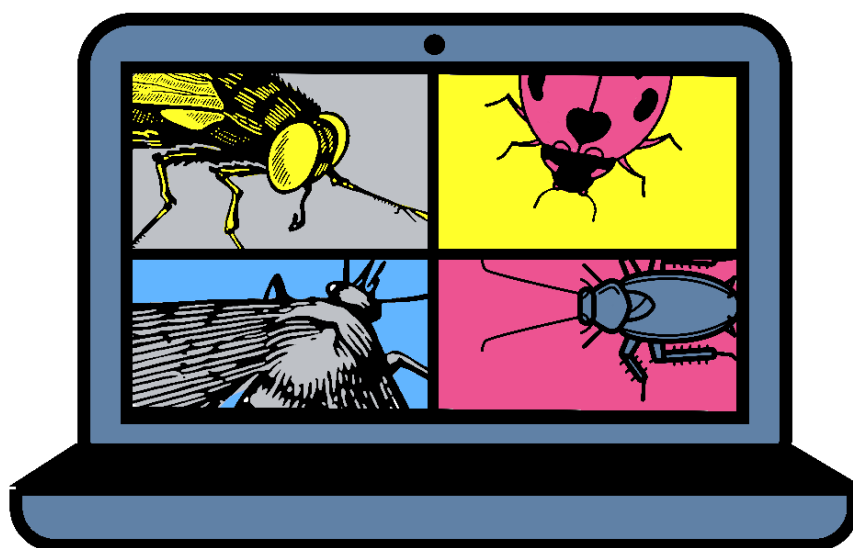




The Acadian
Entomological Society



Tentatively Out of Torpor

The 79th Annual Meeting /
79e Réunion Annuelle

Dalhousie University Agricultural Campus
Truro, Nova Scotia – 22 July 2022

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President's Welcome

It is a great pleasure to welcome you all to the Dalhousie University Agricultural Campus in Truro, Nova Scotia, for the 79th Annual Meeting of the Acadian Entomological Society.

Our theme for this year's meeting is "Tentatively Out of Torpor". We chose this theme as a play on our collective Covid-19 experiences – including shut-downs, isolations, reduced activity, mental toll, and lethargy – and the many aspects of insect life history related to entering, enduring, and emerging from torpor. Bearing in mind that we certainly do not have the Covid-19 pandemic completely behind us, I for one am very pleased that we are at least tentatively out of our Covid-19 torpor period, and now can more safely engage with our family, friends, and colleagues.

I am very excited we are hosting our first in-person AES meeting in three years. Scientific societies work best when members connect face-to-face. Zoom and Teams meetings work great (as per our logo!), but it is in-between formal sessions and presentations where so much important informal AES business takes place – everything from personal catch-up conversations with old friends, to brainstorming of new ideas with trusted colleagues, and introducing ourselves to new members and forging new collaborations. These are just some of the reasons in-person meetings are so useful and enjoyable.

Like many aspects of life, the AES feels like it has largely been on pause the past three years. This annual meeting will hopefully serve as a bit of reset for us, enabling society business to get back on track, while openly sharing our knowledge, discoveries, and ideas, and strengthening our collegiality. This is critical as we serve as a critical voice and vehicle for entomology in Atlantic Canada. Let's all work to ensure we continue to strengthen the presence and impact of the Acadian Entomological Society.

Thank you all for coming to Truro, and for your valued contributions to the Society. Enjoy the meeting!

Chris Cutler
President

Acadian Entomological Society, 2021-2022

Program

Friday, July 22

8:00-8:30	Registration
8:30-8:35	Land Acknowledgement, Opening remarks

Keynote Address

Moderator	Chris Cutler
8:35-9:15	A long winter's nap – with company: why infection matters for overwintering insects and ticks Dr. Laura Ferguson

President's Prize Oral Session I

Moderator	Chris Cutler
9:15-9:30	1. Thermal immune performance in juveniles and adults of the mosquitoes, <i>Aedes aegypti</i> and <i>Culex pipiens</i> Emma Rand
9:30-9:45	2. A special kind of flash mob - The role of semiochemicals in mass outbreaks of <i>Mythimna unipuncta</i> Sarah Koerte
9:45-10:00	3. Investigating chemoreception and behavioural responses of <i>Tetranychus urticae</i> Koch to naturally-based repellents and acaricides Kayla Gaudet
10:00-10:15	4. Detecting the spread of invasive mosquitoes and disease potential in Nova Scotia Taylor Swanburg
10:15-10:30	5. Field crickets as weed control agents in wild blueberry systems Janelle MacKeil

10:30-10:45 **Break**

President's Prize Oral Session II

Moderator Kirk Hillier

10:45-11:00 **6. Effects of imidacloprid basal bark sprays for hemlock woolly adelgid (*Adelges tsugae*) control on non-target pollinator communities in old eastern hemlock (*Tsuga canadensis*) forests in southwest Nova Scotia, Canada**
Luca Voscort

11:00-11:15 **7. How far can a fly fly? Spatial distribution of sarcosaprophagous *Diptera* in key habitats of Greater Moncton**
Denis R. Boudreau

11:15-11:30 **7. Identification of compounds produced by male hairpencil glands of Heliiothinae (Lepidoptera: Noctuidae) and their role in male autodetection and female mate acceptance**
Sandunika Ranmini Mullegama

11:30-11:45 **9. Characterizing pollen loads of wild bees in lowbush blueberry fields (*Vaccinium angustifolium* Aiton) during bloom using DNA metabarcoding**
Katherine Rutherford

11:45-12:00 **10. Phenotypic and molecular responses in a beneficial insect predator stimulated by mild stress**
Rachel Rix

12:00-13:30 **Lunch**

12:30-13:30 President's Poster Session I

Regular Session I

Moderator Laura Ferguson

13:30-13:45 **11. Using digital "bycatch" to advance natural history in all types of ecosystems**
Paul Manning

- 13:45-14:00 **12. Bumble bee community composition across agricultural and forested landscapes in Maritime Canada**
Jess Vickruck
- 14:00-14:15 **13. Potential of a commercial *Beauveria bassiana* strain against the European fire ant, *Myrmica rubra***
Barry Hicks
- 14:15-14:30 **14. Cold tolerance of the apple maggot fly and its endoparasitoid wasps**
Jantina Toxopeus
- 14:30-14:45 **15. Ticks in the Maritimes: A 10 year summary of ticks and tick-borne pathogens in the Canadian Maritimes**
Vett Lloyd
- 14:45-15:15 **Break**

14:45-15:15	President's Prize Poster Session II
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Regular Session II	
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- Moderator Chris Cutler
- 15:15-15:30 **16. Combined effect of essential oil constituent and vegetable oil for aphid and mite control**
Seyed Ahsaei
- 15:30-15:45 **17. Horizontal and vertical movement of wireworms, *Agriotes sputator* (Coleoptera: Elateridae) through soil.**
Christine Noronha
- 15:45-16:00 **18. Early Intervention Strategy for spruce budworm: Can we contain outbreak spread?**
Sara Edwards
- 16:00-16:15 **19. The prevalence of bee diseases in bumble bees from Labrador**
Barry Hicks
- 16:15-16:30 **Closing remarks**

AES Annual Business Meeting

16:30-17:30 **AES Annual Business Meeting**

18:00 **Dinner**

AES Executive 2021-2022

PRESIDENT	Dr. Chris Cutler
VICE PRESIDENT	Dr. Md Habibullah Bahar
PAST PRESIDENT	Dr. Gaétan Moreau
REGIONAL DIRECTOR TO THE ESC	Dr. Jess Vickruck
SECRETARY–TREASURER	Dr. Sara Edwards
JOURNAL EDITORS	Dr. Sara Edwards, Dr. Rob Johns
NL REGIONAL REPRESENTATIVE	Dr. Carolyn Parsons
NS REGIONAL REPRESENTATIVE	Dr. Suzanne Blatt
WEBMASTER	Rylee Isitt

Organizing Committee

Dr. Chris Cutler	Dalhousie University
Dr. Paul Manning	Dalhousie University
Rachel Rix	Dalhousie University
Janelle MacKeil	Dalhousie University
Dr. Seyed Md Ahsaei	Dalhousie University
Jared Verge	Dalhousie University
Dr. Sara Edwards	University of New Brunswick

Oral presentation abstracts / Résumés des présentations orales

1. Thermal immune performance in juveniles and adults of the mosquitoes, *Aedes aegypti* and *Culex pipiens*

Emma Rand, Todd Smith, Laura Ferguson
Acadia University

Climate change is likely to have disparate impacts on immune activity within and among species as temperature creates many physiological challenges and opportunities that can suppress or enhance ectotherm immune activity. To determine if variation in the immune response occurs and whether it may arise from variation in thermal environments and life histories, I compared the thermal performance of the insect immune system between juvenile and adult life stages of *Aedes aegypti* by measuring melanization and encapsulation responses. *A. aegypti* larvae exhibited their greatest melanization and encapsulation responses at 26°C and declined thereafter; in contrast, adult melanization plateaued from 26°C to 32°C, and encapsulation plateaued from 18°C to 32°C. Adults relied more heavily on encapsulation, whereas larvae produced stronger melanization responses, suggesting the immune system responds to the environment differently depending on life stage. Understanding this variation is essential for predicting how insects will survive infection under changing thermal environments.

2. A special kind of flash mob - The role of semiochemicals in mass outbreaks of *Mythimna unipuncta*

Sarah Koerte, N. Kirk Hillier
Acadia University

Throughout North America, the true armyworm moth, *Mythimna unipuncta* (Haworth) (Lepidoptera: Noctuidae), is infamous for its sporadic mass outbreaks during which the enormous numbers of its herbivorous larvae cause considerable economic damage to cereal and forage crops. Little is known on how the migratory moths synchronize oviposition timing or why females oviposit in close vicinity to each other, initiating large outbreak populations. In this study, we want to learn more about semiochemicals controlling armyworm behaviour, especially of the female moths. In Electroantennograms (EAGs) we tested different volatile organic compounds found in the environment of the armyworm for their antennal response profile. Furthermore, we recorded the antennal response of adult moths to host plant volatiles or plant extracts using Gas Chromatography–Electroantennographic detection (GC-EAD). In bioassays, we characterized the behavioural relevance of semiochemicals that elicited electrophysiological responses in EAGs or GC-EADs. For this we conducted wind tunnel experiments and oviposition assays.

3. Investigating chemoreception and behavioural responses of *Tetranychus urticae* Koch to naturally based repellents and acaricides

Kayla Gaudet, N. Kirk Hillier, Nicoletta Faraone
Acadia University

Tetranychus urticae Koch (two-spotted spider mite) is a globally-distributed multi-host agricultural pest that has developed resistance to a variety of synthetic pesticides. The present study focuses on assessing the potential of plant-derived products as repellents. A novel electrophysiological approach (electrotarsography) was developed to record olfactory sensitivity of *T. urticae*. Additionally, a novel two-choice behavioural assay was designed to determine whether *T. urticae* is attracted or repelled by selected compounds. Using Gas Chromatogram-linked to electrotarsographic detection (GC-ETD), we determined that *T. urticae* is sensitive to terpenoids commonly found in essential oil mixtures, as well as carboxylic acids and a series of aldehydes, which are typically detected by ionotropic receptors. To further identify compounds of behavioural relevance for *T. urticae*, collections of volatiles from mites were made using thermal desorption linked with GC-MS analysis. The study provides novel insight to identify behaviourally relevant chemical cues for the development of mite control strategies.

4. Field crickets as weed control agents in wild blueberry systems

Janelle MacKeil, G. Christopher Cutler, Scott N. White
Dalhousie University

Weeds are a major limiting factor in commercial wild blueberry production and the need for economical viable management techniques continues to be of vital importance. *Gryllus pennsylvanicus* (Gryllidae), are post-dispersal seed consumers, common in wild blueberry fields. Field experiments revealed *G. pennsylvanicus* was active for 14 weeks, peaking in mid-August, coinciding with the seed rain of economically destructive weeds. Spatial population dynamics of *G. pennsylvanicus* did not change with increasing distance from field edge and did not migrate within the field. Laboratory no-choice feeding studies revealed *G. pennsylvanicus* consumes seeds (0.057 –1.9 mg). An average of 449 hair fescue seeds, per cricket, over 120 hours were consumed with an estimated final constant feeding rate of 65.5 seeds/day. These findings suggest that seed consumption by *G. pennsylvanicus* in wild blueberry fields, when used in conjunction with an integrated weed management plan, may influence weed emergence providing a valuable and sustainable ecological service.

5. Detecting the Spread of Invasive Mosquitoes and Disease Potential in Nova Scotia

Taylor Swanburg
Acadia University

Shorter, warmer winters linked to climate change in Nova Scotia are inviting non-native mosquito species and the diseases that they vector. To understand the human health and ecosystem impacts of these invasions, we must establish regular monitoring of mosquito populations. To assess the current risk, we sampled adult mosquitoes from 40 CDC light trap locations and collected mosquito larvae from 232 water sources. To determine if we could detect invasive mosquitoes through DNA in the environment, we collected water from 34 sites and will use Next-Generation Sequencing to identify species presence. Of the 4,370 mosquitoes collected, we identified 30 species with four not previously recorded in Nova Scotia. Additionally, we observed the province-wide range expansion of the invasive species *Aedes japonicus*. Overall, the diversity of mosquitoes in Nova Scotia appears to be increasing, highlighting the potential for increases in vector-borne disease transmission as climate change progresses.

6. Effects of Imidacloprid Basal Bark Sprays for Hemlock Woolly Adelgid (*Adelges tsugae*) Control on non-target Pollinator Communities in old Eastern Hemlock (*Tsuga canadensis*) Forests in southwest Nova Scotia, Canada

Luca Voskort
Acadia University

Hemlock woolly adelgid (HWA), is an invasive pest that threatens eastern hemlock forests in Nova Scotia. In the United States, the impacts of HWA are controlled with basal bark sprays of the neonicotinoid imidacloprid to infested trees. There has been considerable research on the impacts of imidacloprid on non-target pollinators in agroecosystems but little in forest ecosystems. We are assessing non-target effects of imidacloprid basal bark sprays on two pollinator groups; bees and flower flies. Four sites were established in southwestern Nova Scotia to sample pollinators in treated and untreated stands using pan traps, blue vane traps, and sweep netting. Plant material was collected from treated sites and examined for residues of imidacloprid and its metabolites. In 2021, we collected 195 bees and 366 flower flies. We plan to compare the diversity, abundance, and species assemblages between treated and untreated stands and between sample years in treated and untreated controls.

7. How far can a fly fly? Spatial distribution of sarcosaprophagous *Diptera* in key habitats of Greater Moncton.

Denis R. Boudreau, Gaétan Moreau
Université de Moncton

Although they affect most parameters that influence insect presence and development, spatial and scale effects are not normally considered in forensic entomology. We documented the spatial dynamics of sarcosaprophageous Calliphoridae species in the greater Moncton area of New-Brunswick using smoothing/interpolation techniques and semivariograms. Results indicated that the regional aggregation patterns differed among species and that the spatial relationships between species varied between aggregation and spatial anticorrelation. These results have either reinforced already known ecological knowledge or shed light on potential ecological mechanisms still unknown in forensic entomology. Overall, this study suggested that even within a restricted timescale, the spatial dynamics of Calliphoridae can operate at many scales, manifest in different patterns, and be attributed to multiple different causes. Forensic entomology and general ecology have much to benefit from the use of spatial analysis because many important questions, both at the fundamental and practical levels, require a spatial solution.

8. Identification of compounds produced by male hairpencil glands of Heliiothinae (Lepidoptera: Noctuidae) and their role in male autodetection and female mate acceptance

Sandunika Mullegama, N. Kirk Hillier
Acadia University

Due to the economic importance of Heliiothine moths, sex pheromones of many species have been studied for development of integrated pest management techniques. Male sex pheromones are associated with abdominal hairpencil structures which are often function in courtship or attract females. My study examines the composition, detection and behavioral role of male *Helicoverpa zea* hairpencil compounds in male autodetection and in courtship. Comparative examination of hairpencil blend composition of male *H. zea* and *Heliothis virescens* revealed subtle differences in pheromone blend composition. Electrophysiological testing demonstrated broad antennal neuron response of *H. zea* to nine stimuli. Behavioral assays suggested that odors released by male hairpencils are important in mate acceptance by female *H. zea* and may play a role in mate choice and species isolation. Wind tunnel observations indicate that key *H. zea* hairpencil odors function in mate competition, antagonizing responses of downwind conspecific males following a female sex pheromone plume.

9. Characterizing pollen loads of wild bees in lowbush blueberry fields (*Vaccinium angustifolium* Aiton) during bloom using DNA metabarcoding

Katherine Rutherford¹, Nancy McLean¹, Scott White¹, David McCorquodale², Robert Beiko¹

¹Dalhousie University

²Cape Breton University

Wild bees are a natural resource which are reported to be more efficient pollinators of lowbush blueberry (*Vaccinium angustifolium* Aiton) than honey bees (*Apis mellifera* Linnaeus). Conservation of wild bee communities helps to ensure sustainable pollination of lowbush blueberry. The objective of this research was to characterize wild bee pollen loads, specifically to identify the wild bees carrying lowbush blueberry pollen. Bee-associated pollen from 451 wild bees was sequenced using DNA metabarcoding. *Vaccinium* spp. pollen was present on 96% of captured bees and 52% of pollen loads were solely *Vaccinium* spp. Ericaceae (including non-blueberry), Rosaceae and Sapindaceae were frequent in pollen loads. Wild bees carrying *Vaccinium* spp. pollen included: *Andrena carolina* Viereck, *Andrena carlini* Cockrell, *Andrena nivalis* Smith, *Bombus bimaculatus* Cresson, *Bombus impatiens* Cresson, *Bombus perplexus* Cresson, *Bombus ternarius* Say, and several species from the genus *Lasioglossum*. Results indicate that supporting wild bees may increase pollination of lowbush blueberry.

10. Phenotypic and molecular responses in a beneficial insect predator stimulated by mild stress

Rachel R. Rix, G. Christopher Cutler
Dalhousie University

Traditional models of toxicology have failed to capture the biological complexity of low dose effects of toxicological agents on organisms and the environment. The hormetic model, whereby low dose exposures to toxins stimulate biological processes, is a common occurrence in the toxicological literature. Stimulatory effects on growth, reproduction, longevity, survival, and increased stress tolerance are ubiquitous in insects. We examined imidacloprid-induced hormesis on the beneficial insect predator, *Podisus maculiventris*, looking at survival and reproductive traits in insects exposed as nymphs or adults, and subsequent effects across generations. We further explored how hormesis manifests in insects at the molecular level through a systematic literature review, and a more specific transcriptome analysis of *P. maculiventris*. Overall, we observed that reproduction may be stimulated in *Podisus* with varying tradeoffs. Patterns in the molecular responses associated with hormesis consist of coordination of genes associated with chaperones and DNA repair, detoxification, and growth and reproduction.

11. Using digital “bycatch” to advance natural history in all types of ecosystems

Paul Manning
Dalhousie University

Many ecologists have lamented the decline of natural history emphasis in scientific research. Others have argued that this apparent decline is concurrent with a shift in how we think about natural history research, with the ongoing development of “next-generation natural history”. This presentation will draw on case-studies, to explore how next-generation natural history (data collected and collated through the platform iNaturalist) can be used to advance scientific knowledge. In the first, I explain how crowd-sourced data can improve understanding of large-scale biotic changes across urban ecosystems. In the second, I show how natural history data can improve coverage of ecological interaction networks. In the third, I share how iNaturalist data can be leveraged for pedagogical purposes through building competencies in exploring and managing data. I share a simple framework for recording and sharing natural history data and argue that sharing “digital bycatch” can have wide-reaching benefits for advancing scientific knowledge.

12. Bumble bee community composition across agricultural and forested landscapes in Maritime Canada

Jess Vickruck¹, Naomi Meed², Pamela MacKinley¹, Stephen Heard²

¹ Agriculture and Agri-Food Canada, Fredericton NB

² University of New Brunswick

The conversion of natural habitat to agricultural land has a well-documented negative impact on wild bees, but most previous work has been completed in Prairie settings. The province of New Brunswick is composed of more than 80% forest. To better understand how habitat type impacts bumblebees across this landscape, we sampled at 43 sites spanning tilled agriculture, pasture, forest and wetland across NB in 2020. In spring, bumblebee abundance was similar across habitat types; however sites in tilled agriculture and pasture had a higher species richness than sites in forest and wetland. This was driven by the presence of parasitic species at disturbed sites. Our results suggest that the conversion of forested landscapes to agricultural land may attract bumblebees. These results could have important implications for wild bee conservation. Clearcutting a forest may attract bees, but could also act as a sink if it increases exposures to pesticides and pathogens.

13. Potential of a commercial *Beauvaria bassiana* strain against the European fire ant, *Myrmica rubra*

Barry Hicks
College of the North Atlantic

The European Fire Ant (EFA) is a troublesome stinging ant in Atlantic Canada and elsewhere. Presently in Canada, there are limited control options for homeowners and pest control operators. The purpose of this research is to determine the potential of a commercial strain of *Beauvaria bassiana* against EFA. Laboratory studies show that BioCeres (Anatis Bioprotection) reduces the numbers of ants in small colonies both when sprayed as a wettable powder or as a granular application.

14. Cold tolerance of the apple maggot fly and its endoparasitoid wasps

Trinity McIntyre¹, Lalitya Andaloori², Glen Ray Hood³, Gregory J. Ragland², Jantina Toxopeus³

¹St. Francis Xavier University

²University of Colorado Denver

³Wayne State University

Many insect species in temperate climates have evolved strategies to survive temperatures below 0°C during winter. While cold tolerance has been studied in individual species, very little investigation has been done with respect to coevolving or competing species. The apple maggot fly, *Rhagoletis pomonella*, is coevolving with at least three endoparasitoid wasps (*Utetes canaliculatus*, *Diachasmimorpha mellea*, and *Diachasma alloeum*). In this study, we characterized and compared the cold tolerance of the three endoparasitoid wasp species from a population in Denver, Colorado. We determined that larvae of all three species can survive to extreme low temperatures (c. -18°C) for brief periods by preventing internal ice formation, similar to their host *R. pomonella*. Prolonged chilling at mild temperatures (4°C) caused high wasp larva mortality in all three species. There was little interspecific variation in wasp cold tolerance, suggesting that differences in overwintering ability are unlikely to affect competition among these endoparasitoid wasps.

15. Ticks in the Maritimes: A 10 year summary of ticks and tick-borne pathogens in the Canadian Maritimes

Vett Lloyd
Mount Allison University

Ticks are obligate hematophagous arthropods and transmit a greater variety of pathogens than any other arthropod. Climate change, land use changes and many other factors have led to a global increase and range expansion of ticks – the Canadian Maritimes are no exception. Data from the past 10 years of tick surveillance and testing show increasing numbers of tick recoveries, range expansion of *Ixodes scapularis* (the black-legged tick), which is a vector for the *Lyme borreliosis* pathogens, an increasing diversity of other pathogens in this species, range expansion of *Dermacentor varibilis* (American dog/wood tick), which is the vector for spotted fever and tularemia pathogens among others and some surprising tick visitors “from away” that highlight the global mobility of ticks.

16. Combined effect of essential oil constituent and vegetable oil for aphid and mite control

Seyed M. Ahsaei, G. Christopher Cutler
Dalhousie University

Control of aphids and mites continued to rely heavily on the use of synthetic insecticides, but biological control as well in greenhouse. In this study we investigated the efficacy of a combination of an essential oil constituent and vegetable oil against *Myzus persicae*, *Tetranychus urticae* and their natural enemies, *Orius insidiosus* and *Podisus maculiventris*. Direct contact and residual contact assays were performed in a growth chamber and under greenhouse conditions. In direct contact bioassays, the formulation can cause 100 percent mortality in treated aphids under lab and greenhouse conditions 24 hours after exposure. Moreover, in residual contact bioassays under lab and greenhouse conditions the combination of essential oil constituent and vegetable oil showed continued efficacy 8-10 days after treatment against aphids and mites, respectively. No residual efficacy was observed against *O. insidiosus* and *P. maculiventris* under lab and greenhouse conditions. The combination of essential oil constituent and vegetable oil had no toxic effects on plants.

17. Horizontal and vertical movement of wireworms, *Agriotes sputator* (Coleoptera: Elateridae) through soil

Christine Noronha¹, MD Bahar¹, Natasha Boyle¹, Suqi Liu²

¹Agriculture and Agri-Food Canada, Charlottetown, PE

²PEI Department of Agriculture and Land

The larvae of the click beetles (Coleoptera: Elateridae), wireworms, are a major pest of potatoes and vegetable crops worldwide. Information on wireworm movement within the soil profile is lacking making it difficult to monitor populations. In this study, we investigated the horizontal and vertical movement of wireworms in the soil. Using 5cm diameter tubes, we studied the time required and distance traversed through soil by a wireworm towards a food source. Results show that 15% and 20% of medium and large size wireworms moved a distance 3.6m in 24 hours to a food source. To study vertical movement, tubes were inserted in the soil to a depth of 80cm and 10 wireworms were released in each tube. We found that the majority of wireworms spend the winter months at a depth just below the frost line and begin moving upwards in April when soil temperature begins to rise.

18. Early Intervention Strategy for spruce budworm: Can we contain outbreak spread?

Sara Edwards¹, Rob Johns², Veronique Martel², Emily Owens², Deepa Pureswaran²

¹Forest Protection Limited

²Natural Resources Canada

Spruce budworm (*Choristoneura fumiferana* Clemens) is the major defoliating pest of spruce (*Picea sp.*) and balsam fir (*Abies balsamea* (L.) Mill) in northeastern North America. The recent resurgence of a budworm outbreak in northeastern North America has rekindled interest and discussion around how best to manage its potential impact across the region. Early Intervention Strategy (EIS) is an area-wide management program aimed at containing the spread of spruce budworm in Atlantic Canada. In brief, intensive regional monitoring is used to help identify emerging 'hot spots' along the leading edge of outbreak, which are then treated with relatively narrow-spectrum insecticides (i.e., Btk or tebufenozide) to slow or prevent further population expansion. Our research represents a large-scale test of the efficacy of the EIS approach. Results from the first 6 years of this program indicate that under the right conditions the EIS has strong potential for containing budworm outbreaks with minimal impacts on non-target species.

Poster presentation abstracts / Résumés des présentations d'affiches

19. Behavioural responses to volatiles by *Varroa destructor* mites within Western honey bee (*Apis mellifera*) colonies

Alicja Muir, Kirk Hillier, Dave Shutler
Acadia University

Domesticated Western honey bees (*Apis mellifera* L.) around the world are parasitized by *Varroa destructor* mites. *Varroa* use chemical cues in a bee colony to find drone brood. There are many volatile organic compounds (VOCs) within a colony, ranging from bee pheromones to plant VOCs. We tested whether VOCs in drone brood elicited an attraction response from *varroa*. We tested VOCs from Common yarrow as mite repellents. Behavioural assays were conducted on *varroa* using eight attractants and repellents to determine the best. Then, we used a control colony with an untreated sticky board, and three treatments using VOCs: repellent applied to the inside of top board, attractant applied to a sticky bottom board, and a combination of those. Twice weekly for 8 weeks, sticky boards were replaced, and captured mites counted. This will lead to a novel trap design using VOCs that will be available for beekeepers battling *varroa* infestations.

20. Investigating the role of antioxidant enzyme catalase in freeze-tolerant crickets

Sarah Rokosh, Robyn Walter, Jantina Toxopeus
St. Francis Xavier University

Many organisms overwinter in temperate climates, and are at risk of freezing during the winter. Oxidative stress is one of the challenges faced by frozen animals. Antioxidants are hypothesized to protect against oxidative damage in these organisms. Previous work has shown that the spring field cricket, *Gryllus veletis*, can survive freezing and has high abundance of the mRNA encoding catalase, an antioxidant enzyme. In addition, we have shown that freeze-tolerant *G. veletis* have relatively high catalase enzyme activity in three of its tissues (midgut, Malpighian tubules, and fat body). To test whether catalase is important for freeze tolerance, we will use RNA interference to knock down production of the catalase protein in freeze-tolerant *G. veletis*. We will then determine whether crickets with decreased catalase abundance are able to survive freezing and its associated oxidative challenges. This work will help elucidate the function of antioxidant enzymes in freeze tolerance.

21. When the red-lined carrion beetle fully assumes control over carcass

Luciana-Elena Popescu, Chloé Losier, Gaétan Moreau
Université de Moncton

Forensic entomology seeks to document the process of colonization of cadavers and vertebrate carcasses by insects to use the information obtained for legal applications. In a recent experiment conducted in the spring of 2022, we set out to investigate the decomposition and colonization of insects on 15 domestic pig carcasses placed at distances ranging from 5 meters to 200 meters. While the initial sequence of insect colonization was typical of what is normally documented at our latitude, about halfway through the decomposition process, the sequence took a different turn, with *Necrodes surinamensis* (Coleoptera: Silphidae) adults and larvae overtaking the decomposition of carcasses placed at short distance. From there, the adults and larvae proliferated, killing all Calliphoridae larvae and quickly dispersed to nearby carcasses. This phenomenon and its particularities will be discussed with reference to the ecology of decomposition and the forensic implications.

22. Investigating olfactory sensitivity of Lepidoptera and Diptera to *Streptomyces* derived volatiles

Sarah Hobbs¹, Jingyu Liu², Kapil Tahlan², Kirk Hillier¹
¹Acadia University
²Memorial University

Streptomyces bacteria produce bioactive secondary metabolites used by the pharmaceutical industry as a major source of antibiotics. Furthermore, *Streptomyces*-derived volatiles may provide novel substrates for insect repellents and attractants. In this study, volatile metabolites identified from *Streptomyces* samples were tested against insect species with different life histories to compare electrophysiological responses. Using Gas Chromatography-linked Electroantennographic Detection (GC-EAD) the olfactory sensitivity of the following species were analysed: *Drosophila melanogaster*, *Heliothis virescens*, *Helicoverpa zea*, *Plutella xylostella* and *Aedes aegypti*. Despite having different life histories, multiple species shared similar sensitivity to the same *Streptomyces*-derived compounds. This could be a potential indicator that *Streptomyces* microbial metabolites elicit highly conserved behavioural responses from a variety of pest species. Understanding the function of *Streptomyces* volatiles in a comparative fashion, will enable new insights into insect-microbe interactions and the prospect for development of novel pest control tools.

23. At the olympics of cadaver decomposition, beetles do not always come second

Chloé Losier¹, Denis Boudreau¹, Kathleen LeBlanc¹, Jean-Philippe Michaud², Gaétan Moreau¹

¹Université de Moncton

²Royal Canadian Mounted Police

The decomposition of cadavers and large vertebrate carcasses is the result of complex processes influenced by ambient temperatures. In this study, we tested whether carcass decomposition rate is modulated not only directly by temperature and insect occurrence, but also indirectly by the mediation of interactions among insects by ambient temperature. To test this, a comparative analysis of the decomposition of domestic pig carcasses in summer and fall was conducted in Eastern New Brunswick. The results indicated that *Necrodes surinamensis* and *Creophilus maxillosus* maintained higher abundances late during succession in the fall than in the summer, which slowed carcass decomposition because these species fed on dipteran larvae. These results demonstrate the variability in response to environmental parameters of insects of forensic importance and support the idea that slowed decomposition in the fall may be exacerbated by changes in interspecific interactions among insects.

24. Visualizing the cytoskeleton of freeze-tolerant crickets

Maranda van Oirschot, Jantina Toxopeus

St. Francis Xavier University

Low temperatures and freezing can damage animal cells, ultimately leading to animal death. The cytoskeleton is an important component of cell structure, but is sensitive to cold in many animals. The spring field cricket *Gryllus veletis* is freeze-tolerant (can survive freezing of its body fluids) if acclimated to fall-like conditions (mild low temperatures, short days). Previous transcriptomic work on *G. veletis* showed that these crickets modify expression of key cytoskeletal genes (actin, alpha- and beta-tubulin) when exposed to these fall-like acclimation conditions. To test whether these crickets modify cytoskeletal structure or stability during acclimation, we first optimized methods to visualize actin and tubulin proteins in multiple tissues using confocal microscopy. Currently we are examining how cytoskeletal structure changes during fall-like acclimation. This will give us a better understanding of how *G. veletis* modify their cytoskeletal structure, and improve our understanding of the mechanisms that underlie insect freeze tolerance in general.

25. Assessing molecular barcoding as an adjunct or alternative to morphological identification of nest-associated arthropods

Vett Lloyd¹, Steve Heard², Glen Parsons³

¹Mount Allison University

²University of New Brunswick

³Canadian Wildlife Service

Identification of nest-associated insects can provide a wealth of information about bird health, bird diet, local environmental conditions, local and imported ectoparasites and much more. Nest-associated insects are usually identified morphologically, ideally from live specimens, following collection of fresh nest material. However, the exigencies of field work mean that fresh and well-preserved nest material may not always be obtainable. Here we assess the value of molecular barcoding to identify nest-associated arthropods from the nests of common eiders from Western Bird Island, NS. We report that while technically challenging, molecular barcoding does allow for identification of both expected and unexpected nest-associated arthropods, the latter including an *I. scapularis* tick. The long-range migration of migratory birds such as the eiders mean that they have the potential to shuttle ectoparasites, and in the case of ticks – tick pathogens – globally.

26. An inquiry into the factors underlying sudden outbursts of individuals from the genus *Eusphalerum*

Mélodi Lagacé, Gaétan Moreau, Denis Boudreau, Louka Tousignant

Université de Moncton

For over a decade, studies have been conducted in New Brunswick to document beetle communities, the primary reservoir of animal biodiversity in forest ecosystems. The studies involve passive trapping methods and have been conducted over several years. Collected beetles were identified to the higher taxonomic level. During these studies, on several occasions, a high number of *Eusphalerum* specimens was collected. The genus *Eusphalerum* includes species of small pollinators characterized by their yellowish body with a black posterior. To elucidate the factors underlying the sudden outbursts of individuals from this genus, we explored their intra-annual trend in density from the south to the north of the province and examined their association with habitats and especially pollen-rich forest stands.

Annual Business Meeting (agenda, minutes)

Acadian Entomological Society 79th Annual Meeting
22 July 2022, Truro Nova Scotia

1. Call to order (C. Cutler)
2. Additions to agenda
 - No additions to the agenda
3. Approval of the agenda (MOTION. Moved by C. Cutler)
 - Seconded by K. Hiller. Motion passed
4. Business arising from 2021 Executive meeting (C. Cutler)
 - C. Cutler informed the group that though there was no AES 2021 Annual Meeting, the AES Executive met 13 Aug 2021 to review various matters. A summary was provided of key items discussed and actions taken. There were no questions or points of clarification from the membership. The minutes to that meeting will be posted on the AES website.
5. President's report (C. Cutler)
 - C. Cutler provided a report. There were no questions or points of clarification from the membership. The report will be appended to the proceedings of the 2022 Annual Meeting and posted on the AES website.
6. Journal Editor's report (S. Edwards, R. Johns)
 - Sara Edwards provided a report. Members were encouraged to submit papers to the J Acadian Entomol Soc, and to serve as reviewers for these papers. There were no questions or points of clarification from the membership. The report will be appended to the proceeding of the 2022 Annual Meeting and posted on the AES website.
7. Treasurer's report (S. Edwards)
 - Sara Edwards provided a report. Slow progress in accessing the Society's TD account; complications due to transfer of Treasurer role from A. Morrison to S. Edwards. Issue was that AES was only officially incorporated in 2018. Former Treasurer Rob Johns did this so we could have a PayPal link directly on our website but nobody was aware that this required annual paperwork to be filed. Now that we know what forms we are required to submit each year this will become part of the

treasures job and will be made explicit so this won't happen again. Paperwork has been filed with Service NB but still hasn't been processed. Because we had no Annual Meeting in 2021 and no other expenditures outside the 2022 Annual Meeting, account is healthy. There were no questions or points of clarification from the membership. A financial statement will be provided to the AES Executive, and Sara's report will be appended to the proceeding of the 2022 Annual Meeting and posted on the AES website.

8. Regional Director's report (J. Vickruck)

- J. Vickruck provided a report. There were no questions or points of clarification from the membership. The report will be appended to the proceeding to the 2022 Annual Meeting and posted on the AES website.

9. New Business

a. Nomination of ESC Regional Director (C. Cutler)

- An email was sent to membership on 21 July indicating J. Vickruck is willing to serve another 3-year term in this role (thank you, Jess), but that we welcome interest from others in the position, and that if there are additional nominees by 27 July, we will hold an election. Otherwise, J. Vickruck will be our nominee as ESC Regional Director 2022-2025.

b. Election of new Vice President (C. Cutler)

- MOTION. Moved by C. Cutler, that to facilitate election of new AES VP, Md Habibullah Bahar will remain VP for until 22 Aug, and Chris Cutler will remain AES President until 22 Aug, during which time nominations will be solicited following by email vote. Seconded by C. Noronha. Motion passed.

c. Re-appointment of Treasurer (C. Cutler)

- MOTION. Moved by Chris Cutler that current AES Secretary-Treasurer Sara Edwards be renewed in the position of Secretary-Treasurer for an additional two years (2022-2024). Seconded by P. Manning. Motion passed.

d. Location of 2023 Annual Meeting (Md Habibullah Bahar)

- H. Bahar reviewed for members locations the most recent previous meetings, and indicated PEI would be willing to host in 2023. NL is also a potential location. B. Hicks indicated he would discuss with

members in NL. If others are interested in hosting in 2023, they are encouraged to contact a member of the AES Executive.

10. Other business / Question period (C. Cutler)

- There were no other questions

11. Adjournment

- Motion to adjourn by C. Cutler. Seconded by S. Cajolais. Motion approved.

2022 AES President's Report (Chris Cutler)

- My report and all other reports will be provided in the proceedings/minutes of this meeting. Other items of importance discussed under other agenda items.
- Annual meeting
 - 40+ attendees. I hope you will agree that it was an enjoyable meeting. Many great talks, particularly by students, as usual
 - I would like to thank Dalhousie Conference Services for their hospitality. Very flexible and helpful, great facilities. Thanks to Chartwells for excellent catering service during the day, and the Nook & Cranny for hosting our dinner after the conference.
 - Many thanks to the organizing committee, i.e. my lab group, who helped tremendously with the program, registration. Additional big thanks to Leah Terry (Dean's Office), Dr. Gray, and Mandi Wilson (Dept Engineering) for assisting with printing and binding of the programs
 - Thanks to our Executive, and in particular Sara Edwards as Treasurer and Secretary (all those emails you've received) and Rylee Isitt for continued and timely updates to our web page.
 - Thanks to our judges: Vett Lloyd, Jeff Ogden, Barry Hicks, Paul Manning, Sara Edwards, and Christine Noronha. It is an important job and full day commitment. Not something that we take for granted.
 - Thanks to Janelle MacKeil for photography, and Paul Manning for designing our wonderful logo, in addition to arranging for t-shirts, handling registrations, and helping with our virtual attendees.
 - Lauren Peters, our Faculty Community Education Manager, for assisting with the swag for your bags.
 - Dr. Laura Ferguson for her excellent keynote talk.
 - I also want to acknowledge the awardees – presented later this evening – as well as all the other students that participated in the student competition.
- ESC notes
 - 2022 ESA, ESC, and ESBC Joint Annual Meeting November 13-16, 2022 in Vancouver, British Columbia, Canada
 - Jess Vickruck is our Regional Director to the ESC, Suzanne Blatt is Co-Editor in Chief of The Canadian Entomologist; Rachel Rix's term as ESC Student and Early Professional Director representative ended in fall 2021, but she remains a member of the ESC Student Committee, and the ESC Science Policy Committee. And we have numerous other AES members who represent other ESC committees that can be viewed on the ESC website ([here](#)). These individuals officially represent you at ESC. Any questions or concerns may go through them, if you wish
 - Jess Vickruck's current term as regional director was for one year. She has kindly agreed to stand for an additional 3-year term. As per section 7.2 our bylaws, we will have an election for renewal of this position.

- Rylee Isitt has agreed to continue as Web Master for AES. I've found Rylee great to work with. Thank you Rylee for continuing in this role
- Carolyn Parsons and Suzanne Blatt have agreed to continue as the AES Representatives for Newfoundland and Labrador, and Nova Scotia, respectively.
- 2023 meeting will be discussed under New Business
- Honorary members. We have not had a nomination in a while (2015?). Consider nominating an outstanding long-standing member of the Society. Consult the By-Laws and reach out to the Executive.
- I am encouraged by the turn-out for this meeting, and in particular the new faces or faces we have not seen in a while. Hopefully this is a good sign of things to come for our Society.

Chris Cutler, AES President (outgoing)

22 July 2022

2022 AES Journal Editor Report (Sara Edwards)

Six articles (Notes) were published since the last meeting. We have one manuscript accepted pending revisions that is currently with the authors, and one article in review.

2022 AES Treasurer-Secretary Report (Sara Edwards)

General Finances

We are in good financial standing and have a decent surplus of cash. Details of the AES finances are summarized below.

Major expenditures for 2022 include the AGM and new AES T-shirts. The cost of the T-shirts will be recovered as we sell them.

Memberships

Membership as of August 2022 was at 54 members.

2022 Annual AGM

There were approximately 48 attendees at the 2022 AGM in Truro, NS July 22. This was our first in-person meeting since 2019 (due to COVID-19 related restrictions/precautions). A virtual attendance/presentation option was provided for people who could not attend the meeting in person.

AES Finances (as of September 2022)

Summary of Expenses	
Webmaster	\$ 180.00
Editor	\$ 180.00
Service NB fees	\$ 14.00
T-shirts	\$ 721.05
AGM 2022	\$ 2,903.61
PayPal service fees	\$ 75.04

AGM breakdown	
Venue fee	\$ 1,421.28
Mixer	\$ 280.00
Dal swag	\$ 510.00
Miscellaneous	\$ 192.33
Student awards	\$ 500.00

Room rental and catering (lunch, morning break & afternoon break)

(name tags, bags, poster mounting supplies etc.)

Revenue	
Membership & conference fees 2022	\$ 3,273.00
Publication fees	\$ 115.00
t-shirt sales	\$ 400.00

AES Funds	
Cash (bank balance)	\$ 16,683.14
GICs	\$ 6,914.73
PayPal*	\$ 2,346.80
Total assets	\$ 25,944.67

***PayPal funds will be transferred into the bank account**

ESC Regional Director's Report

In my first year as a director for the ESC I was able to attend all of the board meetings and get up to speed with what is happening in the society. I think that the following information will be of interest to the members of the AES.

1. There has been quite a bit of discussion as to what the future of the ESC Annual General Meetings will look like. This has centered around how to best use in person and virtual meetings to support members of the ESC looking for both options. I will update you as I know more.
2. ESC recently passed a motion to appoint a co-secretary. As of September 1, Erin Campbell and Neil Holliday will work together in the secretary position.
3. Bryan Brunet is the new treasurer of the ESC.
4. There is an outreach fund of \$500 that each regional society can request from ESC to help support entomological outreach activities in our communities. The AES hasn't made a request for funds in the last few years, but if anyone has an idea for an event that could be supported using these funds just let me know and I can help facilitate!

I think that is all of my important notes! If any member of the society has something they would like me to bring forward at the next ESC board meeting in November, please feel free to get in touch with me (jess.vickruck@agr.gc.ca).

Jess Vickruck
18 July 2022