb (2), Carol Frost (1)

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Native bee populations are threatened by anthropogenic land use. We explored the relationship between bee counts and human land use using the ABMI human footprint index. This index quantifies anthropogenic landscape change using satellite imagery of Alberta. We hypothesized that sites that were located within areas with a high human footprint index rating would have smaller bee populations, whereas sites located in areas with a low index would have greater bee populations. Bee count data was collected in summer 2025, from Malaise traps installed at 22 sites next to central Alberta highways. Using GIS software, a digitized map of the sites was paired with an overlay of ABMI's human footprint GIS data to compare the human footprint index score with native bee counts from each site. Understanding how land use in Alberta relates to native bee abundance is the first step in planning for native bee conservation.

Carabid beetle assemblages and weed seed predation across an urban-rural gradient.

Nathan Gyan (1) and Christian Willenborg (1)

1. University of Saskatchewan, ydv185@mail.usask.ca

Urbanization and agricultural intensification threaten biodiversity and ecosystems functioning in agroecosystems vital for global food security. In Canada, these pressures jeopardize the sustainability of cereal production, a crop group crucial for economic viability and international competitiveness. Carabid beetles, important for services like weed seed predation and pest control, are declining, potentially weakening agroecosystem resilience. This research examines how environmental factors shape carabid assemblages in cereal agroecosystems along a rural–urban gradient, focusing on their predation of foxtail and volunteer canola seeds in both rural and urban sites. Objectives include quantifying weed seed predation intensity and assessing the influence of abiotic and biotic factors—temperature, weed species, soil moisture, and light pollution—on carabid community structure, predation efficiency, and seedbank dynamics. *Pterostichus melanarius* dominates rural catches, while *Amara* species prevail in urban areas, reflecting community responses to environmental gradients. Understanding these interactions can strengthen carabid-mediated biocontrol, reduce reliance on pesticides, support insect conservation, and improve the long-term sustainability of cereal production in Canada.

Disruptive houseguests: effects of social parasitism on colony threat response in an urban social wasp.

Brianna M. Kaldor-Mair (1), Byron N. Van Nest (2)

1. University of Manitoba, kaldormb@myumanitoba.ca, 2. University of Manitoba, Byron.VanNest@umanitoba.ca

Brood parasitism occurs when a species takes advantage of the parental care behaviours of another to raise their young without the energetic cost required. In my study, we investigated the behavioural and physiological effects of a closely related brood parasite in two yellowjacket species (*Vespula*). Disturbance assays were performed on six wild yellowjacket colonies once per week from discovery to colony death using a target apparatus placed at the nest entrance. Once disturbed, workers would strike the target, which would record the number of strikes via a connected counter device. Data were highly variable, with apparent significant effects of host species and parasite load on attack duration, and apparent significance of humidity and host species on total strikes. Attack duration and total strikes appeared to increase with increasing parasite load in one host species, and decrease in the other. Specimen brain tissue from each colony was also imaged via confocal microscopy, with the goal of assessing serotonin levels, often used as a measure of insect aggression. Image analysis is ongoing.

Deciphering weed seed choice decisions by carabids to augment long-term seedbank management

Danielle J. Koole (1), Khaldoun A. Ali (1), Christian J. Willenborg (1)

1. University of Saskatchewan, dak538@mail.usask.ca

Carabid beetles (Coleoptera: Carabidae) are abundant in agricultural fields, and can remove upwards of 65–90% of certain weed seeds per season. Carabids tend to select certain seed species for consumption when seeds of different species are available in the environment. Yet, the behavioral mechanisms that guide seed choice decisions by carabids remain understudied. Here, seeds of *Galium aparine*, *Amaranthus retroflexus*, *Setaria viridis*, and *Echinochloa crus-galli* were offered to *Pterostichus melanarius* in no-choice and multiple-choice seed feeding experiments as a model system to study the behavioral mechanisms that guide seed selection decisions by carabids. Preliminary results suggest that seed choice decisions by carabids are dynamic, as carabids tend to identify the seed species that is most suitable for consumption by comparing the suitability values of the different seed species offered in the experiment. Thus, seed selection decisions by carabids are predicted to be context-dependent and thus, preferable seed species for carabid consumption are expected to vary depending on the identity and number of seed species available in the field.

Ecological dynamics of leafhoppers (Hemiptera: Cicadellidae) and their parasitoids in Eastern Canadian agroecosystems

Alexandra Landry (1, 2), Nicolas Plante (1, 2), Abraão Almeida Santos (1, 2), Valérie Fournier (1, 2), Edel Pérez-López (1, 2)

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Since 2022, our laboratory has been monitoring the diversity and abundance of leafhoppers in strawberry fields across Quebec, revealing the complexity of their seasonal dynamics and potential as vectors of plant pathogens. Building upon this, we now expand our research to include blueberry and canola crops in two provinces, Quebec and Ontario. This expanded study aims to compare leafhopper diversity and abundance across different crops and regions, allowing us to identify both generalist and crop-specific species. In parallel, we will evaluate parasitism rates to assess how agricultural practices and climatic conditions may influence trophic interactions between leafhoppers and their natural enemies. While focus remains on leafhopper communities, specimens from sticky traps will be preserved to assess the presence of parasitoid families (*Dryinidae*, *Mymaridae*), which may inform future AI-based monitoring tools. This study will provide critical insights into the structure of leafhopper communities in key Canadian crops and help identify environmental and agronomic drivers that shape their dynamics, knowledge essential to developing more sustainable pest management strategies under changing climatic conditions.

PCR detection of flea beetle DNA in gut contents of insect predators

Aldo F. Ríos Martínez (1), Chulantha P. Diyes (1), Anamaria Dal Molin (2), Alejandro C. Costamagna (3), Barbara J. Sharanowski (4) & Boyd A. Mori (1)

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Flea beetles (*Phyllotreta striolata* and *P. cruciferae*) are major pests in canola (*Brassica napus*) and other brassicaceous crops, capable of causing economic losses exceeding \$300 million annually in North America. Management of these two species relies mainly on insecticides, whereas biological control is yet to be thoroughly investigated. Identifying insect predators that consume flea beetles in crop fields is essential for developing integrated pest management (IPM) programs, and molecular gut content analysis provides a power tool to detect such predation. We developed species-specific primers for *P. striolata* and *P. cruciferae*, which amplify 249 and 178 bp, respectively, of the mitochondrial cytochrome c oxidase (COI) region. The use of these primers may aid our understanding of predator prey interactions in canola agroecosystems, ultimately aiding IPM programs toward sustainable management.

Inhabitants and size distribution of goldenrod galls produced by *Eurosta solidaginis* (Diptera: Tephritidae) in central Alberta

Rowan Rowland (1), Juno Montgomery (1), Hannah Stormer (1), Bennett Grappone (1) and Heather Proctor (1)

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Eurosta solidaginis is a species of gall-making fly whose larvae produce round galls in the stems of goldenrod (*Solidago* sp.). The size of galls produced by *E. solidaginis*

is a well-known example of stabilizing selection; small galls can be more easily infiltrated by parasitoid wasps, while larger galls are more visible to predators (birds). Central Alberta is close to the northernmost edge of this fly's range, and most of the studies regarding gall size have focused on eastern North America. Here we examined the inhabitants of various sizes of goldenrod galls from three locations in central Alberta to compare the inhabitants and gall size distribution with eastern North American populations. We found living *E. solidaginis* in galls with diameters of 10 mm to 25 mm, with a peak in living *Eurosta* that is slightly skewed to the higher end of the size distribution. Other inhabitants of the galls included two parasitoid wasp species (*Eurytoma gigantea* and *E. obtusiventris*) and one species of inquiline beetle (*Mordelestena convicta*).

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)

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University of Northern British Columbia

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*.

Hopocalypse Now: Climate-Driven Surges in Leafhopper Abundance and Diversity in Nova Scotia Lowbush Blueberry Fields

Emma Stainforth (1), Dr. Paul Manning (1), Edel Pérez-López (2).

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Leafhoppers (Hemiptera: Cicadellidae) are a diverse group of plant-feeding insects. Leafhoppers can cause significant economic losses directly through feeding injury on crops, and indirectly by vectoring plant pathogens. Lowbush blueberry (*Vaccinium angustifolium*) is an important small-fruit crop managed from naturally occurring wild stands across Northeastern North America. Lowbush blueberry is an important host plant for leafhoppers, including species known to vector blueberry stunt phytoplasma (*Candidatus Phytoplasma asteris*), a plant pathogen which causes yield reductions in other related *Vaccinium* species. Using yellow sticky traps, we sampled

the leafhopper community in N=10 lowbush blueberry fields in Nova Scotia between May–October 2025. All adult leafhoppers were identified to genus level. We identified several species of leafhoppers that are new provincial records. We explore patterns in diversity and abundance across the season. A better understanding of leafhopper communities in this system may inform monitoring strategies and inform integrated pest management approaches to mitigate the risk of phytoplasma transmission in lowbush blueberry.

The effects of forest management tactics in Northern British Columbia cut blocks on native bee pollinators (Hymenoptera: Apoidea).

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To promote the establishment of replanted conifers in harvested cut blocks, forest managers use several tactics to control brush and angiosperm tree growth including herbicide sprays and mechanical brushing. Little is known about how such tactics affect post-harvest arthropods communities. Glyphosate-based herbicides (GBH) – the primary herbicides used in forest management – persist long after original application, exposing arthropod communities in and around cut blocks. Foliar tissues and fruits can contain glyphosate residues one year after application and residues have been detected in some plant tissues up to 12 years after arial application. In laboratory settings, GBHs have been shown to have sublethal effects on arthropod health. The true impact of GBH on arthropod communities outside laboratory settings is unknown. We identified native bee pollinators (Hymenopteran: Apoidea) in cut blocks with two treatments; aerially sprayed GBH or mechanically brushed. Sampling was conducted three times before treatments and once immediately following treatments. Future work will consist of sampling in similar times for temporal comparison of functional and taxonomic biodiversity of native bee pollinators.

Polyandrous *Aedes albopictus*: high estimates of female remating in wild mosquitoes has implications for vector control

Tyrone Ren Hao Tan (1), Qian Qi Hillary Yee (1), Huiqing Yeo (1), Nalini Puniamoorthy (1)

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The environmentally resilient mosquito *Aedes albopictus* is major vector for arbovirus disease transmission that is generally presumed to be monandrous. However here, we found the highest estimate of female *Ae. albopictus* mosquitoes remating (58%) in Singapore, an urbanized city with a mosaic of fragmented greenery. We found that polyandry for wild *Ae. albopictus* differ amongst habitats with forested populations exhibiting significantly higher remating rates ($p < 0.01$). Additionally, most females were infected with Wolbachia (96%) and higher polyandry was significantly associated with females that were infected with a single strain of Wolbachia (B; $p < 0.05$). All other factors including female body size, gravid and blood-fed status had no effect. While previous papers have found *Ae. albopictus* to face genetic barriers with forested areas, they exhibited higher remating

frequencies highlight a different strategy to overcome mating with similar genetic populations and increasing the genetic resilience of the *Ae. albopictus* population.

Arthropod biodiversity in climate-adaptive silviculture systems

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To understand the effects of silvicultural disturbance and the process of regeneration of climate-adaptive silvicultural methods on biodiversity, we are monitoring pollinator and ground-dwelling arthropod communities in a sub-boreal spruce forest at the controlled and replicated (N = 4) Adaptive Silviculture for Climate Change (ASCC) trials near to Ft. St. James, BC. The trial was set up in 2022 which has allowed us to monitor early changes (2023 onward) to assemblages caused by features such as planned gaps, machine-created brush mats, and different stand densities. This research will provide baseline biodiversity data for this long-term trial and will provide managers with information on biodiversity conservation while managing for forest climate resilience.

Oregonin: a putative anti-phloeophagy compound in red alder (Betulaceae)

Jamie You (1, 2), Xinyi Huang (2, 3), Shawn Mansfield (2, 3), Allan Carroll (1), Debra Wertman (1).

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Red alder, *Alnus rubra* (Betulaceae), is a keystone hardwood tree species of great ecological importance in riparian, mixed, and recently disturbed forests in the Pacific Northwest of North America. The alder bark beetle, *Alniphagus aspericollis* (Curculionidae: Scolytinae), is a tree-killing bark beetle that readily infests red alder throughout its range. Recent observations in southwestern British Columbia, Canada have indicated the possibility of widespread red alder mortality that may be attributable to impacts of the alder bark beetle. One well studied defense compound, previously shown to inhibit lepidopteran feeding, in red alder is oregonin, a diarylheptanoid xyloside. We hypothesized that high oregonin content is related to resistance to alder bark beetle colonization in red alder. In support of our hypothesis, we found that the phloem oregonin content of trees that were successfully colonized by the alder bark beetle was significantly lower than of trees that were not attacked and those that resisted colonization. These results suggest that oregonin is likely a defense against alder bark beetle colonization in red alder.

Plenary 2: Phil Lounibos: Invasive species and mosquito-borne disease'

Having hitchhiked with human travellers for millenia, invasive mosquito species were transported intercontinentally on sailing vessels during the 15-19th centuries and on container ships beginning with the 20th century. Outbreaks of mosquito-borne diseases, including yellow fever, malaria (human and avian), filariasis, dengue, chikungunya, West Nile fever, and Zika have been attributed to and amplified by invasive vector species. Drought-resistant eggs and domesticity both favor invasiveness in mosquitoes, and pre-adaptations in their native ranges, such as preferences for disturbed, ecotonal habitats, may have facilitated the

invasive successes of *Aedes aegypti* (L.) and *Aedes albopictus* Skuse. Independent invasions by *Ae. albopictus* in 1985 led to competitive exclusions of *Ae. aegypti* in southeastern USA but not in Brazil. Experiments identified asymmetric reproductive interference (=satyrization) as causing the rapid displacements of *Ae. aegypti* in the USA but not in Brazil, where male *Ae. albopictus* are ineffective satyrs. In 2012 the Indian vector *Anopheles stephensi* Liston was recognized as the major transmitter during a malaria outbreak in arid Djibouti. Now widespread in Africa, invasive *An. stephensi* occupies a more urbanized niche than native vector species and, hence, represents a new obstacle to malaria control on that continent. In southern Florida, the Burmese python has decreased mammalian diversity in areas of the Everglades where this invasive reptile is common. Everglades virus, which circulates through murid rodent hosts, is now 10X more prevalent in *Culex cedecei* Stone and Hair in areas where this snake is common because mosquito vectors have few alternative mammals to feed upon.

Tuesday, October 7

Plenary 3: Andrea Gloria-Soria: Using population genomics to reconstruct *Aedes aegypti* evolutionary history

Aedes aegypti is the primary vector of the most important arboviruses causing human diseases: dengue, chikungunya, Zika and urban yellow fever. The species originated in the islands of the Southwest Indian Ocean, before colonizing Africa <85,000 years ago and spreading to the global tropics and subtropics in the last half century. Its expansion to temperate latitudes continues today aided by human-mediated transport of adults, larvae, or eggs and climate change. Range expansion, combined with *Ae. aegypti* adaptability to thrive in human environments, dramatically increases the percentage of global population at risk for diseases it transmits. I will talk about the current distribution of *Ae. aegypti*, recent invasions, discuss the use of population genomics to investigate the evolutionary history of the species and how human activity has shaped the distribution of these species throughout the years, and how this information can contribute to vector control.

Symposium 4: Biological Survey of Canada Symposium: Casting a wide net: the challenges of biodiversity research in a large, ecologically diverse country/ Commission biologique du Canada

Accessing the archive: Biodiversity data hidden in old ecological studies.

Donna Giberson (1)

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Much has been written about the importance of specimens in natural history collections. They can be a valuable source of biodiversity and distributional information (including from

remote or difficult to reach locations), a source of specimens for taxonomic updates, and a source of information for baseline study when assessing invasions. All of these, however, assume that the specimens and their data are accessible. Despite huge advances in databasing collections, there are still many instances of specimens in collections that have not been databased, and/or have specimen labels that are hard to read and/or are incomplete, making the information difficult to access. Here I report on the challenges (and rewards!) of diving into two large archived collections from the 1970s, focusing on mayfly (Ephemeroptera) and stonefly (Plecoptera) specimens collected in the western arctic and in Newfoundland and Labrador.

Pitfalls in biodiversity data management & generation: Systems & strategies for a streamlined spreadsheet.

Kirra Kent (1), Jaime Pinzon (2).

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Data management in biodiversity studies can be difficult, time consuming, and fraught with error-potential. This presentation covers a handful of different tools and formatting strategies one can use in Excel to make data entry, processing and subsequent analyses easier. Students are often not required to take basic to mid-level data management strategies during their undergraduate degrees, and supervisors or other professionals may not have time to teach it. This leads to a wide variety of mistakes that wastes valuable time for all parties during data clean-up and error correcting. Rather than presenting new tools, this presentation serves as somewhat of a workshop to better explain ubiquitous older tools to support new students and those that employ them. A reference manual PDF will be included at end of talk for interested parties.

Closing the gaps: Integrating biodiversity data on Alberta's spiders.

Jaime Pinzon (1), Philip Hoffman (2) and Kirra Kent (3).

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Spiders (Araneae) play critical ecological roles as predators and indicators of environmental change; however, their distribution and diversity in Alberta remain relatively poorly documented. Over the past several years, our team has contributed knowledge of spider biodiversity in both peatland and upland systems, with applications to forest management and ecological monitoring. By integrating systematic site selection and study designs tailored to capture community diversity, combining targeted surveys with ongoing monitoring, vouchering and specimen curation, incorporating museum and community science data, and developing practical tools to aid species identification, we are addressing major geographic and habitat gaps in provincial species distribution information. Our findings have revealed

several outcomes, including new provincial records, first detections of introduced species, and range extensions for multiple taxa. Beyond contributing to foundational biodiversity knowledge, these efforts have direct implications for conservation planning, restoration monitoring, and environmental assessment in Alberta.

For the ‘Love of a rose’: How our garden shrub roses are under attack by aliens from Asia and Europe.

Joe D. Shorthouse (1).

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Urban gardens of domesticated shrub roses across Canada host a wide range of plant-feeding insects some of which are generalists feeding on leaves and flowers of all garden varieties while others are specialized host-specific feeders. Some of the rose feeders are endemic while others have been accidentally introduced from Asia or Europe and have become naturalized. Studying the ecology of insects on garden roses is complicated because most of the varieties are a hybrid mixture of several distinct species. Referred to as cultivars, garden roses are biological misfits that do not breed true and do not follow the biological species protocol. They are artificially developed by human for aesthetic purposes but provide challenging opportunities for entomological studies of host specificity, dispersal, and component community ecology. The international rose horticultural industry must remain vigilant in preventing the international spread of rose-feeding insects.

Expect the unexpected: moth survey work in Alberta.

Greg Pohl (1)

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We report on 20 years of Lepidoptera survey work on a rural acreage in boreal forest near Edmonton, AB, and 10+ years at Dillberry Lake in parkland habitat in east-central Alberta. With over 700 species at each of these sites, these faunal lists are virtually complete. Examples are given of new records, introduced species, and recent arrivals to the area. We explore the value of such comprehensive surveys, compared to incidental and less complete surveys. We present an inventory of other sites surveyed for Lepidoptera in Alberta, and highlight geographical and phenological gaps in coverage. A targeted sampling strategy could fill some gaps in these existing inventories, to produce a network of high-value datasets across Alberta. This could potentially be expanded to cover every ecoregion in Canada.

Hiding in plain sight: Sampling aquatic macroinvertebrates with the Alberta Biodiversity Monitoring Institute.

Cheryl Tebby (1), Lisa Lumley (2), and Tyler Cobb (2)

(1) University of Alberta, cltebby@ualberta.ca, (2) University of Alberta

The variety of natural regions within Alberta support a rich diversity of organisms. From alpine tundra to shady parkland, from dry badlands to rich boreal, there's an abundance of ground and biodiversity to survey. In order to guide responsible land-use planning and ongoing resource management, unbiased and comprehensive biodiversity data are urgently needed. The Alberta Biodiversity Monitoring Institute (ABMI) is a non-profit, science-based organization that uses a range of data collection methods to track and report changes in biodiversity across Alberta over time. At the provincial scale, Alberta's landscapes present unique challenges for maintaining consistent and adaptable datasets for all to use. Through the lens of aquatic macroinvertebrates, I will describe the approach used by ABMI to collect, process and identify the taxa present across Alberta and highlight new taxonomic finds uncovered by the ABMI.

Biodiversity on mobile islands: challenges and rewards of studying chewing lice (Phthiraptera: Amblycera, Ischnocera) infesting birds in Manitoba.

Terry D. Galloway (1).

1. University of Manitoba, Terry.Galloway@umanitoba.ca

Investigations of ectoparasites of birds are challenging, in part, because of the mobility of their hosts and difficulties in sampling. There are 404 species of birds recorded in Manitoba; 312 breed or potentially breed in the province, of which, 43 species are permanent residents. The rest are migratory, generally present in the province for no more than six months. Examination of birds for chewing lice may require regional, provincial and federal permits, and adherence to federal (Canadian Council on Animal Care) and institutional animal care guidelines. Specialized techniques are required, whether sampling live or salvaged hosts. There are taxonomic impediments in identification of lice, especially for several large, diverse genera. Prior to the ectoparasite survey in Manitoba (<1993), there were published records for only about 33 species of chewing lice infesting birds. Because of the Manitoba biodiversity survey, this number is now approximately 275 species, with perhaps >70 undescribed species. Investigations anywhere in Canada will undoubtedly result in new information about our poorly known fauna.

Symposium 5: Revealing the Complex Story of Arthropod Invasions with 'Omics/ Invasions d'arthropodes et 'omiques (sponsored by Physiological Entomology /financé par Physiological Entomology)

Insect physiology is key for invasion science.

Leigh Boardman (1).

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Physiological processes are relevant at every stage of the invasion pathway and form integral parts of several hypotheses and frameworks in invasion biology. From molecular levels to the influences of external environments on animals, physiology data is integral to understanding insect responses to varied abiotic and biotic stressors, and thus invasions. In searching for unifying traits of invasiveness, researchers often find that understanding invasive organisms requires integrative approaches. Good phenotyping is key to interpreting biomarkers and underlying mechanisms of invasions, and stronger integration of physiology into invasion science, including 'omics studies, is needed to continue to move this field forward. Here, I will discuss the integration of physiology with invasion science, including modelling, and limitations of these approaches. Using recent examples across different insect taxa, I will illustrate how a better understanding of insect physiology could help with early detection of pests and their associated pathogens, predict invasive species spread, direct quarantine treatment research, as well as provide physiology data that can be integrated into demographic models of potential invasives.

Life signs below zero: Overwintering transcriptomic responses of the mountain pine beetle renal system.

Rebecca A. Dean (1), Amanda D. Roe (2), Leanne Petro (3), Maya L. Evenden (3), Heath A. MacMillan (4).

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Insect geographical limits are tied to their ability to tolerate thermal extremes. Climate change is increasing both mean global temperatures and extreme weather event occurrences, which has implications for shifting habitats. Mountain Pine Beetles (*Dendroctonus ponderosae*; MPB) are a species of bark beetle that have expanded past their native range, severely impacting the forests of British Columbia and Alberta. As a freeze-avoidant insect, Pine Beetles have the capacity to lower their internal freezing temperature and survive extreme cold through maintenance of ion balance and cryoprotectant accumulation. Unlike less tolerant species, MPB can avoid a catastrophic loss of ion balance that drives tissue damage in the cold, possibly through changes to renal function in response to chilling. To broadly investigate how one component of the renal system responds to cold stress, we

conducted tissue-specific mRNA sequencing of MPB Malpighian tubules before, during, and after a simulated cold snap in winter, the results of which suggest that this species may shut down renal ion transport and thereby maintain homeostasis during cold stress.

Regionally localized population genetic structure of a non-native terrestrial isopod (*Porcellio spinicornis*) (Isopoda: Porcellionidae).

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Terrestrial isopods (Isopoda: Oniscidea), also known as sowbugs, are readily transported by human activity, with greenhouses considered common introduction sites. In the Prairie Provinces of Canada all sowbugs are non-native, but little is known of their origins and movements. We investigated the population structure of the sowbug *Porcellio spinicornis* Say in Alberta using genomic markers (ddRADseq) and mitochondrial COI barcodes to explore its dispersal history and assess the long-held hypothesis that greenhouses play an important role in sowbug introduction. Populations of *P. spinicornis* in Edmonton, Calgary, and southeastern Alberta are genetically dissimilar and likely originated from at least three separate introduction events. Edmonton populations display genetic homogeneity consistent with anecdotal reports that sowbugs in Alberta arrived recently. Evidence for greenhouses as initial introduction sites was inconclusive, with at least one greenhouse population potentially originating from an adjacent outdoor site rather than serving as a source population itself. Given the probable recency of *P. spinicornis* introduction, sowbug populations in Alberta should be monitored for future range expansion outside of urban areas.

Deciphering the invasion history and population structure of the European spongy moth, *Lymantria dispar dispar*, in North America using genomics.

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The European spongy moth (ESM, *Lymantria dispar dispar*) is one of the most important pests of broad-leaf trees in northeastern North America, with an estimated economic impact of US \$3.5 billion annually. Following its unintentional introduction from Europe to Massachusetts in the late 1860's, the ESM has spread to neighboring states and provinces, resulting in a current range that spans from North Carolina to southeastern Canada on the eastern seaboard and extends to Minnesota inland. Through the examination of thousands of

single nucleotide polymorphisms (SNPs) obtained via a genotyping-by-sequencing approach, we initially confirmed that spongy moths introduced in the 1860s originated from France. Here we begin to explore the possibility that additional introductions occurred after the 1860s. Ultimately, we aim to assess the population structure of the ESM in North America and investigate whether differences among populations are based on divergent SNPs associated with genes potentially involved in local adaptations. The results of these analyses have relevance to the establishment of regulatory measures.

Signatures of selection in repeated invasions of Asian Longhorned Beetle.

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Successful invasions are complex processes that proceed through several distinct filters, culminating in establishment and spread of a non-native species in a new environment. Ecological filtering selects for individuals capable of tolerating new conditions, potentially leaving genomic signatures that provides insight to invasive adaptations. Repeated invasions of the same species provide an opportunity to assess repeatability of genomic selection and adaptation during invasions. The Asian Longhorned beetle, *Anoplophora glabripennis*, is a globally invasive forest insect with over 30 documented invasion events in North America, Europe, and other parts of Asia. By comparing five independent invasions in North America, we showed that these invasive populations of *A. glabripennis* had complex signatures of selection, with evidence of both parallel and non-parallel selection on loci associated with immunity, environmental stress tolerance, and detoxification. We were surprised at the degree of overlap between our outliers and gene expression results from past studies on larvae exposed to stressful temperatures and new hosts, highlighting potential functional significance of these outlier regions in successful *A. glabripennis* invasion.

Evaluating nanopore sequencing for population genomics: A comparative study in *Culex pipiens*.

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Population genomics relies on highly accurate sequencing technologies to identify genetic variants, with Illumina platforms currently serving as the gold standard in almost all contemporary population genomics studies. As the accuracy of Oxford Nanopore Technologies improves, however, its utility for population genomic applications warrants investigation, and has been largely untested. In this study, we evaluate the utility of nanopore sequencing for population genomics by directly comparing SNP discovery, genotyping accuracy, and sequencing error profiles between Illumina and Nanopore platforms using matched *Culex pipiens* samples. *Cx. pipiens* is a newly invasive vector of West Nile virus in Alberta, and little is known about its population structure or origin in the region. This work represents one of the first efforts to assess nanopore sequencing in a population genomics context. On top of being cost-effective, nanopore sequencing is able to detect structural variants. Such capabilities could enhance our understanding of population structure and demographic history, particularly in the context of invasive species.

Whole-genome insights into the population genomics and connectivity of diamondback moth (*Plutella xylostella*) on the Canadian Prairies.

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The diamondback moth (*Plutella xylostella*) is a globally significant pest of Brassica crops, including canola, where larval feeding can cause substantial yield loss. Its rapid life cycle, high dispersal ability, and widespread insecticide resistance make it one of the most difficult pests to manage. In Canada, especially across the Prairie provinces where canola dominates, the diamondback moth is a recurring threat. However, it cannot survive most Canadian winters. Instead, infestations are believed to originate from overwintering populations in the southern United States and Mexico, arriving each spring via long-distance wind-assisted migration. To trace these migration pathways and assess population connectivity, we conducted whole-genome sequencing of diamondback moth populations collected across the Canadian Prairies and the southern United States. Using population genomics tools, we investigated genetic structure and gene flow to identify potential invasion routes. Our findings offer critical insight into the seasonal movement of this pest and provide a foundation for improved forecasting and integrated pest management.

A pangenomic approach to interrogating the yellow fever mosquito (*Aedes aegypti*) genome.

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The yellow fever mosquito (*Aedes aegypti*) is delimited to two sub-species: *Aedes aegypti formosus* (Aaf) that is native to the sub-Saharan Africa, and the globally invasive *Aedes aegypti aegypti* (Aaa) found in tropical and subtropical regions. In addition to their geographic distributions, these taxa differ behaviorally and ecologically: Aaf females are mammal generalists, found predominantly in rural and sylvatic environments, while Aaa preferentially feed on humans and are found largely in and near human dwellings. Here, we aim to understand the genomic underpinnings of these behavioral and ecological differences using a pangenome approach, wherein we characterize the genomic variation across multiple whole genome sequences. First, we built a pangenome assembly graph of Aaf, Aaa, and laboratory strains of *Ae. aegypti* to assess architectural differences between taxa. Next, we used orthology to understand the set of genes that may elucidate taxon- or population-specific genes associated with behavioral and/or ecological differences. Preliminary findings suggest genomic structural differences between Aaf and Aaa, which may contribute to the observed phenotypic differences.

Examining the role of copy number variants in range expansion and adaptation in *Dendroctonus ponderosae*, using whole genome data.

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The mountain pine beetle (MPB), *Dendroctonus ponderosae*, is a bark beetle historically located in western Canada. Changing climatic conditions have allowed for MPB populations to erupt into novel territories and decimate millions of hectares of pine forests. Our study aims to examine the role of copy number variants (CNV's) in range adaptation, by using whole-genome sequencing of 179 MPB samples taken across historic and novel sites on the edge of this range expansion in Alberta and British Columbia. CNV's provide potentially adaptive polymorphisms in insects, but their role in contributing to a rapid range expansion is understudied. Four methodologically distinct CNV callers were used (rCNV, delly, CNVnator, and LUMPY) and cross-identified CNVs were assessed for population structure and clustering, using a PCA and pairwise F_{ST} . CNVs with signatures of positive selection will undergo functional analysis to assess their biological roles. As MPB and other forest pests experience range expansion across the globe, we hope to close the knowledge gap about the role of CNV's in rapid genomic adaptation.

(10) Genomic regions influencing adaptation to extreme cold in the expanding native forest pest, *Dendroctonus ponderosae*.

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Climate change has led to environmental alterations that supported a significant range expansion of Canadian mountain pine beetle (MPB), *Dendroctonus ponderosae*. These bark beetles spread from their historic range in B.C. into central Alberta. Persistence of MPB in Alberta is expected to lead to local adaptation to expansion range conditions, such as extreme cold winter temperatures. In this study, we use the whole genome sequence data of MPB collected from within the expansion range to determine whether beetles are adapting to winter conditions in the expansion range. We collected beetles from bolts that underwent an extreme cold event. Each collected beetle was phenotyped as alive or dead and had genomic DNA extracted. After filtering for quality and repetitive regions we retained over 700,000 single nucleotide polymorphisms (SNPs). We performed a genome wide association study using GMMAT to quantify correlations between SNP differences and whether the beetle survived or not. We found significant correlations of SNPs on each chromosome, suggesting MPB are adapting to extreme cold events in their expansion range.

(11) BioSAFE: target-enrichment tools for genomic surveillance of invasive insect pests.

Richard C. Hamelin (1), Brian Boyle (2), Mingming Cui (2), Michel Cusson (3), Roger Lévesque (2), Sandrine Picq (3), Julien Prunier (2), Ilga Porth (2), Amanda Roe (4), Alex Wu (5).

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Invasive alien species pose major threats to biodiversity, ecosystem services, agriculture and forestry, and human well-being. A cost-effective prevention strategy involves reducing invasion likelihood by identifying the geographic origins of intercepted insects and implementing targeted preventative measures at source ports abroad. We developed a genomic-based method for accurately determining the geographic origins of intercepted insects. Our approach uses genotyping-by-sequencing amplicon panels containing single nucleotide polymorphisms selected for their ability to accurately assign individuals to their source populations. SpongySeq, a panel targeting Asian spongy moths (*Lymantria dispar asiatica* and *L. dispar japonica*), achieved assignment accuracies of 82-97%. We traced the

origin of intercepted egg masses in US ports from Japan, Russia, China, and Korea. BeetleSeq, a panel targeting Asian longhorned beetles (*Anoplophora glabripennis*), was used to assess the structure of the *A. glabripennis* invasion in Japan. Multiple Chinese sources contributed to the Japanese invasion. These two genomic tools represent a significant advancement in the identification and tracking of invasive insect species, providing regulatory agencies with information to implement targeted prevention strategies.

Plenary 4: Heath MacMillan: New woes rising: How chronic stressors progressively challenge insect physiology

The world is a stressful place. Stressors act on biotic systems at the molecular and biochemical levels. In multicellular animals, like insects, these subcellular impacts manifest problems that cascade through cellular, tissue, organ, and organ systems to ultimately challenge fitness. How and why insects experience or avoid these effects is important for forecasting change in the natural world, for predicting and controlling their negative impacts on human endeavours, and for leveraging their enormous positive potential. In this talk, I will outline our integrative approach to understanding how conceptually simple challenges (e.g. it is too cold, or there is not enough protein) impact multiple levels of biological organization, and how insects have evolved to tolerate or circumvent such woes. We will start with how low temperatures disrupt ion and water balance in cold-intolerant species, driving a systemic loss of homeostasis, injury, and death. We will then touch on how some very cold tolerant species of interest, like the mountain pine beetle, or Asian tiger mosquito have evolved to physiologically avoid these pesky issues in cold winters and survive the cold. Lastly, we will explore how we can use integrative stress physiology as one way to improve insect mass rearing, with a focus on how we can make cricket rearing for food and feed more productive and sustainable..

Symposium 6: Emerging Tools in Arthropod Conservation / Outils de conservation des arthropods

Improving conservation decision making for data-sparse insect species; a case for multi-species modelling.

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Conservation agencies are often tasked with assessing extinction risk in species. However, in hyper-diverse groups like insects, how to prioritize which species should be assessed first? Citizen science data, such as iNaturalist, are an invaluable resource for occurrence data, but exhibit taxonomic, spatial, and temporal biases. Occupancy models can address many of

these issues but require presence-absence data. As much of citizen science data is presence-only, absences must be inferred using assumptions about collector behaviour. We built multi-species occupancy maps for each of Canada's ~300 butterfly species over the past 20 years across a number of collector behaviour scenarios to examine occupancy change across these modelling assumptions. We found much variation in occupancy trends between individual species: some have increased, while many have decreased in occupancy. We find that how one reconstructs collector behavior can affect estimates of occupancy change through time, though these estimates seem relatively robust overall. Comparative approaches such as this can help prioritize which species should be of highest conservation priority in the future.

Using a mosaic of conservation tools to conserve an endangered and curiously isolated butterfly.

James Glasier (1).

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With the global decline of insect populations, effective conservation of rare and endemic species depends on integrating traditional ecological monitoring with innovative tools and technologies. The Curiously Isolated Hairstreak (*Satyrrium curiosolus*) is a newly described and endangered butterfly found only within a 3 km² alluvial fan in Waterton Lakes National Park, Alberta, Canada. Since 2020, partnerships between the Wilder Institute/Calgary Zoo, Parks Canada, and academic institutions have been heading a program that uses a multi-faceted approach to species recovery by combining field-based monitoring, conservation genetics, species distribution modeling, and early-stage captive breeding and rearing trials. Our work has led to the full genomic sequencing of the species, description of the Curiously Isolated Hairstreak as its own species, identification of host associations, and development of a framework for population augmentation and assisted colonization. These efforts demonstrate how combining traditional observation with emerging tools can fill knowledge gaps and support informed, data-driven decisions to secure the future of Canada's most range-restricted butterfly.

From detection to conservation: Using high-speed video to improve capture–mark–recapture studies of insects.

Rassim Khelifa (1).

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Capture–mark–recapture (CMR) approaches are widely applied in ecology and conservation. However, their use in small, fast-moving organisms such as insects is especially challenging. In these taxa, low recapture rates often bias demographic estimates, limiting the reliability of analyses and the effectiveness of population management. In this study, we employed high-speed video (HSV) to detect marks on two large dragonfly species, *Anax*

junius and *Rhionaeschna multicolor*, which rarely perch and are therefore particularly difficult subjects for CMR. We evaluated whether HSV, compared to conventional visual (“eye”) observations, enhances resighting rates and thereby improves estimates of survival and the influence of demographic covariates. HSV increased resighting detections substantially in *R. multicolor*. Moreover, it improved estimates of resighting and survival probabilities, which were otherwise under- or overestimated using traditional observations. Incorporating HSV reduced the confidence intervals for resighting and survival in both species, respectively. These results demonstrate that HSV can substantially improve CMR studies, expanding opportunities to study a wide range of elusive species, including those of conservation concern.

What are the units at play? Delimiting evolutionary units in *Cicindela formosa* using genomic and elytral pattern data.

Wei Han Lau (1), Aaron J. Bell (2), Kiara S. Calladine (2), Rowan L. K. French (3), Diego S. Souza (4), C. Barry Knisley (5), Jay Shetterly, John H. Acorn (6), and Felix A. H. Sperling (6).

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The Big Sand Tiger Beetle (*Cicindela formosa*) is one of the largest tiger beetles in North America. Due to its narrow tolerance for dune complexes, *C. formosa* is under risk of extinction in the western regions of its range. One subspecies native to Canada, *C. f. gibsoni*, is recognized as threatened, while *C. f. gaumeri* faces similar threats in Colorado. Elytral patterns in *C. formosa* are highly variable and form the basis of subspecies delimitation. However, these patterns are potentially unreliable for delimiting evolutionary significant units (ESUs) due to their adaptive significance. Despite the threat this species faces, ESUs within *C. formosa* thus remain untested. Here, we use DNA barcodes and single nucleotide polymorphisms from restriction-site associated sequencing to survey the genetic diversity of the species. We also quantify elytral pattern variation using the R packages *recolorize* and *patternize* to compare genetic and morphological diversity. Our results lay the groundwork for rigorously delimiting ESUs within *C. formosa* to aid conservation strategies and inform the taxonomy of this tiger beetle.

Leveraging community science for large-scale monitoring of insect pollinators: insights from Abeilles citoyennes.

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Identifying at-risk pollinator communities remains a major challenge due to the substantial time, cost, and expertise needed to collect and identify wild pollinators— particularly when monitoring is needed across broad spatial and temporal scales. The Abeilles citoyennes (abeillescitoyennes.ca) project was launched in Quebec in 2019 as a community science initiative to monitor the diversity of wild bees and pollinating Diptera in Quebec over time. Specifically, volunteers are provided with a kit for sampling pollinators. All sorting, processing, and pollinator identification are conducted by the university research team. From 2019 to 2024, 185 volunteers collected insect samples at 259 sites across the province, resulting in the identification of 27,027 bees and 5,060 Diptera (hover flies, soldier flies, and bee flies). In this presentation, we present trends in pollinator abundance, species richness, and community diversity over five years, at both population and community levels. We also highlight interesting provincial records and explore how landscape structure influences pollinator communities. Finally, we discuss the benefits and challenges of our approach and opportunities for improvement.

Abstracts for contributed talks and posters in alphabetical order

Population structure in *Paracoenia bisetosa*: Adaptation in an environmentally tolerant semiaquatic fly

Shawn Abraham (1), Felix Sperling (1)

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Shore flies (Ephydriidae) are an understudied family of flies best known for environmental tolerance and semiaquatic adult behaviour. *Paracoenia bisetosa* is a widespread species that can be found in typical wetland environments as well as hot springs and saline lakes. Here, we use a long read, Pacific Biosciences HiFi reference genome and shotgun sequencing to investigate structure across habitat types in Albertan populations of *P. bisetosa* and begin to examine the extent to which high stress environments affect the genomics of shore flies, as well as make connections to the external morphology that might facilitate their semiaquatic habits.

Outbreaks of western yellowstriped armyworm (*Spodoptera praefica* Grote, 1875) (Lepidoptera: Noctuidae) in the southern interior of British Columbia

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Outbreaks of *Spodoptera* species are often sporadic and can cause significant crop losses. The first reports of Western yellowstriped armyworm, *Spodoptera praefica* in the North Okanagan valley of British Columbia were received in July 2018. A severe outbreak followed in 2019, with widespread reports of crop damage from farmers and homeowners. Although *S. praefica* is known to occur in British Columbia and the western United States, previous records from Southern B.C. were limited to Cranbrook (2007) and Okanagan Falls (1992, 2009), based on specimens in the Royal BC Museum and Strickland Entomological Museum (University of Alberta). We monitored *S. praefica* flight activity using pheromone-baited traps, observed larval development, and identified host plants and natural enemies. We present monitoring results, host plant records, and observations on potential biological control agents of *S. praefica* in alfalfa farms in the North Okanagan Valley.

Iridescent warning colours form a widespread, uncommon, but remarkably consistent pattern

John H. Acorn

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Warning colouration typically contrasts pigmented red, yellow, or orange with black, white, or brown, at least in insects. Less commonly, we see iridescent aposematism, including red and green patterns, especially among beetles, involving chrominance contrast but not luminance contrast. Most iridescent red and green beetles, as well as some iridescent roaches and mantids, have all-green near relatives that are likely cryptic against vegetation, as well as

all-blue (rarely, all-red) near relatives that belong to a separate mimicry complex. Iridescent colours in beetles are generally produced by epicuticular thin-layer constructive interference, such that the thickness of the ultramicroscopic layers determines the hue of the iridescence. It appears, then, that iridescent insects have frequently shifted between cryptic green colouration, red-green aposematism, and all-blue aposematic, by altering their iridescent hues. This general pattern is seen in multiple taxa, worldwide, and is therefore a consistent but low-density mimetic phenomenon.

The decision-making behind seed selection responses by carabid beetles

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Carabid beetles (Coleoptera: Carabidae) assess the suitability of different seed species before identifying the most suitable seed species for consumption, but the behavioral mechanisms that underlie this assessment remain understudied. Here, we show that the carabid species *Pterostichus melanarius* and *Poecilus corvus* employ a comparative mechanism for seed suitability assessment. Seed choice by both species was dynamic as the value of the preferable seed species changed depending on the seed options (i.e. species) offered and the number of these options. Furthermore, the presence of a highly preferable seed species always depressed the value of other seed species for both carabids. These findings closely align with the predictions of Dawkins' Threshold Model (Dawkins, 1969), suggesting that carabids identify the preferable seed species by comparing the suitability value of different seed species available in the environment. Thus, seed preferences by carabids are dynamic and context-dependent, and the preferable seed species is predicted to differ from one location to another depending on the composition of carabid community and the soil seed bank.

Harnessing vibrational signals for sustainable pest management: Insights from biotremology

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Biotremology is an emerging field that investigates how organisms communicate through substrate-borne mechanical vibrations. This discipline has shown promising applications in crop protection, offering innovative strategies to manage insect pests. Much like chemical ecology, biotremology explores how specific signals—vibrations in this case—can be used to alter pest behavior. In this presentation, I will discuss vibrational-based approaches to pest control, drawing from both existing literature and my own experimental work. I will demonstrate how vibrational signals can be employed to attract and disrupt mating in a psyllid pest, and how they can influence the feeding behavior of a spittlebug vector of *Xylella fastidiosa*. These findings highlight the potential of biotremology as a tool for sustainable pest management in Canadian agriculture and suggest future directions for research and application.

Making every weevil count: density dependent feeding and dispersal behaviour of *Ceutorhynchus scrobicollis* (Curculionidae) on *Alliaria petiolata* in central Ontario and implications for invasive plant management

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Garlic mustard (*Alliaria petiolata*) is a European biennial that has invaded much of temperate North America. Biocontrol is a tool to manage invasive plants and *Ceutorhynchus scrobicollis*, a root-crown feeding weevil, has been identified as a potential biocontrol agent for this species. *C. scrobicollis* can increase mortality, reduce biomass, and alter plant architecture. This species has been released in Canada, yet many aspects of survival and dispersal in a novel landscape remain unknown. Long-term monitoring of populations is important for understanding agent efficacy and to optimize release methodology. We released weevils and quantified feeding and dispersal over a 30-day period. Results indicate that there is a relationship between density and both foliar damage and dispersal distance, with the most damage occurring under moderate densities and the furthest distances occurring under high densities. Our results indicate that the release of more agents may not necessarily yield better results. Rather, optimizing agent densities may improve plant management and lead to a more efficient utilization of biocontrol agents as a resource.

Investigating the economic threshold for *Hypera postica* (Coleoptera: Curculionidae) in alfalfa seed production fields

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The alfalfa weevil, *Hypera postica* (Gyllenhal) (Coleoptera: Curculionidae), is a significant threat to alfalfa seed production, much of which is grown under irrigation in southern Alberta. Alfalfa, *Medicago sativa* (L.) (Fabales: Fabaceae), is an economically important crop due to its high protein content and ability to fix nitrogen. In alfalfa seed production, insecticides are often critical to maintaining yield, but frequent use can contribute to resistance development and harm beneficial insects. To minimize these impacts, economic thresholds can guide insecticide applications, ensuring that applications are made when pest damage exceeds the cost of control. This project compares alfalfa weevil abundance, crop damage, and yield in insecticide treated and untreated plots to evaluate the economic impact. Results will determine if current threshold levels of 20 larvae per sweep remain appropriate, or if needed we will provide producers with updated, research-based guidance for on-farm management decisions

(POSTER) Efficacy of *Beauveria bassiana*-based bioinsecticides against alfalfa weevil

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Alfalfa weevil, *Hypera postica* (Coleoptera: Curculionidae), is a major pest of alfalfa and a serious threat to seed production across North America, including the Canadian Prairies. Current management strategies rely on chemical insecticides; however, their effectiveness is declining due to increasing insecticide resistance. Additionally, these chemicals negatively impact natural enemies and leafcutter bees, critical pollinators for alfalfa seed production. These effects highlight the need for alternative control strategies. This study evaluated the efficacy of two commercial bioinsecticides containing distinct strains of the entomopathogenic fungus *Beauveria bassiana* under laboratory conditions. Alfalfa weevil adults and larvae were collected from alfalfa fields in southern Alberta in spring of 2025 and treated following label recommendations (five doses tested across three independent bioassays). Preliminary results showed greater larval susceptibility, with the most effective formulation causing over 70% larval mortality and approximately 40% adult mortality within five days post-treatment. One bioinsecticide product demonstrated greater potential for field application. Further research will evaluate its field efficacy and economic viability.

Insect physiology is key for invasion science

Leigh Boardman

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Physiological processes are relevant at every stage of the invasion pathway and form integral parts of several hypotheses and frameworks in invasion biology. From molecular levels to the influences of external environments on animals, physiology data is integral to understanding insect responses to varied abiotic and biotic stressors, and thus invasions. In searching for unifying traits of invasiveness, researchers often find that understanding invasive organisms requires integrative approaches. Good phenotyping is key to interpreting biomarkers and underlying mechanisms of invasions, and stronger integration of physiology into invasion science, including ‘omics studies, is needed to continue to move this field forward. Here, I will discuss the integration of physiology with invasion science, including modelling, and limitations of these approaches. Using recent examples across different insect taxa, I will illustrate how a better understanding of insect physiology could help with early detection of pests and their associated pathogens, predict invasive species spread, direct quarantine treatment research, as well as provide physiology data that can be integrated into demographic models of potential invasives.

Checklists of the aculeate wasps of Canada, Alaska and Greenland: faunistics in the new golden age of citizen science.

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Faunistic knowledge on aculeate wasps in Canada and Alaska has increased dramatically in recent decades as demonstrated by the already published Checklist of apoid wasps, with two more instalments on Chrysidoidea and Vespoidea sensu lato to follow. We present an overview of the project and discuss the opportunities and limitations of citizen science through websites such as iNaturalist in the context of a large-scale faunistic study as the present checklist.

Bumble Bees in the City: Factors Influencing the Abundance of Species of Bumble Bees (*Bombus* spp.) in Lethbridge, Alberta

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Many bumble bee populations are in decline, both locally and globally. Meanwhile, urbanization and alteration of natural bumble bee habitats are on the rise. Therefore, understanding how to support bumble bee populations within urban areas is becoming increasingly important for their conservation. In the summer of 2024, we surveyed bumble bee species and recorded visitation patterns on plants at 20 sites in and around the city of Lethbridge, Alberta. We quantified the effects of environmental variables, the abundance of honey bees and other pollinators, floral abundance and species richness on bumble bee species richness and assemblage patterns using a multi-model inference framework. Our results showed that floral species richness and the abundance of other pollinators are positive predictors of bumble bee abundance, and that floral species richness, proportion of flower species native to Alberta, and honey bee abundance were positive predictors of bumble bee species richness. By identifying the traits and conditions associated with greater bumble bee presence, we will inform conservation efforts to support bumble bees in urban environments.

The third player: pathways of fungal contributions to bark beetle semiochemical systems

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Semiochemical systems that modulate bark beetle colonization of host trees are often described as bipartite, driven by volatile compounds from beetles and trees. However, a growing body of evidence indicates that at least some of these systems may be tripartite, with volatiles produced by beetle-associated fungi playing critical roles. Studies of several tree-killing bark beetles demonstrate that fungal emissions can directly and indirectly influence beetle behavior. These fungal compounds may offer novel opportunities for managing beetles. Building on recent evidence, we will first discuss a conceptual model illustrating the pathways by which beetle-associated fungi can produce volatile semiochemicals. We will then present recent results from work profiling emissions of *Grosmannia abietina*, the spruce beetle's (*Dendroctonus rufipennis*) symbiotic fungus, and highlight potential semiochemical compounds produced by the fungus.

A closer look at how oils and soaps kill *Dactylopius* cochineal pests

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The mode of action of five compounds (neem, soybean, and mineral oils; dish soap; and Tween 20) was evaluated on nymph and adult stages of *Dactylopius opuntiae* and *Dactylopius coccus* using two application methods: spraying at concentrations of 0.01%, 0.1%, 1%, and 5%, and topical application at 5%. Mortality was stage-dependent and absent in topical treatments. Spraying at 0.01 and 0.1% caused no mortality in any stage, whereas 1–5% caused 100% mortality in first instars for all compounds. Second instars showed >80% mortality with neem, soybean oil, and Tween 20, and 50–70% with dish soap and mineral oil. Adults were less susceptible, with 5% Tween 20 being the most effective (44% in *D. coccus*, 96% in *D. opuntiae*). Scanning electron microscopy revealed complete body coverage in immature stages but only partial coverage in adults; transmission electron microscopy showed no cuticular damage. Results indicate these compounds are non-toxic, and mortality is mainly due to asphyxiation via spiracle blockage, with reduced effectiveness in larger individuals.

Farmer-reported crop insect pressures and adoption of IPM strategies in Alberta, Canada

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Field crop production in the Canadian prairies is challenged by numerous pest insects. Decades of entomological science has produced descriptions and integrated pest management (IPM) options for most pests in the region, but farmers and agronomists are the translators of that science into agricultural impact. Understanding the challenges decision-makers face is necessary to track and facilitate the adoption of IPM. We conducted a survey of 353 Alberta farmers about their insect pressures and management practices in their cereal, canola, and pulse crops in the 2021 growing season. We report on uptake of insect scouting and pests observed in each crop, and use of economic thresholds and foliar and seed treatment insecticides at the crop-pest level. Some of these practices differed for multiple pests when the farm employed an independent crop advisor. Farmer knowledge of conservation biological control arthropods (i.e. ‘beneficials’) was very low, and influenced by both farm and farmer level characteristics. This information suggests different intervention pathways towards significant improvement in awareness and hopefully greater consideration of biological control

High-tech biodiversity monitoring to safeguard prairie pothole wetlands in agroecosystems.

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Prairie pothole wetlands – North America’s “duck factory” – are vital biodiversity hotspots facing mounting threats from agriculture and climate change. The Alberta Biodiversity Monitoring Institute, Ducks Unlimited Canada and InnoTech Alberta are developing scalable, cost-effective tools to assess how farming practices affect wetland water quality, waterfowl productivity, and macroinvertebrate prey availability. We integrate conventional biodiversity surveys with advanced technologies including drone based thermal imagery for waterfowl counts, remote cameras and autonomous acoustic recorders for predator monitoring, and genomics tools (metabarcoding, qPCR) for macroinvertebrate assessment. Early results from wetlands in Alberta (2023-2024) detected 31 pesticides and revealed marked differences in invertebrate community composition between cropped and uncropped sites – patterns with clear implications for waterfowl food resources. Drone surveys proved highly effective for waterfowl brood detection, while combining morphological and molecular techniques for macroinvertebrate taxonomy showed potential to move beyond presence-absence data to biomass estimates. These findings provide insights into the drivers of waterfowl declines in the prairie pothole region and evidence-based workflows to support sustainable wetland management in agroecosystems under a changing climate

(POSTER) Efficacy of overwinter miticide treatments against *Varroa destructor* in honey bee colonies in Western Canada

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The parasitic mite *Varroa destructor* is associated with more than 30% of overwinter honey bee (*Apis mellifera*) colony losses in North America. Many beekeepers use synthetic products to control *Varroa*, however these products can be toxic to bees, can contaminate honey and wax, and *Varroa* can develop resistance against their active compounds. One approach is the use of natural compounds such as oxalic acid, which efficacy depends on environmental conditions, specialized personal protection equipment, and several applications within a time period. Additionally, applying *Varroa* treatments during winter could have the advantage of killing most of adult mites present on adult bees, however environmental conditions during Canadian winters would difficult the treatment application. This study evaluated the efficacy of a new slow-release formulation of oxalic acid inside of overwinter indoor facilities in Western Canada. Five treatments were established, including negative and positive (amitraz) controls, and oxalic acid (low, mid and high doses). Oxalic acid treatments had higher *Varroa* natural fall, lower *Varroa* infestation levels, with lower colony mortality during winter.

Evidence of recent declines in flower flies (Diptera: Syrphidae) across North America

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Mounting evidence of widespread insect declines highlights the need for large-scale population assessments, especially for ecologically significant groups like pollinators. Syrphidae (flower flies or hover flies) are the most common dipteran pollinators but are underrepresented in conservation research relative to bees. To better understand the population trajectories of syrphids across North America, we leveraged 138,112 digitized records across seven museums and employed a Bayesian occupancy model to examine the trends of 318 species over a 120 year span (1900–2020). We find strong support for a recent overall decline in syrphid occupancy (10.4% reduction across species between the 1961–1990 and 1991–2020 eras) with more species declining compared to those increasing. However, there was little support for overall occupancy change across the full 120 years. Species with predatory larvae and smaller body size were more likely to have declined. Our findings warrant further investigation into drivers of recent syrphid declines and greater efforts to identify and digitize the millions of specimens that remain otherwise inaccessible in North American biological collections.

A molecular approach to quantify predation of pea leaf weevil (*Sitona lineatus*) by *Pterostichus melanarius* in Alberta

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The pea leaf weevil, *Sitona lineatus* (Coleoptera: Curculionidae) is an invasive pest that threatens field pea and faba bean production in western Canada. Control strategies for this pest predominantly rely on insecticide applications, but the generalist predator, *Pterostichus melanarius* (Coleoptera: Carabidae) may serve as a potential biological control agent. We developed a multiplex PCR assay targeting a portion of the mitochondrial COI gene to detect *S. lineatus* DNA within *P. melanarius* gut content. The assay was validated through a laboratory feeding bioassay and prey DNA detectability was assessed at 0-, 8-, 18-, and 24-hours post feeding. Field-collected *P. melanarius* from pea and faba bean crops in Alberta were then screened for *S. lineatus* DNA. Of the beetles tested, 16% of 201 individuals from 2021 and 6% of 103 individuals from 2022 were positive. These results enhance our understanding of the ecological role of *P. melanarius* in pulse agroecosystems and its potential in insect pest management.

Monitoring and protecting Alberta's native bees

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Native bees are essential pollinators in Alberta's ecosystems, yet data on their diversity, distribution, and population health remains limited. The Alberta Native Bee Council (ANBC) is working to fill this knowledge gap through a province-wide monitoring and stewardship program. This presentation will introduce ANBC and outline our collaborative approach to monitoring native bees across Alberta, including methods, partnerships, and how collected data supports conservation planning. We will share key findings from previous years, provide an update on 2024 data, and highlight our outreach efforts like volunteer training, citizen science initiatives, and bee box workshops. We will also discuss emerging threats to native bees, with a focus on the risks posed by managed bees, and introduce our plans for a new certification program aimed at mitigating the impacts of escaped non-native bumble bees from greenhouses on wild bee populations.

(POSTER) Monitoring and management of beech leaf-mining weevil in its invasive Range
Sara Edwards (1), Rob Johns (1), Jon Sweeney (1), and Emily Owens (1)

1. Canadian Forest Service, Atlantic Forestry Centre, Natural Resources Canada

The beech leaf-mining weevil, *Orchestes fagi* L. (Coleoptera: Curculionidae), first detected in Nova Scotia in 2011, has expanded its range and caused extensive damage to American beech (*Fagus grandifolia*). Outbreaks of this invasive pest result in severe leaf necrosis and can lead to tree mortality. Field studies in 2014 and 2016 established pest density–leaf damage relationships, showing that adult feeding and early mine initiation were strongly associated with end-of-season leaf necrosis, explaining approximately 70–80% of its variation. These results suggest that leaf necrosis may be linked to damage caused by adults or by mine initiation rather than larval mine expansion and gallery development. Successful management of this pest will therefore require tactics that target adult populations. These findings provide essential tools for monitoring and guiding the development of integrated pest management strategies for *O. fagi* in its invasive North American range.

Three new provincial and national species records for Trichoptera from the Stellako River, BC.

(POSTER) **Daniel J. Erasmus**, Shayden Hiebert, Dylan Zummack, Isaiah Reynolds, and Dezene Huber

University of Northern British Columbia

Worldwide, aquatic taxa such as the Ephemeroptera, Plecoptera, and Trichoptera (EPTs) have experienced a dramatic decline in biomass and diversity. The EPTs provide important ecosystem services to fish and humans. The Stellako River is located on the traditional territory of the Stellat'en First Nation (northern BC) and has an abundance of rainbow trout and juvenile sockeye salmon. The rainbow trout attract recreation anglers from around the world and the Stellat'en First Nation harvest the adult sockeye. The biodiversity of the EPTs was catalogued over two sampling seasons by capturing specimens using sweep netting, kick

netting, and Malaise traps. DNA barcoding revealed a total of 67 EPT species with 19 Ephemeroptera, 14 Plecoptera, and 34 belonging to Trichoptera. Two Trichopteran species: *Protoptila coloma* (Glossosomatidae) and *Hydroptila argosa* (Hydroptilidae) are new species records for Canada. A third Trichopteran, *Hydroptila hamata* (Hydroptilidae) is a new species record for British Columbia. These new species records emphasize the importance of these diminutive insects that are easily missed in monitoring and biodiversity assessments.

(POSTER) Spatial and temporal patterns of off-host activity of *Ixodes scapularis* in response to temperature and moisture

Jaclyn Delahunt and **Laura V. Ferguson**

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Understanding spatial and temporal patterns of off-host activity of blacklegged ticks in response to abiotic conditions can help us to predict their survival, the risk of host encounter, and inform efforts of biocontrol that rely on application of pesticides and natural products to tick habitats. To determine the depth to which ticks will travel through the leaf litter to seek refuge from heat, cold, and desiccation, we created vertical chambers with 20 cm of surrounding leaf litter and exposed ticks to -5 °C, 0 °C, 20 °C, and 32 °C in wet and dry conditions. Wet conditions encouraged ticks to remain closer to the surface of the leaf litter; conversely, ticks traveled to the level of the soil to escape dry conditions. We also determined, using locomotor behaviour monitors, that ticks shift the timing of their activity in the day depending on temperature. Overall, temperature and moisture were major drivers of tick habitat use and activity that are likely to shape host interactions and tick survival.

(POSTER) Interactions between temperature, host defensive profile, and prior colonization by *Ophiostoma ips* on mountain pine beetle gallery initiation and length in artificial media.

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Following the expansion of mountain pine beetle (MPB; *Dendroctonus ponderosae*) into jack pine in NE Alberta, populations collapsed. However, jack pine's long-term vulnerability to MPB remains uncertain, especially under a warming climate. In endemic populations, MPB and its fungal symbionts interact with a diverse subcortical insect-fungal community, but these interactions are poorly understood in jack pine. Recent work from our group suggests warming may reduce the antagonistic effects of *Ophiostoma ips* (a fungal symbiont of the MPB competitor, *Ips pini*) on *Grosmannia clavigera* (a MPB symbiont) in media amended with jack pine-like monoterpenes. Here, we evaluate adult MPB preference (gallery initiation) and performance (gallery length) on media with and without prior *O. ips* colonization. Beetles were exposed to arenas containing two semi-circles of media with similar host defence profiles, one pre-inoculated with *O. ips*. Two host defence treatments and three temperatures were tested in a full factorial design. Preliminary results indicate that

temperature, host defences, and fungal presence interactively affect MPB gallery initiation and length in artificial media.

Breeding blueberries for aphid resistance: evaluating host-plant resistance to blueberry feeding aphids in high-bush blueberry and their wild *Vaccinium* relatives

Michelle Franklin (1), Yonathan Uriel (1), James Pickett (1, 2), Gosia Zdanowicz (1), Michael Dossett (3); Bryan Brunet (4)

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The blueberry feeding aphid, *Ericaphis fimbriata* (Richards) is a known vector of blueberry scorch virus (BIScV), which poses a major threat to British Columbia's blueberry production. Breeding for host-plant resistance has received little attention for the management of blueberry pests, however it could be a key tool to sustainable aphid management. Here we evaluate aphid resistance for blueberry cultivars and their wild relatives that are part of the BC Berry Breeding program to identify plants with aphid resistant traits. Over three years, we have conducted in-field screening, through weekly monitoring of aphid abundance for over 100 unique varieties. Six varieties have consistently shown low aphid abundance and based on these results, we have selected varieties to conduct further laboratory tests of host acceptance and aphid fecundity. These results will be used to inform future blueberry breeding, with the goal of providing an aphid management tool to combat the spread of BIScV.

Freezing out flour mills to control red flour beetles

Vincent A. D. Hervet, Ahmed Y. Abdelghany, Paul G. Fields

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Cold winter temperatures on the Canadian Prairies can be used to control insects in buildings, but only if temperatures are sufficiently low, as shown in a study we conducted in mills near Winnipeg, Manitoba, in the winters of 2014, 2015, and 2019. Twenty ventilated plastic vials, each containing 50 adult red flour beetles, *Tribolium castaneum* (Tenebrionidae), were placed throughout each facility. Effects of cold acclimation in growth chambers (1 month at 15°C) and on-site (1 month on site, ~15°C) were investigated. Freeze outs lasted 70 h (2014), 76 h (2015), and 166 h (2019). During these times, outside temperatures averaged -15°C (2014), -20.3°C (2015), and -5.4°C (2019). In 2015, 100% mortality was observed in non-cold-acclimated insects, and 91-95% in lab and mill cold acclimated insects, respectively. In 2014, 90% mortality was observed for the lab cold acclimated and non-cold-acclimated insects, but only 24% mortality for insects acclimated on site. In 2019, due to higher temperatures, mortality was only 3% for cold acclimated insects and 17% for non-cold-acclimated insects.

Winter biology of the beach-dwelling carabid beetle, *Chlaenius cordicollis* in Manitoba

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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 $+5^{\circ}\text{C}$, 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.

Using random forests to cut through the noise of complex ecological data

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Ecological data are often messy, riddled with missing observations and noisy relationships that obscure underlying patterns. Such is the case for a long-term dataset of spruce budworm and parasitoid densities, defoliation levels, and other variables derived from branch samples collected in Quebec from 2006 to 2023. Making sense of this dataset has been challenging, but one approach has proven particularly powerful: random forest models. This flexible machine learning method is gaining traction across ecology and entomology for its ability to handle high-dimensional, messy data without strict distributional assumptions. In this talk, I will share preliminary insights from our spruce budworm analyses and show how random forests can reveal hidden structure in ecological systems - and how you can harness their power to make sense of your own data.

(POSTER) Adaptive Area-Wide Management for Controlling Spruce Budworm Outbreaks: Insights from an Early Intervention Strategy Case Study

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Spruce budworm (*Choristoneura fumiferana*) outbreaks are managed mainly through two insecticide-based strategies: the foliage protection strategy (FPS) and the early intervention strategy (EIS). FPS suppresses defoliation and associated mortality in high value stands, whereas EIS is an adaptive, area-wide approach aimed at suppressing low-density populations (aka hotspots) to limit outbreak rise and spread. We present results from a 10-year case study (2015–2024) evaluating EIS in New Brunswick alongside a contemporaneous FPS program in neighboring Quebec. EIS treatments suppressed population growth annually, reducing hotspots by 10–65% relative to surrounding untreated areas, and generally suppressed outbreak expansion. In contrast, FPS had a limited impact on population trends and the outbreak continued to grow and expand in the FPS management area. EIS required substantially less insecticide and fewer retreatments. Outcomes align with each strategy's objectives, and our findings highlight EIS as a proactive, effective approach when applied under appropriate conditions.

Estimation of energy and biomass in insects available as food for grassland birds in protected areas, conservation zones, heritage rangeland, and revegetated grassland in Alberta

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Insects are important in the diets of grassland birds. We recorded grasshopper (Acrididae) species, size, and abundance as indicators of habitat quality. We measured the content of fatty acids such as linoleic acid, linolenic acid, oleic acid, and 30 others. Using data on population density, body size, capturability, and life cycle timing, we mapped available protein and energy for birds, and compared it to vegetation cover, in multiple protected areas and revegetated grassland. In one example, a typical density on native grass of 5 g Acrididae per square meter, equal to about 1.6 g dry weight (0.96 g/m²; protein energy 0.96 g x 14.6 kJ/g=14.0 kJ/m²), and containing 0.176 g lipids (11% of dry weight), represents energy of 6.5 kJ/m² (1.5 kcal). (Protein =60% of dry weight). Total energy (fat+protein) before assimilation = 20.5 kJ/m² = 205 MJ/ha. With 95% assimilation in birds, energy available in grasshoppers on typical native grassland = 195 MJ/ha. Crested wheatgrass provided less abundant food than native grassland, in all cases observed in the field.

Leveraging existing pest surveillance programs for agro-ecosystem biodiversity data: challenges and opportunities

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Insect pest surveillance programs are designed to monitor and communicate population dynamics, relative risk, and introduction of specific insect pests. The survey timing, methodology, and data collection are designed with specific pests in mind. Even so, unintended sampling of non-target insects occurs in most surveillance activities. Additions to collection and processing methodology can capitalize on non-target sampling to provide added value to producers and valuable data. Cabbage seedpod weevil survey data in Alberta is presented as an example.

Bark beetles and their natural enemies in *Dryocoetes confusus*-attacked subalpine fir (*Abies lasiocarpa*) trees

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Dead and dying bark beetle-attacked trees are vital reservoirs for wood-inhabiting insects, including competing beetle species and natural enemies that play key roles in regulating tree killing beetle populations. However, how these communities change with the health and condition of host trees over time is poorly understood. This presentation will discuss results from a two-year study investigating variation in bark beetle and natural enemy communities inhabiting subalpine fir (*Abies lasiocarpa*) trees attacked by the western balsam bark beetle (*Dryocoetes confusus*). Insect emergence from bolts representing four stages of decline post-beetle attack was monitored through the summers of 2024 (n = 35 bolts) and 2025 (n = 32). Many secondary bark beetle and potential enemy species (e.g., parasitoid wasps, predatory beetles, and flies) were commonly observed. Variation in insect community composition across tree decline stages and study years will also be discussed. This work provides valuable insights into the indirect impacts of *D. confusus*-caused tree mortality on the biodiversity of subalpine fir-dominated forests.

(POSTER) RDL: A Citizen Conservation and Biodiversity Project

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What began as an attempt to find a “weekend escape from the city” has turned into a 16-year conservation effort and biodiversity study. Habitat loss and contamination throughout southern and central Saskatchewan has been increasing for decades due to modern agricultural practices which has resulted in declines of native flora and fauna populations and biodiversity. This project began with the purchase of 194-hectares (480 acres) of marginal hay land and wetlands in the Boreal Transition Ecoregion of Saskatchewan with the intent of protecting it from further destruction. We also began documenting the flora and fauna associated with the property. To date we have recorded nearly 800 taxa from

Cyanobacteria to moose including nearly 170 plant species and almost 600 animals, of which 370 are insects. The project is ongoing and estimates suggest the taxa number will likely double.

(POSTER) Investigating potential cryptic speciation of blueberry gall midge (*Dasineura oxycoccana*) from cultivated highbush blueberries (*Vaccinium corymbosum*) in the Pacific Northwest

Tamryn Kennedy¹, Michelle Franklin², Lydia Tymon³, Lyndsey Baillie¹, Tracy Hueppelsheuser⁴, and Paul J. Adams¹

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A new species can arise without any visible differences, known as cryptic speciation. An insect that damages highbush blueberries (*Vaccinium corymbosum*), the blueberry gall midge (*Dasineura oxycoccana*), was hypothesized to have formed a new cryptic species that is more harmful to this economically important crop. An observed increase in tip-dieback in *V. corymbosum* was investigated through sequencing the *COI* mitochondrial gene of *D. oxycoccana*, generating a phylogenetic tree, and performing fragment length analysis (FLA) to identify both SNP and microsatellite variations, potentially revealing distinct populations. The *COI* sequences had near perfect alignment except for three SNPs present in four sequenced samples and six NCBI database samples. PCoAs and Bayesian clustering analysis of the FLA data showed no distinct population clustering, and individuals from each of the six collection sites do not possess a unique ancestry; thus, supporting that these sites are not genetically isolated and there is evidence of gene flow between populations. These results suggest that a cryptic speciation event has not occurred.

Insect trails in rocks: Bridging Entomology and Ichnology

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Ichnology is the study of modern and ancient traces—such as burrows, tracks and trails—produced by animals. Fossilized traces, or trace fossils are keys to understanding how their producers interacted with the environment and how those behaviours evolved across geological time. Insects, for example, leave behind a wide range of fossilized evidence, including trackways, trails, burrows, nests, and plant interactions. Examples of these can be found in various sedimentary deposits in Alberta and worldwide. In comparison to marine invertebrates, significantly less research has been devoted to the ichnology of insects and other terrestrial invertebrates. One way to facilitate research is to establish a better understanding of the traces produced by modern insects. Neoichnology strives to do just that. Ideally, a robust neoichnological description of an animal's trace should include: (1) the environmental setting; (2) the substrate type; (3) the trace morphology; (4) the identity of the producer; (5) behaviours associated with trace formation; (6) a high-quality image of the trace; and, if possible, (7) comparable trace fossil analogs.

Are biting insects mechanical vectors for cancer in horses?

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Biting flies act as mechanical vectors for many pathogens, making them an important area for investigation. In horses, genital cancer is caused by a recently discovered equine papillomavirus (EPV). Comparable cancers in humans, including cervical, anogenital, and throat cancers, are caused by human papillomaviruses (HPVs), which are primarily transmitted through intimate venereal contact. The same is not true for horses, as many develop genital cancer having never mated or had close contact with other horses. We hypothesize that biting insects act as mechanical vectors for EPVs, transferring the virus between horses during feeding. Here, we discuss the results of our pilot trials, where black flies (*Simulium* sp.) experimentally exposed to EPV-infected tissues retain and transfer viral particles between spatially and temporally separated feeding stations. These initial findings support the plausibility of mechanical transmission. We discuss future directions towards understanding the role of biting flies as mechanical vectors of EPVs, including current field studies to discern which flies may be the most important vectors.

Chemical ecology and biocontrol potential of pteromalid wasp *Jaliscoa hunteri*, a natural enemy of the pepper weevil in North America

Serena Leo, Cynthia Scott-Dupree, **Roselyne Labbe**

The pepper weevil, *Anthonomus eugenii* (Coleoptera: Curculionidae), is a serious pest of pepper crops across North America, including greenhouse and field-grown peppers in Canada. Once introduced to a crop, this pest is hard to control because young weevils are hidden and protected within host fruit and buds. However a small parasitic wasp called *Jaliscoa hunteri* (Hymenoptera: Pteromalidae) may be of some help. In 2016, at the height of a costly pepper weevil infestation in Ontario, we discovered *J. hunteri* along with several other parasitoid species emerging from infested pepper fruit, suggesting that natural enemies of pepper weevil are readily present in Canada. Subsequent lab studies showed that *J. hunteri* is especially effective at attacking late instar weevil larvae, reducing their numbers by over 60%. The wasp also exerts the greatest reduction of larvae developing within small pepper buds and fruit. Other research found that *J. hunteri* is specifically attracted to volatiles emitted by weevil infested pepper plants and fruit, confirming the wasp uses chemical cues for host finding. Taken together, this work demonstrated that *J. hunteri* has a strong potential for enhancing the sustainability of pepper crop protection in North America.

Investigating ecological interactions between insects, pesticides, and insectivorous birds breeding in Central Alberta

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This project seeks to leverage the partnership between Burman University and Ellis Nature Centre to explore the correlations between (a) pesticide use in central Alberta, (b) pesticide accumulation in insects, (c) the local abundance of such insects; and (d) determine whether such pesticides are transferred to the birds that feed on them, affecting their reproduction. Funding was secured in the form of a 5-year NSERC Alliance Grant as well as an ACA grant in 2023. In 2023, 24 nests were sampled, 16 nests in 2024, and 20 nests in 2025. Analysis of the DNA of nestling fecal matter shows lepidoptera the major source in the diet of the birds, which agrees with “Lewis, D., and Carey, M. 2023. Lepidopteran Larvae the Dominant Prey of Mountain Bluebirds. *Bluebird* 45(2):22-24.” Chemical analysis has so far shown herbicides, especially glyphosate, in both insect and bird samples. Sampling and analysis continue with one final year of sampling (2026), and an additional year for completing analyses and publication (2027).

From morphotaxa to described species: challenges and triumphs in maintaining oribatid mite nomenclature in a large-scale monitoring program.

Lisa Lumley (1).

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Oribatid mites are abundant and diverse soil arthropods, and are used as bioindicators for environmental monitoring. Although the Oribatida are among the most well documented soil taxa, assigning described species names to morphotaxa can still be a challenge for many reasons including descriptions that are not to modern standards, uncertainty in character description or illustration, and lack of keys or other compiled taxonomic resources. New literature that solves these dilemmas can also provide the challenge of maintaining updated nomenclature over time, particularly in a large-scale and/or long-term monitoring program requiring name consistency over time for data analyses. Here, I will present process and efforts to put described species names on oribatid mite morphotaxa based on taxonomic publications that have recently become available. These efforts to maintain updated species names allow a more global impact for publicly available data and are necessary towards determining which taxa are yet to be described.

(POSTER) Bees, blooms, and biodiversity: Developing a scoring system for evaluating pollinator habitat initiatives

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Efforts to conserve pollinators are gaining momentum, yet effective tools to evaluate habitat quality remain limited. To address this gap, we are developing a "pollinator preservation score," a trait-based system that uses the presence and diversity of specific bee species to assess habitat quality. Inspired by frameworks like the Hilsenhoff Biotic Index, our tool prioritizes vulnerable, specialist, cleptoparasitic, and rare bee species as indicators of ecological health. We have categorized 680 bee species found in Canada by ecological traits and developed a prototype score based on pollinator communities in natural and semi-natural habitats. Key challenges include data gaps in species-level identification, trait information,

vulnerability status, and site-specific community composition. This presentation will share our progress to date and invite feedback from the entomological community to refine the scoring structure and improve its utility for conservation planning.

Native waterlily leaf beetle, *Galerucella nymphaeae*, damages invasive parrot's feather watermilfoil, *Myriophyllum aquaticum*, in Canada

Valerie Marshall and David Ensing

Agriculture and Agri-Food Canada

Parrot's feather watermilfoil, *Myriophyllum aquaticum* (Vell.) Verdc. (Haloragaceae), is an emergent freshwater macrophyte native to South America and popular worldwide in aquatic horticulture and aquariums for its attractive foliage. The floating stems form dense mats over slow-moving water, and *M. aquaticum* is considered invasive in several countries including Canada, USA, UK, and South Africa due to the negative impacts from the formation of extensive mats. We report the first recorded host association between *M. aquaticum* and *Galerucella nymphaeae* L. (Coleoptera: Chrysomelidae) in Canada. Given international efforts to locate safe and effective biological control agents for *M. aquaticum* in North America, we briefly discuss the potential role for *G. nymphaeae* in biocontrol in Canada, as well as the potential for the ecology of *G. nymphaeae* to be used to inform future biocontrol efforts, particularly by the confamilial *Lysathia cilliersae* Cabrera, in *M. aquaticum* systems in North America.

Some recent investigations in control of cabbage pests at AAFC St. John's

Carolyn Parsons, Dena Wiseman, Tobias Laengle, Julia Wheeler and **Sean McCann**

Agriculture and Agri-Food Canada

Cabbage maggot and diamondback moth are some of the most difficult pests that Canadian brassica farmers deal with. In vegetable fields, control options are limited, and effective non chemical interventions to combat these pests are sorely needed. Here we present some promising findings from recent work we have done using insect exclusion netting to control cabbage maggot and diamondback moth, and also on the use of selected fungal biopesticide formulations against cabbage maggot.

Getting there is only half the battle: Identifying morphological and physiological traits of the monarch butterfly associated with survival at overwintering sites

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In temperate climates, migration is a common strategy to cope with seasonal changes in weather and resources. Particularly impressive is the massive migration undertaken by the small and ectothermic North American monarch butterfly (*Danaus plexippus*). In recent years, the eastern population has seen significant declines at the overwintering sites in central

Mexico, sparking a myriad of research on the breeding grounds and the southward migration. There has however, been comparatively little work done to identify drivers of mortality, and conversely, survival at the overwintering grounds. We compared morphometrics, lipid stores, and the natal origins of both living and deceased monarchs across multiple overwintering sites for three consecutive years. As expected, lipid quantities play an important role in monarch survival throughout the overwintering period. We also found natal origins, wing loading, and percent water to be significant predictors of overwintering survival. Our results highlight traits that confer the greatest survival odds for monarchs during the overwintering period and help focus conservation efforts accordingly.

(POSTER) A Clifford for Saskatchewan.

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For over three decades Hugh Clifford's, *Aquatic Invertebrates of Alberta*, has been a standard reference for aquatic research in Alberta, adjacent provinces, states and territories. However, it is now very outdated due to the many classification changes that have occurred in the years since its publication in 1991. For the Saskatchewan fauna the book includes taxa not found in the province and does not include some that are. We are currently developing an online set of couplet-based identification keys for Saskatchewan aquatic macroinvertebrates. Additionally, as did Clifford, we include taxonomic, biological and distribution information for each group. Using a digital format enables recent information and error corrections to be incorporated relatively easily ensuring the information is current compared to traditional printed materials.

Dutch elm disease in Edmonton: Vector beetle rising

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Edmonton, Alberta's status of having the largest stand of elms in the world without Dutch elm disease (DED) is threatened since the 2024 detection of the first ever cases of DED in the city. The devastating disease is caused by the fungal pathogen *Ophiostoma novo-ulmi* Braiser. The suspected vector of the fungal disease is the invasive banded elm bark beetle, *Scolytus schevyrewi* Semenov (Coleoptera: Scolytidae). The detection and eradication of DED positive trees by the City, as well as the strategies of the City of Edmonton Forestry and Pest Management teams since then will be discussed. Focus will be on enhanced monitoring and management efforts for *S. schevyrewi*, including the recent discovery of a parasitoid using the beetle as a host.

Black fly diversity and vector potential in Arctic Canada using taxonomy, DNA, and SDMs

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Department of Biomedical Sciences, University of Guelph

The response of black flies (Diptera: Simuliidae) to climate change in northern Canada remains poorly understood, despite their role as disease and parasite vectors in other regions. We compiled 22,924 georeferenced records from Nunavut, Yukon, and Northwest Territories using historical surveys (2000–2011) and DNA barcode data from the Barcode of Life Data System (BOLD), with 90% newly digitized. Discrepancies were found between literature-reported species ranges and our dataset: Yukon (57 vs. 29), Northwest Territories (57 vs. 23), and Nunavut (31 vs. 35). We report 90 species across 9 genera, including 14 known vectors of wildlife or human disease. Four species (*Simulium tormentor*, *S. decorum*, *S. noelleri*, *S. venustum*) are known to transmit pathogens to moose, muskoxen, and caribou. Using Species Distribution Models (SDMs) under the BCC-CSM2-MR model and SSP2-4.5 scenario, we project a northward shift and 86% range expansion by 2100. Increased connectivity is expected, particularly between Northwest Territories and Nunavut. Ongoing monitoring of *Simulium* is essential to track emerging wildlife disease risks in a rapidly warming Arctic.

A Natural History Museums Role in Understanding the Past and Future Trends in Species.

Ryan Oram (1)

1. The Royal Saskatchewan Museum Natural history museums show snapshots of the world's biodiversity through their collections -permanent records of species, ecosystems and environmental changes over time. These collections are vital for understanding the natural world while supporting research, education and conservation efforts by providing unique, invaluable data not found elsewhere. These collections are also used by exhibits and programming staff to inspire curiosity and nurture an appreciation of nature for the public. The main mandate of the Royal Saskatchewan Museum (RSM) is to collect, study and preserve specimens and information that enhances information of Saskatchewan's natural history; the Invertebrate Zoology unit has a secondary mandate focused on North America's bees and wasps to better understand these ecologically important species. The RSM Invertebrate Zoology collection is composed of nearly 500,000 specimens with over 300,000 of these being bees and wasps native to North America. This talk will aim to highlight the uses and importance of museum collections to better understand both the past but also aid in understanding the future of entomology biodiversity.

Why are moths less attracted to light traps than they used to be?

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Entomologists monitor insect population trends by surveying individuals attracted to artificial lights at night with the assumption that flight-to-light behavior is not subject to change. However, emerging data suggests that entomological light traps are rapidly losing efficacy relative to other trap types, and dramatic growth in anthropogenic light pollution over the past century has been identified as a probable cause. To investigate whether light competition and/or rapid evolution have compromised light trapping as a survey method, we

compared the light attraction of urban and rural corn earworm moths (*Helicoverpa zea*) to historical behavioral records from 1967. Our results suggest that the flight-to-light response has remained relatively constant over time but is strongly influenced by environmental visual clutter, even in seemingly dark habitats. These findings call into question the use of light traps in long-term surveys, as the darkness within which they operate is rapidly deteriorating.

(POSTER) Diversity of leafhoppers in Nunavik and Arctic Quebec regions

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Leafhoppers (Hemiptera: Cicadellidae) represent a highly diverse group across Canada, particularly in Québec. However, in the northern areas of this province, their diversity remains poorly characterized. A recent initiative, *Nunavik Sentinels*, developed in collaboration with northern communities, aims to engage youth in observing, identifying, cataloging, and preserving insects and other arthropods in their environment. Here, we report the diversity of leafhoppers collected from 2018 to 2023 in this participatory science project. Insects were sampled using sweep nets and colored bowl traps, as the project was initially intended for pollinator monitoring. A total of 747 leafhoppers, both nymphs (n = 139) and adults (n = 608), were recovered. Surprisingly, the specimens identified belonged to 21 genera and 32 species, including seven species newly recorded for both the Arctic and Nunavik: *Cicadula ciliata*, *Colladonus torneela*, *Hebecephalus occidentalis*, *Latalus misellus*, *Limotettix myralis*, *Macustus grisecens* and *Soroniinus binotatus*.

~~Diversity Amidst Livestock: Assessing Rangeland Arthropod Communities~~

~~**Evan Quick** (1), Sean Prager (2), Jon Bennett (3)~~

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~~Native grassland communities in Canada are currently fragile ecosystems. Plant community simplification can alter existing ecological interactions, lead to simplification of animal communities at higher trophic levels, and reduce the quality of ecosystem services. Terrestrial arthropod communities are often reliant on plant communities for food, shelter, and reproduction. These relationships range from being general to highly specific, and mutualistic to exploitative. Consequently, shifts in plant community diversity are often reflected in their associated arthropod communities, potentially altering ecosystem services mediated by arthropods like decomposition, herbivory, pollination, and population control of other arthropod species. Species diversity between plants and arthropods is suggested to be linked; higher plant species diversity should result in more insect species, with the inverse in simplified plant communities. We examined this relationship both in rangelands across three summer months, and a plant census was done to determine local plant diversity and light~~

~~penetration. We used eDNA from the passive samples in conjunction with morphological identification to determine the insect community makeup.~~

(POSTER) Validating dynamic action thresholds for lygus bugs, aphids, and grasshoppers in lentils: a comprehensive plan.

Héctor Cárcamo (1), Sean Prager (2), Tyler Wist (3), Dan Johnson (4), Teresa Aguiar Cordero (2), Samuel Robinson (5), Timothy Schwinghamer (1), **Brendan Roy***(1), Bronwyn Taylor (1), Ethan Lang (1), Caitlin Watt (6), Joshua Leffers (7), Rob Dunn (8).

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Action thresholds inform pest management decisions and they require local validation where multiple approaches can be used. Dynamic action thresholds integrate natural enemies into decision processes. Lentil is an economically significant cash crop in southern Alberta and Saskatchewan. In different regions and years, there can be significant risk of crop infestation by aphids, lygus, and grasshoppers. To develop or validate thresholds for these pests in lentils we plan multiple studies from 2025 to 2027: laboratory studies of predators of lygus bugs/aphids (bugs), cage studies with bugs and predators, greenhouse insect-plant interaction studies, molecular determination of key predators, refinement of sampling methods, reanalysis of previous experimental data, and commercial field level insecticide trials with growers on a 200 km gradient in 3 ecoregions in southern Alberta. In this presentation, we will outline our comprehensive approach to develop action thresholds and share preliminary results from the various studies. The ultimate goal is to guide farmers toward more environmentally sustainable crop production systems that rely on conservation biological control than on chemical pesticides.

Cutworm parasitism in the province of Quebec.

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Cutworms (Lepidoptera: Noctuidae) are early-season crop pests. The larvae could be attacked by diverse natural enemies and pathogens, that can offer a potential tool for integrated pest management. However, their role in suppressing these pests remains unclear in Quebec. The effectiveness can vary with species, environmental conditions, and synchrony between the host and the natural enemies. This study aimed to identify natural enemies associated with the black cutworm (*Agrotis ipsilon*) and the darksided cutworm (*Euxoa messoria*) in Quebec, assess parasitism rates, and map the distribution of hosts and natural enemies. In 2025, cutworm larvae were collected from multiple crops and fields in

the province. Specimens were reared individually on artificial diet under controlled conditions. They were frequently observed to determine mortality causes and to identify the natural. Parasitism rates were low across surveyed sites, suggesting limited natural enemy impact on cutworm populations during the study year.

When the wind rises: weather conditions associated with the spring influxes of *Empoasca fabae* in Québec, Canada

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Empoasca fabae (Harris) is a Nearctic leafhopper species that migrates annually from its estimated overwintering area in the Southeastern United States (US) to the Midwest states and eastern Canada. In the US, the poleward-transporting synoptic weather system (PTSWS) is associated with the migration of *E. fabae*. Here, we investigated whether this weather system drives *E. fabae* influxes into Québec and if spring individuals originate from the estimated overwintering area. Our trajectory analyses suggested that warm southerly winds ($> 10^{\circ}\text{C}$) originating in the overwintering zone at 150 to 2000 m above ground level were associated with the first capture of *E. fabae*. Remarkably, the isotopic signature indicated that individuals collected during spring were likely to have originated in the estimated overwintering zone. Our study confirms that *E. fabae* spring influxes are composed of individuals born in the overwintering zone in the US, and these can reach Québec by the time of the PTSWS events.

Safety in numbers: aggregations of sleeping hymenopterans derive defense against spider predation

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Solitary hymenopterans frequently sleep in single- or multi-species aggregations. Sleeping in groups is hypothesized to provide defense against predation, but there is little direct evidence for this function. We studied sleeping insects in a coastal sand dune habitat on Vancouver Island over a three-week period in summer 2025. Here, three solitary hymenopteran species (*Ammophila azteca* Cameron, 1888, *Prionyx canadensis* (Provancher, 1887), and *Coelioxys rufitarsus* Smith, 1854) often perch together on dead plants at night. They are occasionally joined by other taxa including robber flies, damselflies, and other bees and wasps. The introduced candy-striped spider *Enoplognatha ovata* (Clerck, 1757) is a voracious predator of sleeping insects at this site. We surveyed suitable perches to document the composition of sleeping aggregations, site fidelity, and predation. Each night, about 50% of perches were

occupied by more than one individual, and we observed spider predation equally often at perches occupied by solitary and aggregated sleepers. The probability of surviving a spider attack increased with group size, providing support for the predator defense hypothesis.

Taxonomy and conservation status of *Megachile* (*Megachiloides*) Mitchell – North America's most speciose and at-risk group of leafcutter bees.

Cory S. Sheffield

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Megachiloides Mitchell is the largest subgenus of leafcutter bees in America North of Mexico, containing 57 species. The majority of species are considered among the rarest of bees in the United States, with only ten considered Secure, while 45 are considered species at-risk, 17 Possibly Extinct, with 12 others either Imperiled or Critically Imperiled. However, the taxonomy of the group is far from resolved, as 18 species are known only from the male, 39 only from the female; 84 names are available however, and at least some of these likely represent the unassociated sex of some of these species. Here I will discuss how the combined use of morphology and molecular data are helping to resolve species concepts within this subgenus, and the implications this will potentially have on future conservation status assessments.

Phenological bottleneck: what limits biological control of wheat stem sawfly (*Cephus cinctus* Norton, Hymenoptera: Cephidae) in Canada?

Timothy Skuse (1), Haley Catton (1), Héctor Cárcamo (1), Brian Beres (1), Ross Weiss (1*)

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Wheat stem sawfly (*Cephus cinctus* Norton) is a major crop pest on the Canadian Prairies. The primary natural enemy of wheat stem sawfly, the bivoltine larval ectoparasitoid *Bracon cephi* Gahan (Hymenoptera: Braconidae), may be the most important regulator of *C. cinctus* populations. However, parasitism rates are highly variable across years, hypothesized to be reliant on the success of the 2nd generation. To better understand this interaction, we created a stage-based within-season tri-trophic phenology model for *C. cinctus*, *B. cephi*, and its host plant, spring wheat (*Triticum aestivum* L.). We parameterized the model with published and unpublished data using 30-year climate normals for meteorological data. With typical wheat seeding dates, model outputs indicate 2nd generation adult *B. cephi* have a phenological overlap with suitable larval hosts of approximately 10 days, while typical adult flight periods last 30 days. Model validation is underway and, if conclusions hold true, this work quantifies the mechanism behind a long-held narrative about *C. cinctus* population regulation and may lead to avenues to reduce crop losses.

Mosquitoes as vectors of arboviruses in Saskatchewan

Loki P. Snyman (1), Jumari Snyman (2)

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Mosquitoes are effective vectors of pathogens, including in Canada. Currently, mosquito distributions, species abundance, and community assemblages are undergoing change, likely due to a changing climate and human activities altering the landscape. Consequently, mosquito-borne pathogens and the diseases they cause will undergo spatiotemporal shifts, leading to uncertain outcomes for public health. Mosquito surveillance and pathogen screening is a useful tool needed to update our basic understanding of these circulating pathogens. Mosquitoes were sampled from 10 localities throughout southern Saskatchewan from June to September in 2024. After the removal of (the majority) of *Culex* mosquitoes, approximately 16 000 mosquitoes were pooled and screened for the presence of West Nile virus (WNV) and California Serogroup virus (CSGV) RNA. CSGV RNA was present in 21/163 mosquito pools peaking in July, while RNA of WNV were detected in 11/163 pools, peaking in August. These results indicate circulating disease-causing arboviruses in Saskatchewan and will hopefully stimulate a renewed interest into the threats these viruses might hold in terms of public health.

Chromosome Translocations in the Medically Important Genus *Aedes*

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Mosquitoes are among the best studied animals on earth, owed to their irritating bites and their propensity to transmit pathogens that cause significant disease. Despite this, it is only recently that genomes outside of a handful of species have been available, as the focus of most genome projects has been on the most medically relevant species globally. Here, we present a reference genome for the eastern tree hole mosquito, *Aedes triseriatus*. This mosquito is the primary vector of La Crosse orthobunyavirus, a California serogroup virus that can cause severe encephalitis. This genome is the largest mosquito genome sequenced to date at over 1.6 gigabases and has a chromosome that is more than 600 megabases. Utilizing this genome and recently available reference genomes from across the Culicidae, we conduct a comprehensive analysis of chromosome evolution in mosquitoes. Our results indicate there are two major chromosome configurations in the genus *Aedes*, including a translocation in the lineage of *Aedes* mosquitoes that includes some of the world's deadliest disease vectors of pathogens.

Long term butterfly monitoring at two Alberta sites

Felix Sperling (1)

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Insect biodiversity loss has been reported globally and received substantial recent scientific and public attention. However, long term surveys are uncommon. I have monitored butterfly species and numbers at two sites in Alberta, each of which has undergone varied changes in

butterfly diversity. My 60-year survey of butterflies at Fish Butte in the foothills west of Calgary is located at an ecotone between mountain, prairie and remnant boreal habitats. Some species have cycled in numbers, but this was only evident with long term monitoring. A second site at Itaska, Pigeon Lake, has received intensive surveys for 26 years. Evidence for the effect of global climate change on butterfly diversity is limited, with transformations via ecological succession and external land management, including road drainage and fire prevention. At both sites, long term trends were overshadowed by yearly variation due to local weather combined with logistic limits on surveys, with some trends requiring monitoring over decades to discern.

(POSTER) Laboratory trials with Clean Works technology on multicoloured Asian lady beetle (MALB), a pest in Niagara's vineyards

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Harmonia axyridis (Pallas) has become a contamination pest in Ontario's vineyards. Beetles are harvested with grape clusters, and they are crushed during wine processing, releasing chemicals that alters the taste and quality of the wine produced, leading to ladybug taint. The industry has a zero-tolerance policy for lady beetles in grapes intended for juice & wine production. While insecticides are effective at reducing the number of ladybugs in vineyards, sustainable alternatives are desired. Clean Works Inc. developed a patented technology that generates hydroxyl radicals ($\bullet\text{OH}$), using UV-C light, hydrogen peroxide (H_2O_2) and ozone (O_3). We tested various treatments of Clean Works technology on adult MALB mortality and egg hatchability in laboratory trials. We found that 5% H_2O_2 , 0.9 mJ/cm² UV-C, 7.5 ppm O_3 with 30 second exposure+ 80 mL/min spray rate of H_2O_2 led to a decline in adult survival and egg hatchability post treatment. Further laboratory and vineyard trials are needed to determine if this technology can be a potential tool for managing MALB populations in vineyards.

(POSTER) Mitochondrial Clues to Leafhopper Migration in the Americas and Arctic Canada

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Understanding the origins and migration routes of agricultural pests is essential for predicting outbreaks and implementing effective management strategies. Our lab is investigating the use of mitochondrial genome sequencing to study the migration and population structure of leafhoppers (Cicadellidae), a group of insects increasingly associated with phytoplasma spread in Eastern Canada. This project focuses on two model species with distinct ecological and geographic patterns. First, *Dalbulus maidis*, a specialist maize pest recently detected in Québec for the first time, will be compared to populations from Brazil, Oklahoma, Iowa, and Missouri to explore its potential long-distance migration from South to North America. Second, we investigate *Macrosteles quadrilineatus*, a more generalist leafhopper, whose presence has been consistently recorded in Québec strawberry fields since 2021. We will compare Québec samples from 2021-2024 with individuals collected in Nunavik (Arctic Québec) from 2018 to 2024 to test for northward migration patterns. Together, these two models will help us assess how mitochondrial genomics can clarify leafhopper movement and improve pest forecasting under climate change.

Crop pests in agricultural landscapes: damage prediction using land use and mapping hazard

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Effective pest management requires an understanding of how agricultural landscapes influence crop vulnerability. We present a predictive model for rice damage caused by *Stenotus rubrovittatus*. This model is based on land use patterns within a 300-meter radius of rice fields and does not use pest abundance data. This model generates hazard maps that guide pesticide use and labor allocation. The model has been successfully applied in northern Japan and is currently being adapted for another key pest in southern regions. By incorporating multiple species, we aim to develop a comprehensive prediction system that supports decision-making in various agricultural settings. Our approach allows stakeholders to visualize risk spatially and temporally, thereby improving the efficiency of pest control strategies. In addition to its practical applications, this method contributes to landscape ecology by linking pest dynamics with land use structure. This presentation will explore leveraging spatial data and landscape features to forecast pest risks, allocate resources more effectively, and enhance the resilience of crop production systems in the face of changing environmental conditions.

The challenges of biodiversity research in the Philippines – application to Canada

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It is not easy to imagine two countries more different than the Philippines and Canada. Our recent collaborative biodiversity research in the Philippines reveals surprising applicability to “a large, ecologically diverse country”. While our field work in the Philippines yielded several new Entiminae weevils (genus *Metapocyrtus* Heller, 1912) that will be briefly introduced, probably more significant are the broader insights applicable to biodiversity studies in Canada and world-wide. Through this presentation I am going to express systematised challenges we faced. Once well articulated and understood, these challenges can be overcome and efficiency of future biodiversity studies increased.

(POSTER) The spread and damage of *Aulacaspis yasumatsui* (Hemiptera: Diaspididae) in Okinawa Island, Japan - Can *Aulacaspis yasumatsui* hitchhike on *Luthrodes pandava* ?

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Cycas revoluta in Kunigami village, Okinawa Island became infested with *Aulacaspis yasumatsui*, the cycad aulacaspis scale (CAS), in 2023, following an earlier report of an invasion of Amami Oshima, Japan. Prior to this invasion, the most common pest of *C. revoluta* in the urban landscape was the cycad blue butterfly, *Luthrodes pandava* (formerly *Chilades pandava*), which continues to defoliate plants throughout Okinawa Island. Here, we clarify the distribution and damage of CAS in Okinawa Island. We also consider the possible spread of CAS crawlers by hitchhiking on *L. pandava*. Among the 1,426 trees surveyed on Ie Island, Iheya Island, Kurima Island, Tarama Island, Okinawa Island, and adjacent islands, there were 536 infested trees on Okinawa Island alone. Ninety-two female and 155 male *L. pandava* adults were collected in Okinawa Island, and no CAS crawlers were found on their bodies. This finding showed that movement of CAS crawlers to new geographic areas in Japan and to Okinawa Island is unlikely to occur by way of hitchhiking on *L. pandava*.

The pest wireworm complex in Canada: developing new tools for identification and management

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Wireworms—the soil-dwelling larval stage of click beetles (Elateridae)—are notable pests of potatoes, cereals, corn, and field vegetables worldwide. Recent surveys have identified approximately 20 pest species in Canada, the distribution of which varies per agricultural region, and often per field. We present an update on recent work, in particular on the identification of sex pheromones of native species and the development of molecular tools for identification. Work on both projects has considerably advanced our understanding of this pest complex, revealing unexpected differences and similarities between species, and facilitating the development of new management tactics.

Wild bee assemblages and pollen use in Canadian blueberry fields

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Across Canada, blueberries represent an industry valued at over \$533 million annually. Critical to the production of blueberry in Canada is pollination, and growers spend thousands each year importing managed bees to their fields. Unmanaged bees provide pollination services for free, and are typically more efficient pollinators of blueberry. One way to attract wild bees to stay and nest in and around blueberry fields is to ensure that there is enough food to eat across the season. To better understand what pollen is preferred by wild bees, we netted bees in blueberry fields from NB, NS, NL, QC and BC in 2024 at multiple time points across the season. In addition to identifying the bees, we also removed and metabarcoded the pollen they were carrying to look at how pollen use differed across species, time of the year and growing region. Each region showed shifts in pollen use across the season, with blueberry pollen being the dominant pollen type collected during crop bloom. This season we will track pollen use across the sprout year in low-bush blueberry, when there are no blueberry flowers in the field.

(POSTER) Dusting Off the Data: Unlocking Historical Mosquito Records to Monitor Arctic Change

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In the warming Arctic, rising mosquito-borne pathogen risks are exacerbated by the absence of standardized baseline data. In collaboration with the Government of the Northwest

Territories (GNWT), we are developing a project that gives a second life to forgotten mosquito data. Currently in its planning phase, this initiative will recover and standardize records from GNWT's 20-year mosquito surveillance program. These records will be standardized and shared through public platforms to support long-term monitoring and public health preparedness. Our objective is to optimize mosquito surveillance data by showcasing how historical datasets can be revitalized to support present-day research. In addition to unlocking the value of past collections, the project will help standardize future mosquito sampling efforts. We also aim to build tools that support data ownership and identification capacity in the region, including an image-rich identification key for mosquito species most relevant to the NWT. By combining archival data and local expertise, this project offers a scalable model for strengthening mosquito surveillance and vector-borne disease preparedness across northern Canada.

Expanding knowledge of mosquito (Diptera: Culicidae) and California serogroup viruses distributions in the North American Arctic

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Climate change is reshaping Arctic ecosystems, increasing the risk of vector-borne diseases such as Jamestown Canyon virus (JCV) and Snowshoe Hare virus (SSHV). Data on Arctic mosquito populations and CSG prevalence remain scarce. We conducted a three-year surveillance program at eight sites in northern Canada and the United States, engaging local community members in standardized mosquito collection. From 4,038 specimens, we identified 18 species, 17 from the genus *Aedes*. We documented new distribution records for *Aedes euedes*, *Aedes implicatus*, and *Aedes spencerii*. JCV was detected in 10 species across seven sites, SSHV in one species at one site. JCV was found for the first time in *Ae. euedes*, *Aedes impiger*, and *Aedes pionips* in North America, and detected in Cambridge Bay, Nunavut, where only three mosquito species are present, none previously recognized as JCV vectors. This suggests possible undocumented vectors or new transmission roles for Arctic mosquitoes. The broad occurrence of JCV indicates widespread enzootic transmission, underscoring the need to reassess Arctic mosquito vector potential in a changing climate.

Subspecies Delimitation of *Tharsalea mariposa*: An Integrative Approach

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Subspecies are frequently used as operational units in taxonomy and conservation, yet they are often poorly defined and based on limited evidence. To address this, this study examines

subspecific boundaries within the North American lycaenid butterfly *Tharsalea mariposa* using an integrative approach that combines both double-digest restriction-site associated DNA sequencing (ddRADseq) and morphological analyses. Our results provide strong support for the distinctiveness and validity of several subspecies, including *T. m. makah*, which has recently garnered conservation interest, while casting doubt on the legitimacy of others. In doing so, this study underscores the value of genomic data in evaluating subspecific classifications and offers critical insights to guide conservation efforts.

A putative red alder decline complex and implications for forest management: Case study from a municipal water supply area in southwestern British Columbia

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Riparian and early seral ecosystems in the Pacific Northwest of North America are dominated by red alder, *Alnus rubra*, an ecologically important, nitrogen-fixing hardwood tree species. Our recent work suggests that a scolytine beetle–fungus complex, consisting of the alder bark beetle, *Alniphagus aspericollis*, eleven species of ambrosia beetle, and associated fungi is contributing to the decline of red alder throughout southwestern British Columbia, Canada. We chose to investigate putative red alder decline within the Greater Victoria Water Supply Area (GVWSA; southern Vancouver Island, British Columbia), a protected, Douglas-fir dominated watershed that contains scolytine-affected red alder. The first objective of this study is to quantify the abundance, distribution, and health of red alder within the GVWSA. We installed scolytine traps and 20 400m² fixed-area plots throughout the 20,550 ha GVWSA in summer 2025 to quantify red alder conditions across the landscape. These data will be used to construct a predictive alder bark beetle susceptibility model for red alder within the GVWSA that will inform future forest management and watershed protection

Evaluating the benefits and risks of biological control agents for managing hemlock woolly adelgid in North America

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The hemlock woolly adelgid is an invasive pest of eastern hemlock. Biological control efforts have released predatory beetles and flies but with limited control. We determined the Benefit Risk Index (BRI) for the four most-used biological control agents (BCAs): *Laricobius nigrinus*, *L. osakensis*, *Lecotaraxis argenticollis*, and *Le. piniperda* using parameters from the literature. The BRI uses the value of native biodiversity as a metric to assess the risk versus benefit of BCAs by considering four categories: (1) dynamics of HWA populations, (2) the impact of introduced BCAs, (3) native species benefiting from HWA suppression, and (4) native species at risk from BCAs. All parameter estimates produced negative BRI values indicating net ecological risks for the four BCAs both individually and collectively. Sensitivity analyses found that positive BRI values (i.e., benefits outweigh

risks) occurred when BCA impact on HWA was increased, greater conservation value was assigned to eastern hemlock and non-targets, or stronger indirect interaction effects assumed. These findings guide the selection of BCAs for HWA to conserve eastern hemlock.

(POSTER) Comparison of two extraction methods for insect recovery from cattle dung

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Efficient recovery from cattle dung pats is crucial for studying dung-associated insect communities. In past studies, we recovered insects by placing dung pats in pails with mesh sleeves and aspirating out emergent insects (pail method) at repeated intervals. This method is effective but time-consuming. As an alternative, we tested a tub method adapted from a design used to recover saproxylic insects from wood. This latter method uses tubs with attached bottom- and side-mounted vials to passively collect insects, eliminating the need for repeated manual collection. In comparison to pails, a greater abundance, richness and diversity of insects were recovered with tubs ($p < 0.001$) although no difference was detected for recovery of individual taxa ($p > 0.05$). For tubs, a greater abundance, richness and diversity of insects were recovered from vials mounted to the bottom than on the side ($p < 0.001$). Recovery of individual taxa (beetles, flies, wasps) either showed no difference (6 cases) or was greater ($p < 0.05$) for bottom-mounted vials (14 cases) prior to Bonferroni adjustments.

Possible strategies for urban pollinator conservation: targeting real estate to enhance pollinator habitat

Sydney Worthy

Alberta Native Bee Council

Turf lawns have been pinpointed as biological “green deserts” but remain pervasive because of the perceived value of turf lawns on home prices, so much so that 50-70% of urban green spaces globally are turf lawns. Despite known benefits such as flood control, reduced water usage, weed control, reduced care and maintenance, and providing pollinator habitat, a paradigm shift is needed to improve the perception and adoption of native lawn alternatives. We are developing a web-based app that educates land developers and homeowners on the benefits of native lawns and the strategies to implement them to improve pollinator habitat, while also allowing users to input their personal preferences to design their ideal pollinator-friendly lawn in a way that preserves home value.

Effects of Non-Native Flowers on Pollinator Visitation to Native Flowers in Aspen Parkland Grassland and Restoration Sites.

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In revegetated grasslands, planting native flowers is often recommended to promote pollinator

habitat. However, existing non-native flowers may also provide floral resources reduce visitation to native plants through competition, often due to larger or more rewarding floral traits. Similarity in floral traits may ameliorate or exacerbate interactions between native and non native species. We examined flower visitor preference between paired native and non-native flowers of similar color and structure in an intact and a revegetated grassland in the Aspen Parkland. Using potted plant trials, we recorded all insect flower-visitor species to both potted and existing flowers before and after placement of the potted plants, and evaluated the effect of non-native flower cover on visitation to native plants. Results indicated that some non-native species diverted visitors from native species, suggesting competitive effects, whereas others increased visitation to native flowers, indicating potential facilitation. This demonstrates that the effect of non-native flowers on plant–visitor interactions is complex, with important implications for revegetation planning and pollinator conservation.