

PROCEEDINGS OF THE 64<sup>TH</sup> ANNUAL MEETING OF THE



# Entomological Society of Alberta

October 27<sup>th</sup>-29<sup>th</sup> 2016  
Calgary, Alberta

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## Entomological Society of Alberta President's Address

- It has been an honour to serve as your president in 2016. I want to thank the entire board of directors for their work on behalf of the society, especially Rob Longair who is vacating his position as our representative to the national society, and retiring, so thank you for all of your service Rob. I also want to give a warm welcome to Haley Catton, who will be taking over that role.
- I have to single out John Swann, Ken Fry, Alec McClay, and Caroline Whitehouse for sharing their experience with the board, and for all the hard work they do all year to make this Society function. Caroline went above and beyond this year, following up with the RCMP when a scammer tried to get money out of the society. We all owe you guys a round of applause as you are the backbone of our Society
- Last year John talked about public involvement, and the importance of interacting with the public and sharing our enthusiasm for entomology, and I believe that that message remains very relevant. We need to help the general public to build a connection with the environment, in order to engender any action on environmental issues. So I challenge each of you to spend at least one day this year informing the public about the wonderful world of invertebrates.
- Many of you will have attended the International Congress in Florida. By all accounts that was an amazing meeting. I want to encourage you to continue to reflect on their theme “entomology without borders”. This can mean not only geographic borders, but also contemplate expanding the traditional borders of our discipline. Many people here do work that falls within multiple disciplines, like agronomy and entomology, or Forestry, or ecology, or physiology. So I also challenge you to expand the borders of your work this year – collaborate with someone in a different discipline, work on a new taxa, whatever this means for you.

S. Hoover  
ESAB 2016 President

**Program of the 64<sup>th</sup> Annual Meeting of the  
Entomological Society of Alberta**

**Venue:** University of Calgary, Calgary, AB

**Thursday, 27 October 2016**

5:00 - 7:00 pm Board of Directors meeting

Last Defence Lounge, 350 MacEwan Student Centre, University of Calgary

7:00 - 10:00 pm Mixer and Registration

Last Defence Lounge, 350 MacEwan Student Centre, University of Calgary

**Friday, 28 October 2016**

BI 211, Biological Sciences Building, University of Calgary

8:30 Keynote Speaker: Dr. Cory Sheffield, Royal Saskatchewan Museum

Review of Bee Systematics, Ecology and Conservation in Canada

9:30 Sosiak, C.: Urban ant biodiversity: a survey of ants in Calgary's urban parks

9:45 Swann, J.E. The Kananaskis Bioblitz: lessons learned

10:00 - 10:30 Refreshment Break

***Biodiversity***

10:30 Acorn, J.H. What can folk taxonomy teach us about entomological teaching and outreach?

10:45 Bercha, R.L. Rings and wings: Observations from a nest of the Western Yellowjacket, *Vespula pensylvanica* (Hymenoptera: Vespidae)

11:00 Glass, H., Carroll, E., Curley, D., Kienzle, H., Vamosi, S., and Yee, D. A barcoding approach to phylogenetic classification of mosquitoes (Aedini: Aedes, *Ochlerotatus*)

11:15 Arachchige, P.L., Brunet, B., and Sperling, FA. Genome-wide exploration for genes underlying spruce budworm wing pigmentation (Lepidoptera: Tortricidae)

11:30 Perry, A., Swann, J. and Wildering W. Prevalence of auto-fluorescent proteins and phylogenetic significance of resilin in the family Milichiidae

11:45 Best, L.R. Notes on the Alpine Pollinator Fauna of Mount Tod in the Shuswap Highland, BC, Canada

12:00 - 1:00 Lunch

### ***Posters***

Brunet, B.M.T., Shpeley, D., and Sperling, F.A.H. Crowdsourcing carabid collections.

De Clerck-Floate, R. Does timing of release matter in early establishment of a galling insect for yellow toadflax biocontrol?

Carscallen, G., Nichols, G., Novotny, V., Volf, M., Miller, S., Teixeira-Anderson, K and Klimes, P. Location, location, location: examining arboreal ant nest distributions in felled trees near Toms Brook, Virginia, USA

### ***Spatial and Temporal Ecology***

1:00 Meehan, M, Song, Z, Cobb, T, Lumley, L, and Proctor, H. The effect of environmental and spatial processes on oribatid mite assemblages across provincial and regional scales in Alberta, Canada

1:15 Dufton, S., Otani, J., Laird, R. Effects of crop rotation and canopy cover on assemblages of ground beetles (Coleoptera: Carabidae) in the Peace River Region

1:30 Punko, R.N. and Cartar, R.V. The importance of matrix and corridors for non-native *Pterostichus melanarius* (Carabidae; Coleoptera) in an agro-ecosystem

1:45 MacDonald, Z.G., Anderson, I., Acorn, J.H., and Nielsen, S.E. Beyond island biogeography: using butterfly assemblages on lake islands to test two competing hypotheses explaining species diversity on fragmented landscapes

2:00 Wilches, D., Laird, R., Floate, K., Fields, P. Survival of *Trogoderma granarium* (Coleoptera: Dermestidae) at extreme temperatures

2:15 Kutby, R., Cartar, R.V. Colony development in bumble bees: A test of the food availability and food continuity hypotheses

2:30 Cartar, R.V. and Lindeman, J. Resource-tracking by bumble bees: Insights from spatial competition for fireweed

2:45 - 3:15 Refreshment Break

### ***Forest Health***

3:15 Goulding, M., LaMontagne, J., and Reid, M. Traits of white spruce that predict attack and success of spruce beetles

3:30 Murphy, W. and Reid, M. The role of tree diameter in host orientation of mountain pine beetle

3:45 Reid, M.L., Alcock, J., Sekhon J., and Wilkinson, K. Hiding in plain sight: prospects of benign bark beetles killing trees in a new climate.

4:00 Ahn, S. and Reid, M.L. Physiological condition of mountain pine beetle and their ability to survive monoterpenes

4:15 Sjolie, D.M., Batallas, R., Hoefele, D., Arachchige, P., Saran, C., Keddie, B.A., MacQuarrie, C.J.K., Evenden, M.L. The sublethal effect of microsporidian infection on flight capacity of the forest tent caterpillar, *Malacosoma disstria* (Lepidoptera: Lasiocampidae)

4:30 Shegelski, V., Evenden, M., Sperling, F.A.H. Morphology and gene expression associated with dispersal capability in mountain pine beetle (*Dendroctonus ponderosae*)

4:45 Peralta-Vazquez, G.H. and Reid, M. Drivers don't care about their hitchhikers: phenotype- dependent dispersal of mountain pine beetle and the costly consequences for its ectosymbionts

5:00 Sperling, F.A.H. and Dupuis, J.R. Phylogeny and species delimitation of the spruce budworm group: A historical perspective

**Banquet** (Atrium of the Administration Building, University of Calgary)

Cash Bar/Drinks 5:30-6:30pm

Banquet Dinner 6:30-9:00pm

Banquet Speaker: Ben Gadd

Icefield Bunnies, Gullible Bees and Why the Tallest Mountain is Not the Highest

**Saturday, Oct 29, 2016**

***Pollinators & canola***

8:30 Waytes, R., Cartar, R., and Hoover, S. Are bees ideal and free? The role of competitor density and floral rewards in patch selection of managed pollinators in a gynodioecious crop system

8:45 Robinson, S.V.J., Cartar, R.V., Pernal, S.F. and Hoover, S.E.R. The spatial distribution of central place foraging pollinators in mass-flowering crops

9:00 Retzlaff, J.L., Galpern, P., Cartar, R.V. Bumble bee responses to landscape depend on body size in a prairie agro-ecosystem

9:15 Grocock, N. L., Batallas, R., Sturm, A., Manson, J., and Evenden, M. L. Bumblebee (*Bombus* spp.) bycatch in moth pheromone traps positioned in canola and wheat crops of central Alberta, Canada

9:30 Galpern, P., Johnson, S.A., Retzlaff, J. L., Chang, D., Swann, J. High-intensity canola cultivation: an ecological trap for bumble bees?

10:00 - 10:15 Refreshment Break

***Food, smells, and life (history)***

10:15 Thomson, D. Mating disruption 50 years on: pheromones coming of age - finally!

10:30 Nieman, C, and Floate, K.D. LongRange® (eprinomectin), faecal residues, and dung-breeding insects

10:45 Jorgensen, A., Otani, J., Evenden, M. Sex pheromone monitoring of wheat midge: efficacy of commercially available lures and traps

11:00 McPike, S., Evenden, M. Effects of nutritional provision and volatile plant chemical lures on parasitism of *Caloptilia fraxinella* by *Apanteles polychrosidis* on green ash in Edmonton

11:15 Mader, C., Erbilgin, N., and Watts, J. Parasitic wasp Sudoku: Field studies of the life history of *Coccophagus gossypariae*

11:30 - 12:30 **Annual General Meeting**

**Oral Presentation Abstracts**  
**(Alphabetically by presenting author)**

**1. What can folk taxonomy teach us about entomological teaching and outreach?**

Acorn, John H.

Dept. of Renewable Resources, University of Alberta, Edmonton, Alberta, T6G 2H1,  
[jacorn@ualberta.ca](mailto:jacorn@ualberta.ca)

Cultural entomology is a recognized field of study, founded by Charles Hogue in the 1980s. However, this field overlaps broadly with ethnoentomology, a subfield within the anthropological discipline of ethnobiology. Ethnobiologists have recently distinguished general-purpose classifications of organisms (such as folk taxonomies) from co-existing special-purpose classifications, based on utility or symbolism (the usual focus of cultural entomology). Here, I explore the importance of general-purpose taxonomies to entomology proper, and the notion of the folk-generic as a cognitively privileged “basic” category. I also draw parallels between folk taxonomies and the organization of my “Bugs of...” books for general audiences. It appears that there is a natural number of “basic categories” (around 100) for “bugs” in all cultures, and that we can take advantage of this when planning entomological teaching and outreach. Author Carol Yoon has also suggested that folk taxonomies provide support for the use of both paraphyletic and polyphyletic groups in teaching, both of which are currently disallowed under the rules of cladistic classification. I argue that this is only partially advisable, and that a balance can be struck between the two extremes through careful, simultaneous presentation of both “real” and “cognitively privileged” groups of organisms.

**2. Physiological condition of Mountain Pine Beetle and their ability to survive monoterpenes**

Sangwook, A.<sup>1</sup>, Mary R.<sup>1</sup>

<sup>1</sup>Department of Biological Sciences, University of Calgary, Alberta, Canada

The ability of a herbivore to successfully consume a plant requires them to effectively counter the plant’s defense mechanisms. We investigated the physiological characteristics of Mountain Pine Beetles (MPB) that allow them to survive the terpenoid chemical defenses employed by conifers. Different hydration treatments and a simulated torpor treatment were performed to produce beetles of differing water and fat content. The beetles were placed in varying levels of monoterpenes (alpha-pinene and limonene) through fumigant exposure. Results indicate that beetles in the dehydration treatment were least likely to survive terpene exposure, followed by hydrated beetles, then torpor beetles. Beetle survival appears to be correlated to the amount of water content of the beetle relative to its body size. These results support proposed mechanisms of detoxification through the hydroxylation of monoterpene substrate with water, highlighting the importance of water content of MPB when attacking pines. This study will shed light onto the physiological conditions that may determine successful MPB colonization of a host pine with potential implications on the probability of outbreaks.

### **3. Genome-wide exploration for genes underlying spruce budworm wing pigmentation (Lepidoptera: Tortricidae)**

Arachchige, Pasan Lebusasin<sup>1</sup>, Brunet, Bryan<sup>2</sup>, Sperling, Felix<sup>1</sup>

<sup>1</sup>Biological Sciences, University of Alberta, 116 St & 85 Ave, Edmonton, AB, T6G 2R3

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Until the advent of molecular techniques in biology, taxonomy heavily relied on morphological characteristics, which can be ambiguous in cryptic species complexes. Next-generation sequencing has opened up exploration of whole genomes, allowing for a holistic approach to species identification. Through genome-wide association analysis (GWAS), molecular markers can be associated with physical characteristics. Our study investigates the underlying genetic basis for wing coloration, an ecologically functional trait, in three cryptic members of the spruce budworm (SBW) complex, *Choristoneura fumiferana*, *C. occidentalis biennis*, and *C. o. occidentalis*. A number of wing coloration characters are shared among the three species, and five single nuclear polymorphisms (SNPs) were identified as associated with variation in SBW wing coloration. One of the five SNPs is part of the *bric-a-brac* protein, which plays an important role in encoding insect pigments (Wittkopp *et al.* 2003). Our study demonstrates a method to link morphological and genomic variation, providing a potential bridge to understanding the functional basis for adaptive variation.

### **4. Rings and Wings: Observations from a Nest of the Western Yellowjacket, *Vespula pensylvanica* (Hymenoptera: Vespidae)**

Robert Bercha, A.<sup>1</sup>

<sup>1</sup>Calgary, Alberta

During the summer of 2015 a large and active colony of *Vespula pensylvanica* occupied and grew in a hollow log in the author's backyard in Calgary, Alberta, Canada. This paper details the observations made over the summer of 2015 and finally in March, 2016 when the nest and its contents were investigated. Investigation of the nest and its occupants included examination of the envelope, combs and numerous specimens of dead *V. pensylvanica* within. The specimens were examined to determine species, wing length, facial pattern and continuity of the yellow loop around each eye to determine the range of variation among individuals within a single colony.

### **5. Notes on the Alpine Pollinator Fauna of Mount Tod in the Shuswap Highland, BC, Canada**

Best, L.R.<sup>[1][2]</sup>

Invertebrate Section, Zoology Museum, University of Calgary, 2500 University Drive NW, Calgary, AB

Bees (Anthophila, Hymenoptera) and other obligate floral visitors are poorly documented in Alpine Ecosystems in Canada. Here we present preliminary data on the bees of Mount Tod, an isolated alpine habitat in Southern BC.

### **6. Resource-tracking by bumble bees: Insights from spatial competition for fireweed**

Cartar, Ralph V. and Lindeman, Julia  
Department of Biological Sciences, University of Calgary

Mobile organisms who compete for food (without interference) with other organisms necessarily face the problem of resource-tracking. That is, where to feed, when, and what to eat, based on the joint spatial and temporal distributions of food quantity | quality and of competitors? One potential theory to guide them (all) is the Ideal Free Distribution, but this is an equilibrium theory, one that is insensitive to mechanisms of its achievement. We test for spatial mechanisms that potentially explain the distribution of marked worker bumble bees (*Bombus*) feeding on fireweed (*Chamerion angustifolium*) in SW Alberta. In a 3 day experiment, we censused all bumble bees in a meadow, and examined their home ranges before, during and following a point-source removal of flowers. By examining bee home ranges and local densities with respect to current and past resources, we make inferences about determinants of the spatial structure of bumble bees, and the spatial extent of local competition. These inferences will allow insights into the nature of spatial competition, and the effects of short-term disturbances.

### **7. Effects of crop rotation and canopy cover on assemblages of ground beetles (Coleoptera: Carabidae) in the Peace River Region**

Dufton, S.<sup>1</sup>, Otani, J.<sup>2</sup>, Laird, R.<sup>1</sup><sub>[SEP]</sub>

<sup>1</sup>University of Lethbridge, Lethbridge, AB<sub>[SEP]</sub><sup>2</sup>Agriculture & Agri-Food Canada (AAFC), Beaverlodge, AB

Carabidae (Coleoptera) are polyphagous feeders that can function as important predators in agro- ecosystems. Specifically, Carabidae act as a natural enemy of *Sitodiplosis mosellana* Géhin (Diptera: Cecidomyiidae), an invasive and economic pest in wheat (*Triticum* spp.). We hypothesized that canopy structure alters infestation by *S. mosellana* but also carabid community composition. A field plot experiment was seeded at Beaverlodge AB to assess how plant species and seeding rates affect canopy and investigate its relationship to wheat midge infestations and carabid assemblages. The field experiment consisted of 16 paired treatments organized into four replicates. Treatments included two wheat varieties (*Triticum aestivum* cv. AC Stettler and CDC Utmot), canola (*Brassica napus* cv. Invigor L120), peas (*Pisum sativum* cv. CDC Meadow) and lambsquarters (*Chenopodium album* L.). Seeding rates were manipulated in both wheat and canola treatments. Carabid beetles were collected weekly from each plot using pitfall traps. Trap catches were sorted to species level for Carabidae and to Family level for all other Coleoptera and Arachnida. Crop canopy was characterized in all plots using plant stand counts plus weekly percent green assessments and growth ratings. Densities of *S. mosellana* were determined by hand-threshing plants from wheat plots. Pitfall trapping performed from May-July of 2016 resulted in a total of 6078 beetles and 56.6% of these were Carabidae. Preliminary data suggest that higher numbers of carabids occurred in the two higher seeding rates of susceptible wheat compared to peas and canola.

## **8. High-intensity canola cultivation: an ecological trap for bumble bees?**

Galpern, P.<sup>1,2</sup>, Johnson, S.A.<sup>2</sup>, Retzlaff, J. L.<sup>2</sup>, Chang, D.<sup>2</sup>, Swann, J.<sup>2</sup>.

<sup>1</sup>Faculty of Environmental Design, University of Calgary, 2500 University Drive NW, Calgary, AB, Canada, T2N 1N4

<sup>2</sup>Department of Biological Sciences, University of Calgary, 2500 University Drive NW, Calgary, AB, Canada, T2N 1N4

We report findings that point to an ecological trap created by canola, a mass-flowering crop widely grown on the Canadian Prairies. We demonstrate that bumble bee queens are attracted to locations with a higher cover of canola, where they establish colonies earlier. However, despite this attraction, bumble bee workers at these locations are less abundant than at control locations when the crop is no longer in bloom. This pattern suggests mass-flowering crops, such as canola, have the potential to lure in mobile pollinators like bumble bees, but that a demographic benefit of this resource pulse may be short-lived. In particular, our study points to this effect when the crop is grown under highly-intensive conditions. This work is relevant in light of recent claims that mass-flowering crops may buffer against the widely-reported decline in wild insect pollinators. Our study suggests that there may be limits to this effect. The conservation implications for bumble bees and other large, mobile bee species are relevant at a continental scale, given the vast region and over which canola is cultivated in North America (approx. 85,000 km<sup>2</sup> planted in 2015), and the spatial intensity with which cropping typically occurs.

## **9. A barcoding approach to phylogenetic classification of mosquitoes (Aedini: *Aedes*, *Ochlerotatus*)**

Glass, H.<sup>1</sup>, Carroll, E.<sup>1</sup>, Curley, D.<sup>1</sup>, Kienzle, H.<sup>1</sup>, Vamosi, S.<sup>1</sup>, and Yee, D.<sup>2</sup>

<sup>1</sup> Department of Biological Sciences, University of Calgary

<sup>2</sup> Department of Biological Sciences, University of Southern Mississippi

Traditionally, entomologists have used morphological characteristics for mosquito taxonomy and systematics. This approach, however, does not take into consideration the genetic relatedness of species. In 2004, Reinert et al. split the *Aedes* genus of mosquitoes in the tribe *Aedini* into two genera (*Aedes* and *Ochlerotatus*), thereby elevating *Ochlerotatus* from subgenus to genus rank, strictly based on morphology alone. We are proposing that a genetic barcoding marker be used to generate a more accurate classification of these species. With over 900 sequences covering 80 species of *Aedini* mosquitoes, downloaded from BOLD systems, we used the COI marker from the mitochondrial genome to construct a phylogenetic tree. We have incorporated species from both the true *Aedes* group and those reclassified into *Ochlerotatus*, in addition to using the genus *Mansonia* as an out-group for the analysis. Based on our preliminary results, it appears that there are some discrepancies between the morphology-based phylogeny created by Reinert et al. (2004) and the phylogeny made via our genetic barcoding approach. A more complete analysis is currently in the works. We suggest that phylogenies utilizing DNA barcodes have the potential to clarify our understanding of mosquito species classifications.

## **10. Bumblebee (*Bombus* spp.) bycatch in moth pheromone traps positioned in canola and wheat crops of central Alberta, Canada**

Grocock, N. L.<sup>1</sup>, Batallas, R.<sup>1</sup>, Sturm, A.<sup>1</sup>, Manson, J.<sup>2</sup>, and Evenden, M. L.<sup>1</sup>

<sup>1</sup> Department of Biological Sciences, University of Alberta, Edmonton, AB, Canada T6G 2E9

<sup>2</sup> Department of Biology, University of Virginia, Charlottesville, VA, United States 22904

Large numbers of hymenopteran pollinators, including bumblebees (*Bombus* spp.), are captured, as unintentional bycatch, in pheromone-baited traps targeting various lepidopteran pests in a wide range of agroecosystems. Removal of bumblebees in pheromone-baited traps may have negative impacts on biodiversity and pollination services for local crops, and can reduce monitoring system efficiency. We conducted field experiments in canola and wheat crops in central Alberta, Canada. Green coloured Unitraps® baited with a food-bait lure (1:1 ratio of fermentation products acetic acid and 3-methyl-1-butanol) or with pheromone lures for three moth pests (Lepidoptera: Noctuidae), redbacked cutworm (*Euxoa ochrogaster*), bertha armyworm (*Mamestra configurata*), or true armyworm (*Mythimna unipuncta*), were compared to unbaited traps. More species and greater numbers of bumblebees were captured in traps baited with noctuid pheromones than in unbaited traps. Food-bait lures did not increase trap attractiveness for bumblebees compared to the control traps. In addition, larger numbers of *Bombus* spp. were captured in traps positioned in canola crops than in wheat. Pheromone-baited traps are common and necessary components of many integrated pest management programs, and the potential ramifications for bee populations and pollination services, affirm the need for further investigation into the mechanism of bumblebee attraction to noctuid pheromones.

## **11. Sex pheromone monitoring of wheat midge: efficacy of commercially available lures and traps.**

Authors: Jorgensen, A.<sup>1,2</sup>, Otani, J.<sup>2</sup>, Evenden, M.<sup>1</sup>

<sup>1</sup> Biological Sciences, University of Alberta, CW405 Biological Sciences Building, Edmonton, Alberta, T6H 3M8, Canada

<sup>2</sup> Agriculture and Agri-Food Canada, PO Box 29, Beaverlodge, Alberta, T0H 0C0, Canada

The wheat midge, *Sitodiplosis mosellana* Géhin (Diptera: Cecidomyiidae), is an invasive pest of wheat (*Triticum* spp.). Monitoring and control targets the short-lived adult stage. The objective of this field study was to compare capture of wheat midge using a variety of commercially available traps and pheromone lures used in monitoring programs in North America. Traps tested included green and orange delta traps (Scotts™ and Scentry™) baited with either a pheromone lure: flex lure (Scotts™), a rubber septa lure (Scotts™ or Great Lakes IPM™) or no lure. Traps were spaced 50 metres apart along the edge of a commercial field of susceptible wheat (cultivars Stettler, Roblin, Thorsby and CDC go) at eight field sites in the Peace River region. Treatments were randomized along a North-South transect at each site. Traps were monitored weekly from 20 June 2016 to 18 August 2016 during wheat midge flight. Peak flight of wheat midge occurred on different weeks at different sites. The number of midge captured was not significantly

different between the differently colored traps, but there was a trend toward higher capture in the orange traps. Significantly more wheat midge were captured in sex-pheromone baited traps compared to un-baited traps, but there were no differences in the number of midges attracted to the two lure types.

## **12. Colony development in bumble bees: A test of the food availability and food continuity hypotheses**

Kutby, R.<sup>1</sup>, Cartar, R.V.<sup>2</sup>

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Many factors potentially shape the reproductive success of animals. Two factors related to food availability are the amount and the consistency of food. We tested the importance of these two factors in explaining development of colonies of bumble bees. Our study sites were located in forests in SW Alberta between the Ghost watershed in the north and the Crowsnest Pass in the south. In each of our 13 sites we installed 24 domiciles prior queen emergence in the spring, and collected them at season end to estimate their success. Floral diversity and abundance were measured by counting flowers along six 150 m transects per site three times (once in each of June, July, and August) to capture seasonality of floral resources. Studies of forest-inhabiting bumble bees are uncommon, so knowing the importance of food to these important pollinators will aid in their conservation, and allow us to better understand environmental effects on bumble bee demography.

## **13. Beyond island biogeography: using butterfly assemblages on lake islands to test two competing hypotheses explaining species diversity on fragmented landscapes**

MacDonald, Zachary G.<sup>1</sup>, Anderson, Iraleigh<sup>1</sup>, Acorn, John H.<sup>1</sup>, and Nielsen, Scott E.<sup>1</sup>

<sup>1</sup> Department of Renewable Resources, University of Alberta, Edmonton, Alberta, Canada

751 General Services Building, Edmonton, Alberta, Canada, T6G 2H1

Inspired by island biogeography theory, ecologists have drawn parallels between oceanic islands and habitat patches on terrestrial landscapes. Thus, it has long been assumed that habitat fragmentation (decreasing patch size and increasing patch isolation) decreases species diversity. However, this relationship may be an artefact of habitat area correlating positively with species diversity, and negatively with degree of fragmentation. In this study, we use butterfly assemblages on islands of Lake of the Woods, Ontario, Canada to test two competing hypotheses: (1) the island effect hypothesis, which suggests that the size and isolation of habitat patches structures species diversity on fragmented landscapes; and (2) the habitat amount hypothesis, which suggests that patch size and isolation play little role, and only total amount of habitat structures species diversity. Several small patches (islands) supported an equivalent or greater number of butterfly species compared with single large patches. Parsing our dataset and running analyses at different scales showed that: (1) ecological processes determining species diversity within habitat patches may be scale-dependent; and (2) broad scale analyses have the potential to obscure fragmentation-species diversity relationships at small scales. We also

introduce a word of caution and a simple method for correctly interpreting species-area relationship extrapolations.

#### **14. Parasitic wasp Sudoku: Field studies of the life history of *Coccophagus gossypariae***

Mader, C.<sup>1</sup>, Erbilgin, N.<sup>1</sup>, and Watts, J.<sup>2</sup>

<sup>1</sup>Department of Renewable Resources, University of Alberta, 442 Earth Sciences Building, Edmonton, AB T6G 2E3, Canada

<sup>2</sup>City of Calgary, Urban Conservation Unit, Parks Department, 11444 Bearspaw Dam Rd. NW, Calgary, AB T3L 0C4, Canada.

Understanding the life history of a species is vital when investigating a natural enemy for potential use in integrated pest management. Greenhouse studies risk presenting a false picture of an organism's behaviour in its actual environment, while field studies on parasitoids are difficult due to their small size and development mostly within their hosts. We present a field method designed to obtain information on the phenology of *Coccophagus gossypariae*, a little studied Aphelinid wasp parasitizing European elm scale (*Eriococcus spurius*) in Calgary, Alberta. This method estimates oviposition and emergence timing, as well as totally life cycle length of the wasps, while minimizing the resources required for study logistics.

#### **15. Effects of nutritional provision and volatile plant chemical lures on parasitism of *Caloptilia fraxinella* by *Apanteles polychrosidis* on green ash in Edmonton**

McPike, S.<sup>1</sup>, Evenden, M.<sup>2</sup>

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*Apanteles polychrosidis* (Hymenoptera: Braconidae) is a native parasitoid wasp that has shifted hosts to exploit the ash leaf-cone roller, *Caloptilia fraxinella* (Lepidoptera: Gracillariidae), an introduced nuisance pest of ash (*Fraxinus*) in Edmonton, Alberta. As the primary parasitoid of ash leaf-cone roller (ALCR), *A. polychrosidis* has the potential to be an effective biological control agent. We tested two approaches to enhance parasitoid attraction and retention on green ash trees, *Fraxinus pennsylvanica*, infested by ALCR: 1) nutritional provisioning with sugar water, and 2) placement of synthetic copies of semiochemicals, methyl salicylate (MS), and the green leaf volatile ((Z) 3-hexenyl acetate, both used by the parasitoid in host location. Lab experiments demonstrated that 25% sugar water provision significantly increases longevity of female *A. polychrosidis* compared to 10% sugar water feeding. Neither wasp numbers, nor parasitism of ALCR were increased in field green ash trees that had 25% sugar water feeders suspended in the canopy. Green ash trees with either one MS bubble cap lure, one (Z) 3-hexenyl acetate bubble cap lure or both of these lures did not show an increase in wasp density or parasitism rate of ALCR compared to control trees.

#### **16. The Effect of Environmental and Spatial Processes on Oribatid Mite Assemblages Across Provincial and Regional Scales in Alberta, Canada**

Meehan, M<sup>1</sup>, Song, Z<sup>1</sup>, Cobb, T<sup>2</sup>, Lumley, L<sup>2</sup>, and Proctor, H<sup>1</sup>

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Species assemblages are structured by a variety of environmental factors along different spatial scales; ecologists use a multi-scale design to study such factors and their affect on biota. Oribatid mites (Arachnida: Acariformes: Oribatida) are thought to be affected by a multitude of environmental factors; however, many studies only assess local environmental factors and do not determine how they are structured spatially. In our study, we tested for the effects of environmental (local and landscape-level) and spatial factors at two spatial scales (provincial level, and Boreal vs. Prairie regions) to determine what structures oribatid mite assemblages most in Alberta. The Alberta Biodiversity Monitoring Institute (ABMI) provided the oribatid mite identifications and much of the environmental data for this study. Our multivariate analyses showed that local and landscape-level environmental variables and spatial variables alone, and in combination equally structured mite assemblages within the provincial and Boreal region. Local environmental variables best-explained assemblages in the Prairie region. Mite assemblages of the two regions were distinctly different, and assemblages were spatially autocorrelated at both spatial scales. This highlights the importance of using different types of environmental data as well as spatial data when conducting similar studies, as all were shown to be important.

### **17. Traits of white spruce that predict attack and success of spruce beetles**

Goulding, M<sup>1</sup>, LaMontagne, J.<sup>2</sup>, and Reid, M.<sup>1</sup>

<sup>1</sup>University of Calgary, Calgary, AB, Canada

<sup>2</sup>De Paul University, Chicago, IL, United States

Conifers primarily defend themselves against herbivory with carbon-based defenses such as terpenes that are concentrated in resin that is produced. These defenses may be costly for the host tree, and due to the finite amount of carbon available there is expected to be trade-offs between what is allocated to defense, growth, and reproduction. A key herbivore of spruce is the spruce beetle (*Dendroctonus rufipennis*), best known for a major outbreak that occurred in the southwest Yukon between 1990 and 2007. Through retrospective analysis of growth and resin ducts in 300 tree cores, we examined how white spruce (*Picea glauca*) allocation of carbon to growth, reproduction, and defense affected spruce beetle attack and the subsequent survival of trees. These analyses showed that the probability of being attacked increased with increasing tree diameter, decreasing annual growth rates, and increasing number of resin ducts produced in both 5- and 10-years prior to attack. Once attacked, the probability of survival increased with both increasing growth rate and number of ducts produced in the attack year. We find that despite the spruce beetle's tendency to have lower success when attacking better-defended trees, higher defenses increased the chance a tree is attacked.

### **18. The Role of Tree Diameter in Host Orientation of Mountain Pine Beetle**

Murphy, W<sup>1</sup> and Reid, M.<sup>1</sup>

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Mountain Pine Beetle (*Dendroctonus ponderosae*) are a notable pest of pine trees (*Pinus* spp.) in Western North America. Current management strategy prescribes the removal of vulnerable trees before they are sufficiently infested. Evidence suggests that the most vulnerable trees are large (*i.e.* diameter ~ 30 cm). There are other properties (*e.g.* resin production, phloem thickness) possibly associated with tree diameter which can also affect the tree's survival. Currently, it is unclear if MPB are selecting for diameter or some other factor. In an experiment, we tested the effect of silhouette size on MPB orientation by using multiple funnel traps in either a singlet or triplet arrangement to simulate small and large trees. Analyses suggest that silhouette size by itself is not important to MPB orientation in turn suggesting that MPB rely on more than just visual stimuli in orienting to their hosts.

### **19. LongRange® (eprinomectin), faecal residues, and dung-breeding insects**

Nieman, C.<sup>1</sup>, and Floate, K.D.<sup>2</sup>

<sup>1</sup> University of Wisconsin, Madison, WI, USA

<sup>2</sup> Agriculture & Agri-Food Canada, Lethbridge, AB, Canada

Cattle treated with parasiticides can faecally excrete insecticidal residues for weeks or months post-treatment, varying with the nature of the formulation; *e.g.*, injectable, topical, bolus. Depending upon residue concentration and the sensitivity of the given taxon, activity of insects in dung of treated cattle is partially or completely suppressed. LongRange® (eprinomectin) is a novel 2-phase formulated parasiticide recently introduced into the market. Treated cattle excrete an initial pulse of residue in the first week post-treatment, followed by a second smaller pulse about 14 weeks post-treatment. In the first study of its kind, results show insect suppression in dung deposited by cattle treated up to 20 weeks previously with LongRange®. Implications are discussed.

### **20. Drivers don't care what matters for hitchhikers: phenotype-dependent dispersal of mountain pine beetle and the costly consequences for its ectosymbionts.**

Peralta-Vazquez, G. H.<sup>1</sup>, and Reid M.<sup>1</sup>

<sup>1</sup>Biological Sciences, 507 Campus Drive N.W. University of Calgary

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T2N 1N4

Dispersal is a costly and phenotype-dependent activity for organisms. Theory suggests that costs associated to the movement of individuals between natal and colonization sites are expected to increase as dispersal increases. At the same time, evidence suggests that dispersal ability increases with the internal state of individuals (*e.g.* larger individuals are more capable of dispersing). Therefore, we expect that only those organisms in better condition should endure long-distance dispersal. This is particularly relevant for phoretic interactions where symbiont species rely entirely on the dispersal ability of their host even when this might not be on the interest of the host. Using mountain pine beetle (MPB) and its ectosymbionts we tested whether host dispersal success (long-distance dispersal) is predictive of symbiont dispersal success (proportion of successful mites) and whether symbiont abundance is costly for the hosts. Our predictions were partially supported in intriguing ways. We found that indeed MPB dispersal is a phenotype-dependent activity but this was not predictive of symbiont dispersal success. Contrary to

our expectations, symbiont abundance was not costly for host and it actually explained increased symbiont mortality after host dispersal. We discuss these results in terms of the species life-history and the persistence of their interaction.

## **21. Prevalence of auto-fluorescent proteins and phylogenetic significance of resilin in the family *Milichiidae***

Perry, A.<sup>1</sup>, Swann, J.<sup>1</sup> and Wildering W.<sup>1</sup>

<sup>1</sup> University of Calgary, 2500 University Dr NW, Calgary, AB T2N 1N4

The presence of the protein resilin in the cuticular exoskeleton of insects is not a novel discovery; however, information regarding the presence of resilin in the ovipositor is absent. Resilin is described here for the first time in the ovipositor of insects in the family *Milichiidae*. Resilin is thought to act as the elastic component for the ovipositor, which helps facilitate egg deposition with the aid of retraction and expansion of the ovipositor. In this study 13 genera of *Milichiidae* were examined for resilin using auto-fluorescence inverted microscopy. Of the genera studied, four distinct patterns were identified along the length of the ovipositor cuticle. Additionally, other internal structures within the ovipositor are thought to also be resilin containing. The identification of resilin characters in both the order Diptera and outside the order can give insight into the evolutionary relationships of insects as well as suggest novel uses for resilin in biosynthetic materials.

## **22. The importance of matrix and corridors for non-native *Pterostichus melanarius* (Carabidae; Coleoptera) in an agro-ecosystem**

Punko, R. N.<sup>1</sup> and Cartar, R. V.<sup>1</sup>

<sup>1</sup>University of Calgary, Alberta

Habitat loss produces remnant patches, and to move between these patches, organisms must disperse through matrix habitat of varying suitability. The degree to which dispersal occurs, known as connectivity, can be improved by habitat corridors. Most agroecosystems have fencelines that act either as a corridor to dispersing organisms, or a habitat to settling organisms. *Pterostichus melanarius* is a large, introduced ground beetle that prefers agricultural fields. We investigated the effect of landscape structure on its abundance by comparing two types of corridors (connected and unconnected) and matrixes (agricultural and semi-natural), and their combined effects. Specimens were collected using pitfall traps at 20 fenceline locations surrounding Analta, Alberta. We found more beetles in fencelines surrounded by agricultural than those surrounded by semi-natural habitats, but only when fence-line habitats were connected. We found that these beetles were more abundant adjacent to agricultural habitats (relative to semi-natural habitats), but only when fencelines were connected. Perhaps corridors also allow for the movement of native species, who then out-compete non-native *P. melanarius* in semi-natural contexts. Overall, both matrix and corridors combine to affect organismal abundance, and low connectedness can enhance the abundance of *P. melanarius* in natural landscapes.

## **23. Hiding in plain sight: prospects of benign bark beetles killing trees in a new climate.**

Reid, M.<sup>1</sup>, Alcock, J., Sekhon, J. and Wilkinson, K.

<sup>1</sup>University of Calgary, Calgary, AB, Canada

The future climate of western North America is expected to be hotter with increased chance of drought. These climate conditions may increase tree mortality inflicted by bark beetles through direct positive effects on bark beetles and through indirect effects on host tree traits that affect beetle success. Here we empirically investigate the indirect effects of climate on lodgepole pine, *Pinus contorta*, and in turn on the bark beetles (Scolytinae) that attack pine. Through tree core analysis, we found that in dry years tree growth and resin ducts were reduced relative to wetter years. Toxicity studies showed that reduced monoterpene concentrations, naturally found in resin, increase the survivorship of mountain pine beetles, *Dendroctonus ponderosae*, that commonly kills trees, and of pine engravers, *Ips pini*, that normally does not attack live trees. The reduced resin defences of pines in dryer conditions may allow pine engravers to become tree killers across the boreal forest.

#### **24. Bumble bee responses to landscape depend on body size in a prairie agro-ecosystem**

Retzlaff, J.L., Galpern, P., Cartar, R.V.

Dept. Biological Sciences, University of Calgary; [jlcosh@ucalgary.ca](mailto:jlcosh@ucalgary.ca)

Landscape in Alberta is changing in composition and configuration of native prairie and crop areas; shifting to large, highly fertilized, monocultures with little surrounding native habitats. Bumble bees (genus *Bombus*) may respond to changing landscape with shifts in body size within species. We sampled bumble bees over a nine week field season in summer 2015, which trapped over 4000 bumble bees from 100 sampling sites that differed in landscape context. We found that species respond differently to amount of native prairie at both local (250m) and landscape (3000m) ranges. For the 5 species for which we had sufficient sample size (n>100 individuals), we found interactions between the amount of native habitats in local (250m) and broad (3 km) radii. The 2 small-bodied species showed no response to native habitat at the broad scale, and body size declined as local native habitat increased, regardless of broad scale habitat. The 3 larger species showed a decline in body size as local native habitat increased, when broad scale native habitat was low. Two of these species increased in body size as native habitat cover increased at the broad scale, but *Bombus ternarius* showed the opposite trend, instead declining as native habitat increased. We discuss implications of these landscape effects on body size for the conservation of bumble bees in the prairie landscapes of Southern Alberta.

#### **25. The spatial distribution of central place foraging pollinators in mass-flowering crops**

Robinson, Samuel V.J.<sup>1</sup>, Cartar, Ralph V.<sup>1</sup>, Pernal, Stephen, F.<sup>2</sup> and Hoover, Shelley E.R.<sup>3</sup>

<sup>1</sup>University of Calgary

<sup>2</sup>Agriculture and Agri-Food Canada

<sup>3</sup>Alberta Agriculture and Forestry

Central-place foraging theory describes the space use of rate-maximizing organisms who return to a central place (nest, hive) after bouts of foraging. The distance that a central-place forager (CPF), including solitary and social pollinators, will travel from their central place depends in part on the costs of travel, as well as the rewards received during foraging. Competition among CPFs can deplete resources locally, changing the structure of rewards and causing CPFs to move further away. Many models of CPF behaviour have examined competition, patch exploitation, and energetics, but none have connected these pieces to build a general model of CPF behaviour in large foraging environments. In this study, we describe an energetically explicit model of central-place foraging based on the ideal free distribution, and test it using observations of honey bees (*Apis mellifera* L.) foraging in mass-flowering canola (*Brassica napus* L.) fields in southern Alberta, Canada.

## **26. Review of Bee Systematics, Ecology and Conservation in Canada** Sheffield, C.S.

In the past two decades, our knowledge of bees in Canada has increase dramatically. This has been due in part to increased focus on pollinators in Canada, including bees, in response to global declines and conservation concerns. The five year NSERC-funded Canadian Pollination Initiative (CANPOLIN) allowed researchers from across Canada to collaborate on multiple projects with a common goal of increasing our knowledge of pollinators and pollination in Canada. Though not directly related to CANPOLIN efforts, the Canadian Wildlife Service has been undertaking national conservation assessments of a growing list of species for all of Canada through their 5 year " Wild Species: The General Status of Species in Canada" initiative. In 2010, the conservation status of bumble bees were added to this initiative, and for the upcoming 2015 report, all bee species in Canada are included (in addition to many other pollinating taxa, including Lepidoptera, Syrphidae, and some wasps). The current status of bee diversity and conservation in Canada will be discussed, in addition to future research to address gaps in our knowledge.

## **27. Morphology and gene expression associated with dispersal capability in mountain pine beetle (*Dendroctonus ponderosae*)**

Shegelski, V.<sup>1</sup>, Evenden, M.<sup>1</sup>, Sperling, F.A.H<sup>1</sup>

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In recent years, mountain pine beetle (MPB), *Dendroctonus ponderosae*, has become a major forest pest in Western Canada, causing immense economic losses in forestry. Dispersal by MPB is poorly understood and improved understanding of MPB dispersal capabilities would improve predictive modelling, allowing more efficient allocation of management resources. Flight morphology and propensity are key elements that must be understood in order to accurately predict dispersal. This study aims to identify morphological characters and genes associated with dispersal capability in MPB. Beetles were flown on flight mills to collect flight data, and measurements were made on the body and wings before RNA was extracted for RNA-seq and differential gene analysis. Dimensions of the wings, body and flight muscles were compared to flight performance; principal component analyses showed no strong relationships between the measured

features and flight. Multiple regression also showed that little variation in flight performance could be explained with wing and body morphology based models, suggesting that behavioural traits - in particular flight propensity - are likely the most important factors affecting dispersal capability. RNA-seq data has been collected and is being analyzed for differential gene expression associated with flight performance.

## **28. The sublethal effect of microsporidian infection on flight capacity of the forest tent caterpillar, *Malacosoma disstria* (Lepidoptera: Lasiocampidae)**

Sjolie, D.M.<sup>1</sup>, Batallas, R.<sup>1</sup>, Hoefele, D.<sup>1</sup>, Arachchige, P.<sup>1</sup>, Saran, C.<sup>1</sup>, Keddie, B.A.<sup>1</sup>, MacQuarrie, C.J.K.<sup>2</sup>, Evenden, M.L.<sup>1</sup>

<sup>1</sup>Department of Biological Sciences, University of Alberta, Edmonton, AB, Canada

<sup>2</sup>Natural Resources Canada, Sault Ste. Marie, Ontario, Canada

The forest tent caterpillar, *Malacosoma disstria* Hübner (Lepidoptera: Lasiocampidae) is a native forest defoliator with a broad geographic range in North America. Forest tent caterpillars experience cyclical population changes and at high densities, there is an increased incidence of disease (microsporidia and virus) that contributes to population regulation. Sublethal microsporidian infection is associated with decreased host body size, fecundity, and longevity which could have implications for dispersal by flight. The objective of the current study was to assess the effect of sublethal microsporidian infection on the adult life history and flight capacity of *M. disstria* (Lepidoptera: Lasiocampidae). *M. disstria* pupae were sent from the Insect Production Service in Sault Ste. Marie, ON. 1-3 day old moths were tethered and flown on computer-linked flight mills to measure flight propensity and distance flown. After the flight bioassay, wing area was measured and wingloading was calculated. As a measure of energy use during flight, lipid content of flown moths was measured using a soxhlet apparatus and compared to that of moths not given the opportunity to fly. Disease status of the moths was determined by slide-mounting abdominal preparations and counting spores at 400x. Moth flight propensity in both sexes was affected by the microsporidian infection. Infected males had lower wing loading compared to uninfected males, but the total distance flown was not affected by disease. Infected female *M. disstria*, however, flew shorter distances than uninfected moths. Fat fuels flight of *M. disstria* as moths that flew farther used more fat.

## **29. Urban ant biodiversity: a survey of ants in Calgary's urban parks**

Sosiak, C.

University of Calgary, 2500 University Drive NW, Calgary AB, T2N 1N4, Canada

The effects of urbanization on biodiversity are becoming of particular interest with increasing rates of urbanization globally. To understand the impact of increasing urban disturbance on ant diversity, nine parks were selected in Calgary, Alberta on a disturbance gradient determined by a City of Calgary ecological integrity metric, the Habitat Condition Rating tool (HCR). These parks were sampled using pitfall traps during early fall 2015. Species richness and abundance data were compared between parks and between overarching HCR categories (high, moderate, and low integrity). High HCR category parks had significantly higher species richness than low or moderate HCR category parks. Park size, HCR score, and distance from the city centre were compared to

average species richness, total number of species, and abundance to evaluate possible correlations. Distance from the city centre correlated significantly with total number of species. Ant assemblages were found to be composed of more genera in highly ranked parks than low-ranked parks, and several species were restricted to highly ranked parks. Some individual parks had unusually low biodiversity; these were a moderately ranked park and a low-ranked park, with park analogues in HCR score and characteristics that were much higher in diversity, suggesting that there is another disturbance metric influencing ant diversity.

### **30. Phylogeny and species delimitation of the spruce budworm group: A historical perspective**

Sperling, F.A.H. and Dupuis, J.R.

Biological Sciences, University of Alberta, 116 St & 85 Ave, Edmonton, AB, T6G 2R3

The evolutionary units of the spruce budworm species group (*Choristoneura fumiferana* complex) have provided much fodder for discussion on species boundaries and phylogenetic relationships. Originally based on biological characteristics and only weakly supported by morphology, most species descriptions were considered tentative even by their authors. Since then, species boundaries have been successively tested using allozymes, mitochondrial DNA, microsatellites and an array of single nucleotide polymorphisms (SNPs). Each source of data has revealed new insights as well as conflicts. We examine efforts to identify species and their relationships within the context of the times in which each new assessment was made, culminating in the application of tens of thousands of genome-wide SNPs. Since the spruce budworm complex includes some of the most important pests of conifers in North America, it remains important to identify and demarcate the evolutionary significant units of this group for management purposes. Spruce budworms provide a demonstration of the limitations of arrangements based on single or few marker types. The taxonomy of the group is still a work in progress, giving insight not only into the evolutionary processes, but also the human factors that influence the criteria and procedures of species recognition.

### **31. The Kananaskis Bioblitz: Lessons Learned**

Swann, J.E.

Department of Biological Sciences, University of Calgary, 2500 University Drive NW, Calgary, AB T2N 1N4

The Kananaskis Bioblitz, July 11-12, 2015, was a collaborative effort between the Entomological Society of AB, Alberta Environment & Parks and several levels of organization within the University of Calgary. The bioblitz and its associated seasonal survey of the insect fauna of the Kananaskis Valley, which ran from mid-May to the end of October 2015, is now starting to yield some interesting results. The logistical pitfalls and somewhat surprising benefits in terms of public engagement will be presented along with the start of the faunistic results.

### **32. Mating disruption 50 years on: pheromones coming of age - finally!**

Thomson, Donald

Pacific Biocontrol, Vancouver, Washington, USA

The first report of the successful deployment of a sex pheromone to control an insect pest *Trichoplusia ni* was published in 1967. Eleven years passed until the US EPA registered the first mating disruption technology, Gossyplure H.F.<sup>R</sup>, for control of pink bollworm *Pectinophora gossypiella* in cotton. Over the last 50 years, the commercial deployment of mating disruption has grown substantially with products registered for dozens of insect pests primarily Lepidopteran species in horticultural crops. Passive-release pheromone dispensers applied by hand or with specialized equipment are the most widely used technologies. Recently, active-release dispensers such as aerosols have been successfully developed and adopted. Mating disruption has been very successful when combined with other management technologies and used in large contiguous areas. Currently, mating disruption is used to manage more than 40 species worldwide with an estimated 750,000 hectares treated. Adoption of mating disruption is increasing especially in the European Union and the USA. Fifty years on and finally coming of age, future trends in development and adoption of mating disruption technology will be discussed.

### **33. Are bees ideal and free? The role of competitor density and floral rewards in patch selection of managed pollinators in a gynodioecious crop system**

Waytes, R.<sup>1</sup>, Cartar, R.<sup>1</sup>, and Hoover, S.<sup>2</sup>

<sup>1</sup>Department of Biological Sciences, University of Calgary, 2500 University Dr NW, Calgary, AB T2N 1N4

<sup>2</sup>Alberta Agriculture and Forestry, Lethbridge Research Centre, 5401-1 Ave S, Lethbridge, AB T1J 4V6

The sexual dimorphism present in gynodioecious systems, which have both hermaphroditic and female flowers, should influence how pollinators visit both floral types. In two-flower systems both floral rewards and competitor density could affect pollinator distribution and visitation, as predicted by the Ideal Free Distribution (IFD). We tested for an IFD in hybrid seed canola (*Brassica napus*), a gynodioecious system where the two floral sexes are spatially separated from each other. We examined the distribution of the two managed pollinators used in this system, *Apis mellifera* and *Megachile rotundata*, according to the local profitabilities of the two floral sexes. Floral profit was calculated by measuring nectar production and floral density, and pollinator density was measured on locally paired hermaphroditic and female bays. At the level of these paired quadrats, we determined that *A. mellifera*, but not *M. rotundata*, were at an IFD on female flowers. Both conspecific and heterospecific competitors were important in explaining the distribution of pollinators on flowers. We conclude that *A. mellifera* were aware of available awards and able to distribute themselves according to an IFD, but there are other factors affecting *M. rotundata* visitation. These results have implications for movement of pollen between canola morphs.

### **34. Survival of *Trogoderma granarium* (Coleoptera: Dermestidae) at extreme temperatures**

Wilches, Diana<sup>1,2</sup>, Laird, R.<sup>1</sup>, Floate, K.<sup>2</sup>, Fields, P.<sup>3</sup>

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<sup>2</sup> Lethbridge Research Centre, Agriculture and Agri-Food Canada, Lethbridge, AB T1J 4B1, Canada.

<sup>3</sup> Cereal Research Centre, Agriculture and Agri-Food Canada, Winnipeg, MB R3T 2M9, Canada.

The khapra beetle, *Trogoderma granarium* (Coleoptera: Dermestidae) is a pest of stored grain in Africa, Turkey, Middle East, Pakistan and India. It is a quarantine insect for much of the rest of the world. It is often intercepted in USA and Canada in food imports. Khapra beetle can be controlled with methyl bromide, but this fumigant is restricted to quarantine and pre-shipment uses and is to be phased-out. Thus, there is an urgent need to find new methods of control, such as extreme temperatures. A number of factors increase tolerance to extreme temperatures; the most important of these are life stage, diapause and acclimation. Khapra beetle has a larval facultative diapause, an arrest in development that improves its survival under extreme environments. The survival for all life stages: Eggs, larvae, diapausing larvae, acclimated larvae, acclimated-diapausing larvae, pupae, and adults at sub-zero temperatures and at high temperatures will be presented.

**Poster Presentation Abstracts  
(Alphabetically by presenting author)**

**35. Crowdsourcing Carabid Collections**

Brunet, B.M.T., Shpeley, D., and Sperling, F.A.H.

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The University of Alberta's E.H. Strickland Entomological Museum contains over 200,000 carabid beetle specimens, of which more than three quarters (173,653) have had their collection information digitized and made publicly available. Here, we describe our efforts to digitize the remainder of our ground beetle holdings for North America as part of a continent-wide initiative with collaborators in the United States and Mexico. We aim to make carabid biodiversity information publicly available to researchers investigating the effects of climate change on diversification and ecological dynamics of this widely studied insect family. Over 20,000 carabids from the University of Alberta's E.H. Strickland Entomological Museum were photographed along with their collection labels. Two part-time undergraduate students completed this work over a period of 23 weeks using standards and guidelines developed by the University of California Berkeley's Essig Museum of Entomology. Transcription of collection label data from the images is now actively being crowdsourced to an online community of volunteers using the Notes from Nature project. Upon completion of data transcription, data will be checked for quality control, re-integrated with our local database, and published to Canadensys, the Global Biodiversity Information Facility (GBIF), and iDigBio data aggregators to ensure persistent public availability for researchers.

**36. Location, location, location: examining arboreal ant nest distributions in felled trees near Toms Brook, Virginia, USA**

Carscallen, G.<sup>1</sup>, Nichols, G.<sup>1</sup>, Novotny, V.<sup>2,3</sup>, Volf, M.<sup>2,3</sup>, Miller, S.<sup>4</sup>, Teixeira-Anderson, K.<sup>5</sup> and Klimes, P.<sup>2</sup>

<sup>1</sup>Smithsonian Conservation Biology Institute, Front Royal, VA

<sup>2</sup>Institute of Entomology, Biology Centre of CAS, Czech Republic

<sup>3</sup>Faculty of Science, University of South Bohemia in Ceske Budejovice, Czech Republic

<sup>4</sup>Smithsonian Institution, National Museum of Natural History, Washington D.C.

<sup>5</sup>Smithsonian Conservation Biology Institute, Front Royal, VA

Ants fill many ecological roles and can heavily influence communities. In the tropics, arboreal ants have been relatively well studied and found to be super-abundant in the forest canopy. However, little is known about arboreal ant communities in temperate regions. We sampled trees in a temperate forest nearby Toms Brook (Virginia) to determine the prevalence of arboreal ants and which trees and nesting sites they prefer. Trees were felled and examined for ant nests. Nests were found under bark, within hollow twigs, branches, and trunks, with the majority of nests in dead twigs (60%). Previous studies found more nests in larger trees, with a higher diameter at breast height (DBH.) This pattern was also supported for Toms Brook, but was less strong than in tropical regions. A relatively smaller DBH here might have contributed to a lower overall density of ants. Together with previous studies in New Guinea (tropical) and the Czech Republic (temperate), this study allows for a rigorous comparison of arboreal ant communities between regions. Linking arboreal ant communities with host trees can help us to better understand their functional roles within the forest ecosystem, which habitats they prefer, and how that differs in temperate versus tropical habitats.

Presentation title: Does timing of release matter in early establishment of a galling insect for yellow toadflax biocontrol?

### **37. Does timing of release matter in early establishment of a galling insect for yellow toadflax biocontrol?**

De Clerck-Floate, R.

Agriculture and Agri-Food Canada, Lethbridge Research and Development Centre, Lethbridge, AB

The stem-galling weevil, *Rhinusa pilosa* Gyllenhal (Coleoptera: Curculionidae) was recently introduced to Canada from Serbia as a biocontrol agent for the invasive perennial, yellow toadflax (*Linaria vulgaris* Mill.). We knew adults emerge in early spring to mate and oviposit into rapidly-growing shoots arising from toadflax roots, but to specifically determine the optimal time to release *R. pilosa* in relation to host phenology, experiments were conducted. 1. A greenhouse experiment involved using potted, artificially overwintered toadflax plants at three developmental stages; 3, 16, 30 days of vegetative shoot growth before exposure to *R. pilosa*. Measurements/plant were; gall and weevil numbers, gall volume, F1 weevil size. Contrary to prediction, the oldest growth stage produced more and larger galls and more weevils, but there was no effect of growth stage on weevil size. 2. A 2015 field experiment involved releasing weevils (150/site) near Calgary, AB at; A) four sites in late April-early May (early stage), and B) four sites in early June (late stage). Sites were revisited in late summer to count galls. More galls were found at the late growth stage sites, thus supporting the greenhouse experiment results. We recommend releasing *R. pilosa* later in spring to increase likelihood of its establishment.

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Batallas, R.	10, 28
Best, L.R.	<b>5</b>
Brunet, B.	3, <b>35</b>
Carroll, E.	9
Carscallen, G.	36
Cartar, R.V.	6, 12, 22, 24, 25, 33
Chang, D.	8
Cobb, T.	16
Curley, D.	9
De Clerck-Floate, R.	<b>37</b>
Dufton, S.	<b>7</b>
Dupuis, J.R.	30
Erbilgin, N.	14
Evenden, M.L.	10, 11, 15, 27, 28
Fields, P.	34
Floate, K.D.	<b>19</b> , 34
Galpern, P.	<b>8</b> , 24
Glass, H.	<b>9</b>
Goulding, M.	<b>17</b>
Grocock, N.L.	<b>10</b>
Hoefele, D.	28
Hoover, S.E.R.	25, 33
Johnson, S.A.	8
Jorgensen, A.	<b>11</b>
Keddie, B.A.	28
Kienzle, H.	9
Klimes, P.	36
Kutby, R.	<b>12</b>
Laird, R.A.	7, 34
LaMontagne, J.	17
Lindeman, J.	6
Lumley, L.	16
MacDonald, Z.G.	<b>13</b>
MacQuarrie, C.J.K.	28
Mader, C.	<b>14</b>

Manson, J.	10
McPike, S.	<b>15</b>
Meehan, M.	<b>16</b>
Miller, S.	36
Murphy, W.	<b>18</b>
Nichols, G.	36
Nielsen, S.E.	13
Nieman, C.	19
Novotny, V.	36
Otani, J.	7, 11
Peralta-Vazquez, G.H.	<b>20</b>
Pernal, S.F.	25
Perry, A.	<b>21</b>
Proctor, H.	16
Punko, R.N.	<b>22</b>
Reid, M.L.	2, 17, 18, 20, <b>23</b>
Retzlaff, J.L.	8, <b>24</b>
Robert, B.A.	<b>4</b>
Robinson, S.V.J.	<b>25</b>
Sangwook, A.	<b>2</b>
Saran, C.	28
Sekhon, J.	23
Sheffield, C.S.	<b>26</b>
Shegelski, V.	<b>27</b>
Shpeley, D.	35
Sjolie, Dylan M.	<b>28</b>
Song, Z.	16
Sosiak, C.	<b>29</b>
Sperling, F.A.H.	3, 27, <b>30</b> , 35
Sturm, A.	10
Swann, J.E.	8, 21, <b>31</b>
Teixeira-Anderson, K.	36
Thomson, D.	<b>32</b>
Vamosi, S	9
Volf, M.	36
Watts, J.	14
Waytes, R.	<b>33</b>
Wilches, D.	<b>34</b>
Wildering, W.	21
Wilkinson, K.	23
Yee, D.	9

**Minutes of the Entomological Society of Alberta  
Executive/Board of Directors Fall Meeting  
Calgary October 27 2016**

Meeting called to order at 5:12pm

Chair: Shelley Hoover (President)

In Attendance: John Swann (Past-President), Shelley Hoover (President), Ralph Cartar (Vice-President), Ken Fry (Secretary), Caroline Whitehouse (Treasurer), Mark Oliver (Central Director), Rob Longair (Regional Director to ESC), Haley Catton (Regional Director to ESC in waiting), Tonya Mousseau (Proceedings Editor), Megan Evans (Southern Director)

Regrets: Sarah McPike (Northern Director), Alec McClay (Webmaster)

1. Agenda approval

**MOVED** by Megan, Seconded by John that the agenda, be approved; Carried

2. Approval of Fall 2015 Executive Meeting Minutes

**MOVED** by Mark, Seconded by John that the minutes be approved; Carried

3. Report from the Treasurer (Caroline Whitehouse)

- See attached report
- Using accounting software, available free online
- Can provide income and balance statement at any time
- Have increased membership to 107 with 61 delinquent
- Cash on hand still around \$9,000.00
- Annual meeting attendance up from 37 to 62

**MOVED** by Tonya, Seconded by Mark that the Treasurer's report be received with subsequent revision; Carried

4. Report from Secretary (Ken Fry)

- See attached report
- Questions about succession planning for officers, especially the treasurer
  - Government employees may not be able to sign cheques

**MOVED** by Ken, Seconded by Mark that the Secretary's report be accepted as amended; Carried

5. Regional Reports

- a. Report from Northern Director (Sarah McPike)
  - Delivered by Ken Fry

- See attached report
- b. Report from Central Director (Mark Oliver)
- See attached report
- c. Report from Southern Director (Megan Evans)
- See attached report
- d. Regional Director to the ESC (Rob Longair)
- See attached report
  - Sale of memoirs not what they used to be so a major revenue stream disappearing
  - Budget constraints a priority
  - National society tax liability not entirely solved, two of seven societies have not provided financials as yet
    - National society is the only entity that is vulnerable
  - National society looking for a regional society representative on a public outreach committee
  - Will be updating the website
  - Kevin Floate stepping down as editor and chief end of 2017
  - Alec McClay received a service award for his work as Secretary
  - 2017 Winnipeg
  - 2018 Vancouver JAM with ESA
  - Fewer industry based members, more interest in non-taxonomic societies (such as Ecology and evolution) which is more relevant
  - Explore multi-year memberships
  - Look at pre-professional membership

**MOVED** by John, seconded by Megan, to accept the reports as submitted; Carried

6. Report from Webmaster (Alec McClay)

- No report supplied

7. a. Fall Meeting Plans Update

- 62 people registered
- \$1500 secured from VPR at UC to be applied to the banquet
- \$1,500 from Department to go towards students to offset costs of registration
- could get students to submit receipts to department as bursary
- no matter what \$1500 from dept will be forthcoming
- may not be \$600 from forestry
- 2 travel awards and one undergraduate award to be granted
- how to deal with drop ins and the catering (single day attendance) for lunch numbers

b. Student Awards

- reviewed by committee after executive meeting

## 8. Old Business

### a. Honorary members

- Recounted history of discussion
- Currently stands at 5%
- What is the cost to carry an honorary member...nothing other than membership fee, and meeting registration
  - i. Is meeting registration a necessary perk?
- Expand definition to include science and contribution to society
- Term limit such as 20 years was proposed and declined
- Currently any member in good standing and those delinquent who have been delinquent only for one year are eligible to be counted toward membership numbers
- Put a by-law revision to increase number of honorary members
  - . Goes on spring exec agenda to draft and issue advance notice to membership (21 days notice)

### b. Regional Director to ESC Protocol

- Nominate a nominee on the slate (therefore not elected, per se)
- Must be done one year in advance to allow ESC can vote our preferred (nominated) candidate
- 
- each board member put together a process document for their portfolio
  - Details of duties and methods and processes to be prepared

## 9. New Business

### a. Resolutions

- none brought forward

### b. 2017 meeting

- South
- Megan Evans to be local organizing chair
- Possibly in Blairmore
- Adequate accommodations
- Polish hall is available

### c. Student Definition

- adhere to 6 months post graduation for students
- Introduce a motion to change by-laws to introduce a new category - early professional

### d. Hardship clause

- advocate they take a one day fee and skip the dinner (most of the registration fee is for the dinner)

MOVED by Caroline, that the Local Organising Committee is encouraged to achieve a profit from the Annual Meeting, seconded by Shelley: Carried

- e. Jeff Goldberg
- ESA asked to support recognition of Jeff's support for systematics and collections at UofC

MOVED by John, that the ESA support acknowledging Jeff Goldberg for his efforts to reinvigorate the entomology collection and entomology in general at the U. Of C., seconded by Megan: Carried

F. Need someone for the next v.p.

- not much luck in getting a candidate thus far

G. Proceedings done for 2015 and will work on previous 2 years

Adjournment

**MOVED** by Megan, Adjourn the meeting at 7:16pm

**Minutes of the Entomological Society of Alberta (Approved)  
63<sup>rd</sup> Annual General Meeting**

**Jasper, Alberta October 29, 2015**

Minutes prepared by Ken Fry, ESA Secretary

**Attendees:**

Martine Baicaen	Paul Galpern	Tom Oliver
Philip Batista	Gregory Holmes	Jennifer Retzlaff
Bette Beswick	Shelley Hoover	Janet Sperling
Héctor Cárcamo	Rola Kutby	Felix Sperling
Ralph Cartar	John Acorn	Rosanna Punko
Diana Catalina Fernández	Sarah McPike	Stephen Trevoy
Samuel Robinson	Christina Gomez	John Swann
Mike Dolinski	Megan Evans	Dylan Sjolie
Maya Evenden	Alec McClay	Riley Waytes
Ken Fry	Rob Longair	Caroline Whitehouse
Zachary MacDonald	Mark Oliver	Tonya Mousseau
Mary Reid		

Meeting called to order at 10:17AM by John Swann (President)

1. 1. Approval of Agenda

**MOVED** to accept, Tonya Mousseau; seconded, Rob Longair: Carried

2. 2. Approval of minutes from the 2014 AGM

**MOVED** to accept, Mike Dolinski; seconded, John Swann; Carried

3. 3. Webmaster's Report (Alec McClay)

- see attached report

- solicited a replacement, no takers at this meeting

**MOVED** to accept, Alec McClay; seconded, Hector Carcamo; Carried

4. 4. Secretary's Report (Ken Fry)  
- see attached report

**MOVED** to accept, Ken Fry; seconded, Mary Reid; Carried

5. 5. Report from Regional Director to Entomological Society of Canada (Rob Longair)
- Oral report provided
  - See attached report provided after the meeting
  - Strauss Associates providing administrative services for the society
  - Financial year ends on 30th June now instead of December, transition not requiring an additional AGM
  - House property sold, hard copy journals moved to a storage space
  - Education fund needs to be accessed
  - Meetings coming up:
    - Montreal 2015
    - ICE/ESA/ESC Orlando 2016
      - will have ESC heritage lecture and business meetings
      - will have ESC student travel awards
    - Manitoba 2017
  - Gold Medal to John Sweeney
  - C. Gordon Hewitt to Cory Sheffield
  - New Fellow: Charles Vincent
  - Criddle: Louis Handfield
  - Lloyd Dossdall Scholarship

**MOVED** to accept, Rob Longair; seconded, Mark Oliver; Carried

6. 6. Treasurer's Report (Caroline Whitehouse)  
1. - See attached report

**MOVED** to accept, Caroline Whitehouse; seconded, Maya Evenden; Carried

7. 7. Nominations (Mike Dolinski): nominations were presented as follows:
1. President – Shelley Hoover
  2. Past President – John Swann
  3. Vice President – Ralph Cartar
  4. Treasurer – Caroline Whitehouse
  5. Secretary – Ken Fry
  6. Southern Director – Megan Evans
  7. Central Director – Mark Oliver
  8. Northern Director - Sarah McPike
  9. Proceedings Editor – Tonya Mousseau
  10. Webmaster – Alec McClay

**MOVED** that nominations cease, John Swann; seconded, Shelley Hoover; Carried.

Nominated slate Acclaimed.

8. 8. Appointment of society financial auditors  
- Janet Sperling and Zach MacDonald accepted.

9. 9. Resolutions: the following resolution was prepared and read by Rola Kutby and Riley Wayte;

Whereas the 2015 Annual Meeting of the Entomological Society of Alberta was great food, fun, interesting insects and was possible only through the help of the after dinner speaker, staff of the Best Western, food and drink staff, meeting chairs Mike Dolinski and Felix Sperling, local arrangements chair Mike Dolinski, scientific programme chair Felix Sperling, registration and finance committee; Caroline Whitehouse, the keynote speaker Paul Galpern, the after dinner speakers Kirsten and Dave, and the financial sponsors Mike Dolinski and Dr. Terry Carlyle, be it resolved that we provide a round of applause for them and that the President write a letter of thanks to the Jasper Inn and Dr. Terry Carlyle.

**MOVED** that the resolution be accepted, Rola Kutby; seconded, Riley Wayte; Carried.

- 10.

11. Old Business

10. Digital Archives (Ken Fry)

- all files from 2002 onward now on Google Drive
- need to investigate paying for increased storage (\$3.50/month for 250GB)

**MOVED** that the Secretary purchase a back-up storage device to mirror all digital archives, Mike Dolinski, seconded by Felix Sperling; Carried

- proceedings will be processed in a timely fashion, with assistance from prior proceedings editor (Megan Evans) and others

12. New Business

11.1 Dosedall Scholarship

- Scholarship endowed by Lloyd's widow
- for aquatic ecology and or agricultural ecology

**MOVED** that the ESA donate \$1,000.00 to the Lloyd Dosedall Scholarship be accepted, John Swann; seconded, Shelley Hoover; Carried.

11.2 Honorary Members

- By-Laws dictate that no more than 5% of membership can be an honorary member
- John Swann to draft guidelines for executive for nomination as an honorary member
- An amendment to the by-laws to be proposed for next AGM

11.3 2016 meeting

Proceedings of the 60th Entomological Society of Alberta Annual Meeting

- Calgary has put forward a proposition
- potentially the UofC
- fallback would be Kananaskis
- Hotel Alma on campus plus motel across the street
- Since ICE at end of September, should have it end of October

12. President's Address

- See attached remarks

1. 13. Adjournment

**MOVED** to adjourn, Megan Evans  
- meeting adjourned at 11:16AM

**2016**  
**Entomological Society of Alberta**  
**Regional Director to the Entomological Society of Canada - Report**  
**to the Board of Directors of the Entomological Society of Alberta**

I attended the ESC Board of Directors meeting (outgoing) on 24 September 2016 and the ESC AGM on 27 September at the International Congress of Entomology in Orlando, FL. The ICE is thought to have been the largest gathering of entomologists ever, with more than 6600 registered participants from 102 countries. The Entomological Society of Canada was only one of many professional societies to hold meetings in conjunction with the ICE.

The following information includes activities with which I was involved in 2015/16 as well as items of note from ESC during that time.

At the Board of Directors meeting, the following items were of particular note and were discussed at some length:

- 1) declining membership and
- 2) the operating budget and the need to reduce expenses or increase revenue. Projected deficits in the future are substantial. In particular, with respect to the reducing expenses, one suggestion was reducing the expenses involved in an editorial assistant for Canadian Entomologist. It was recognized that the Editorial Assistant position has been critical to the ability of the Editor-in-Chief to complete their responsibilities effectively and a number of strong statements were offered in support of maintaining the position.

Financial discussions included:

the risk/return tradeoff of investments that the Society has.  
the appropriateness of expenditures on individual medals for the major awards offered every year by the Society. "Less expensive" alternatives will be investigated.

**Joint Annual Meetings & GST/HST arrears** - The past year saw substantial effort on the part of regional societies, including ours, to provide ESC Treasurer Christopher Dufault with financial and registration information from Joint Annual Meetings held in their areas. ESC learned, after the fact, that GST/HST should have been paid on portions of expenditures during these meetings, and was not. In an effort to prepare to discuss this with Canada Revenue Agency, details of meetings dating back 10 years were compiled. This involved two meetings with ESAB, Canmore in 2005 and Edmonton in 2012. Caroline Whitehouse and Greg Pohl were of particular help in resurrecting some older statements and ESC expressed its appreciation. In particular, details of the meetings in Edmonton will undoubtedly be of use.

Christopher now has all the required information from 5 of the 7 regional societies (including ESAB). As noted previously, ESC agreed to cover any tax in arrears from these meetings.

**Public Education Committee** (Chair - Patrice Bouchard) is still searching for a representative from our Society, about which I circulated e-mails during the past year. No response was received. The Committee will be compiling a list of existing resources related to youth and public education resources in Canada with respect to entomology. A reminder (once more - see last year's minutes) that there is a sum of \$600 available to ESAB every three years (technically, \$200/year, but we haven't applied). There is still time to apply for this funding by 31 December 2016.

**Membership** - As noted above, this is a serious ongoing issue for ESC as it is for many professional societies with no requirement for membership. It is not clear to prospective members what benefits accrue from membership in the society. ESA(merica) is much more successful at making a connection to product suppliers, etc. Considerable discussion ensued on this point, much of it (in my view) similar to suggestions that have been made in the past.

There was a suggestion of multi-year memberships (I believe we are all aware of the possible benefits in this society) or automatic renewal.

**Management Company:** The one-year old relationship/arrangement with Strauss Associates Management Co. in Winnipeg continues to develop - after a year, several minor wrinkles have been resolved. Teleconferencing for Board of Directors meetings, registration renewal and other activities have gone much more smoothly with Strauss' involvement. There will be an effort to determine any changes that might be possible and agreed upon with respect to the contract, but most seem to be happy with the move, on the whole.

**Web Site:** There will be an effort to modify substantially the web site for the ESC. The extent to which Strauss will be involved is a matter for discussion since major changes are not part of the original contract.

**The Canadian Entomologist** - Kevin Floate has requested to complete his period as Editor-in-Chief of Canadian Entomologist at the end of 2017. The Society offered its thanks to Kevin, and to Andrew Smith, the Editorial Assistant for their work, during which time the journal has flourished as well as having increased its impact factor. Discussions with Cambridge University Press will be important in the upcoming year.

**Service Award:** President Neil Holliday presented Alec McClay with an award to mark his service as Secretary from 2011 to 2016.

#### **2016 ESC Award Recipients**

Gold Medal - Guy Boivin (AAFC, St-Jean sur Richelieu)

C. Gordon Hewitt Award - Amro Zayed (Dept. of Biology, York University)

Fellow of the ESC - Valerie Behan-Pelletier (CNC/AAFC, Ottawa)

Honourary Member - Cedric Gillott (Dept. of Biology, University of Saskatchewan)

“Particular thanks go to Alec McClay, who has very capably served the Society as Secretary for five years” - Alec has now stepped down and the position has been filled by Aynsley Thielman, University of Northern British Columbia. Volunteers?

New directors, to fill vacant positions, were voted on and the following are the new ...:

Societal Director (2nd Vice-President) - Fiona Hunter

Director at Large - Laura Timms

Regional Director, ESAB - Haley Catton

Regional Director, SEQ - Étienne Normandin

Regional Director, AES - Suzanne Blatt

The regular progression of other officers results in the following individuals in the positions listed:

President - Neil Holliday 1st

Vice-President - Patrice Bouchard

### **Future ESC meetings**

**2017** - Next year's JAM will be held at the Fairmont Hotel in Winnipeg, Manitoba 22-25 October 2017 in conjunction with the Entomological Society of Manitoba, with the ESC AGM on Tuesday, 24 October. The JAM theme is "Small is Beautiful".

**2018** - There will be a combined meeting of the Entomological Societies of America, Canada and British Columbia to be held in Vancouver, November 11-14, 2018.

Prepared by Robert Longair

27 October 2016

**2016**  
**Entomological Society of Alberta**  
**Northern Director's Report to the Entomological Society of Alberta**

The following happenings have been reported for October 2015-October 2016:

From the lab of Dr. Felix Sperling:

Julian Dupuis defended his PhD in January 2016 and now has a position as Junior Faculty at the University of Hawaii

Brittany Wingert started an MSc in Sept. 2016 on mechanisms of spruce budworm species differences

Tyler Nelson started an MSc in Sept 2016 on crescent-spot butterfly species delimitation

From the lab of Heather Proctor:

Liu, Qi. "Diversity of wetland non-biting midges (Diptera: Chironomidae) and their responses to environmental factors in Alberta", defended Jan 2016. Qi was jointly supervised by me and Rolf Vinebrooke. Qi got a job with Cordillera Consulting in B.C. as a chironomid taxonomist.

Uherek, Christiane "Assessing effects of habitat manipulation on invertebrates in an Arctic barrenlands stream", defended Sept 2016. Christiane was jointly supervised by Dr. Heather Proctor and Bill Tonn.

New Ph.D. student, Andrew Cook, started September 2016. He will be doing something on feather mites of tropical passerines.

From Canadian Forestry Service:

Milestone of note: we have survived a temporary relocation and renovation, and the insect collection is accessible again on a new compactor, with expansion room up to 2000 drawers.

Passing: Dr. Robin Leech, arachnologist passed away June 17th, 2016

Sarah McPike  
October 2016

**2016**  
**Entomological Society of Alberta**  
**Central Director's Report, October 2016**

University of Calgary

John Swann, [jeswann@ucalgary.ca](mailto:jeswann@ucalgary.ca))

**Outreach**

**Grade 2 workshops on small crawling and flying animals with Dr. Diane Edwards**

- Marion Carson Schools, 4 classes ca. 90 students Oct 21, 2016 (ASN)
- Tuscany Public school 8 classes ca. 190-200 students May 16-17, 2016
- Col. Fred Scott Public School 7 classes of split grade ½ ca. 140 students June 9-10, 2016 (ASN)

**Other outreach**

- Co-ordinated the running of the Kananaskis Bioblitz (July 10-12) and Kananaskis Biosurvey May- Oct. 2015. I answered numerous public inquiries and several media requests and acted as liaison between Bio Sci., Dean of Science's office, Biogeosciences, VP Research's office and the Entomological Society of AB.
- Coordinated with the 50<sup>th</sup> anniversary committee the creation of the Paclawsky butterfly display
- Creation of 3 new display drawers, a new museum activities poster, and an interactive exhibit for 50<sup>th</sup> anniversary day and alumni weekend events in April 2016
- Manned (along with volunteers) exhibit on the Friday and Saturday for above 2 events
- Provided display drawers of insects for all Departmental outreach activities as requested by I. Barrette-Ng
- Supplied marine biology exhibit material for Kindergarten activities via Emma Carroll for Tuscany Public School ca. 80 students

**Talks**

- Swann, J.E. Five Minutes of Minutia. Pecha Kucha: Object Based Learning and Creativity, University of Calgary Conference on Postsecondary Learning and Teaching; Calgary, AB. 2016.
- Cosh, J.L., Swann, J., Cartar, R. and Best, L.R. Edges of Agricultural Fields and Communities of Prairie Bees. Entomological Society of Alberta Meetings; Jasper, AB. 2015.
- Swann, J.E. and Beswick, B. Collecting on the Edge of Everything. Entomological Society of Alberta Meetings; Jasper, AB. 2015.

**Media**

1. CBC: Alberta at noon, on mosquitoes. 14 June 2016
2. CBC: The Homestretch, on mosquitoes 25 May 2016
3. Calgary Herald: interview on mosquitoes 24 May 2016
4. Global TV AB: spring insects/dry conditions 21 April 2016
5. News Talk 770 radio: spring insects/mosquitoes 20 April 2016
6. Metro News Calgary: Paclawsky butterfly collection *ca.* Dec 22 2015

- <http://www.metronews.ca/news/calgary/2015/12/23/3000-butterflies-donated-to-calgary-university.html>
7. Global TV AB: Paclawsky butterfly donation Nov. 19 2015  
<http://globalnews.ca/news/2403265/vancouver-man-donates-mind-blowing-butterfly-collection-to-university-of-calgary/>
  8. North Shore News (North Vancouver): Paclawsky butterfly collection Oct 30 2015  
<http://www.nsnews.com/news/prized-butterflies-donated-to-museum-1.2100956>
  9. Global TV BC: Paclawsky butterfly collection Oct 29 2015 (part of succeeding Nov. article item 7)
  10. News Talk 770 radio: impact of El Nino on insects 14 Oct 2015
  11. Global TV AB: Interview on impacts of El Nino in insects 13 Oct 2015
  12. CBC: The Eyeopener: mosquitoes/summer insects 31 July 2015
  13. News Talk 770 radio: Bioblitz and other insect questions 9 July 2015
  14. Rocky Mountain Outlook: Bioblitz interview 7 July 2015  
<http://www.rmoutlook.com/BioBlitz-focusaes-on-biodiversity-of-K-Country-insects-20150708>
  15. CBC: The Eyeopener: mosquitoes 8 Jun 2015

### **Teaching and Mentoring**

- Supported lab exercises for Zool 375 (Intro. Invertebrate Zoology)
- Supported lab exercises for Zool 435 (Entomology)
- Supported/mentored Zool 528 student, Rosanna Punko (with Ralph Cartar)
- Supported/mentored when asked by student doing Ecol 507 research project with R. Longair
- Supported/mentored when asked by student doing Zool 528 research project with R. Longair
- Co-taught with C. Ryan (Geosciences) a unit on stormwater pond ecosystem functioning for ENSC 501 (Environmental Science Field Course II; Aug-Sept 2015)
- Developed lecture and taught lab exercise on identifying aquatic invertebrates for ENSC 401 (Environmental Science Field School I; (Aug 26 2015)
- Mentored/supervised students identifying aquatic invertebrates for ENSC 502
- Continued to help graduate students J. Retslaff, S. Villalobos, R. Waytes & S. Robinson
- Continued to have roughly 12 undergraduate student volunteers working in the collection each semester
- Facilitated bee identification short course for the Cartar and Galpern labs
- Facilitated honours project student at Ambrose University using our Neuroptera collection

### **Donations**

- Completed paperwork/evaluations for second half of Kenner collection donated of aquatic beetles – this puts us top 5 in the country for university holdings of aquatic beetles. (GIK tax receipt for \$30, 639.13)
- Completed paperwork/evaluations for R. Best donation of bees and miscellaneous insects – this will be a very good potential continuous pipeline of fully identified

pollinators that will improve our collection for teaching and research. (GIK tax receipt for \$4,296.50)

- Acquired most of the Paclawsky butterfly donation and have started with the help of volunteers to catalogue it for getting external collection evaluations. There is a small (ca. 200 specimens) portion of this collection that needs to be picked up
- Will be acquiring Lawrence Harder's research related bee collection June 2016
- May acquire donation of identified Symphyta and spiders along with misc. Malaise trap samples from Vanderhoof BC – must contact former Ambrose University student to start donation process

### **Loans issued and received**

- 15 loans sent out in 2015
- 2 so far in 2016 with about 5 more pending.
- Numerous loans of Symphyta (sawflies), *Bombus* (bumblebees), and Heteroptera (true bugs) have been returned in late 2015 and early 2016

### **Curation**

- Have successfully moved the wet invertebrate collection into BI 460. Unpacking and improving the curation of this material is ongoing. New space has provided the sink necessary for curating this collection and more work space for the increased use of the collections.
- Curation has focused on the Kananaskis biosurvey/Bioblitz material and on the Beauvais Lake Provincial Park biosurvey material
- The collection holdings of aquatic beetles is now top 5 in the country. This is in large part a result of the Kenner donations of which about 60 % is now curated into the main collection
- The collection holdings of Neuroptera is now top 3 in the country. Much of this is a result of collaboration in a Canadian Wildlife Service 'Assessment of Neuroptera Fauna Survey'
- Family counts of our holdings are now complete for all orders except Diptera, Hymenoptera and Lepidoptera. This was done with the assistance of volunteers and should go up online soon.
- Revisions of the departmental museum/collection webpage texts have been made and submitted to the technical manager.

### **Research**

- Biosurvey of Kananaskis Valley 2015 (collaboration with Entomological Society of AB) (9 Malaise traps run May-Oct 2015, limited d-netting of aquatics and sweeping)
- Biosurvey of Beauvais Lake Provincial Park (3 Malaise traps running May-Sept 2015 with limited hand collecting)
- Collaborator on successful Alberta Conservation Association and Ducks Unlimited grants with P. Galpern for looking at pollinator patterns at the ecosystem level.
- Continued with personal research (after hours at home) on milichiid flies with 1 book chapter on Colombian milichiid flies released June 2016, one invited chapter on milichiid flies accepted for the Manual of Afrotropical Diptera and

the carnid chapter in prep for the same publication. Asked to and accepted to participate in the Manual of South American Diptera contributing one chapter.

### **Anticipated curatorial activities for 2016-2017**

- Complete the rough curation of the wet collections so that the facility is fully ready for the fall semester
- Move my office into the new collection facility
- Hosting the 2016 Entomological Society of AB meetings in late October 2016. Currently working with the department's faculty, graduate students and the Dean's office to successfully highlight 50 years of entomology at the University of Calgary.
- Will continue to prepare and develop the material from the two 2015 biosurveys and the material from the continued biosurvey of Beauvais Lake in 2016.
- Anticipate adding between 30-45,000 specimens of pollinators over the next 3 years via collaborations with P. Galpern (he is providing the drawers, unit trays and ultimately when needed cabinets, to house this material.
- Re-integrate the recently returned loans into the collection (several thousand specimens)
- Integrate the remainder of the Kenner donation and R. Best donation into the collection
- Integrate Lawrence Harder's collection into the main collection
- Get the collections' new webpages up and get a specially made new webpage for the invert collection allowing updates to holdings and giving us a web presence. First material to go online will be Galpern bee material, true bugs and sawflies. May apply with P. Galpern to the Calgary Foundation for a grant to facilitate this as this material is everyone's natural heritage and being online will give everyone access to this 'library of life'

### **Dr. Mary Reid, [mreid@ucalgary.ca](mailto:mreid@ucalgary.ca)**

- Mary has one new MSc student, William Murphy, studying host selection by mountain pine beetles in Jasper.

### **Dr. Ralph Cartar, [cartar@ucalgary.ca](mailto:cartar@ucalgary.ca)**

- Ralph Cartar's lab group, in the Fall of 2016, consists of:
  - Rola Kutby (PhD candidate). Topic: Foraging ecology and life history of bumble bees.
  - Jennifer Retzlaff (MSc candidate, co-supervisor: Paul Galpern). Topic: Trait-structured bumble bee communities in canola agro-ecosystems.
  - Samuel Robinson (PhD candidate; co-supervisor: Shelley Hoover). Topic: Behavioural and spatial ecology of bee pollinators in canola fields and canola-dominated landscapes.
  - Riley Waytes (MSc candidate; co-supervisor: Shelley Hoover). Topic: Distribution and movement in canola by managed pollinators.
  - Siena Achal (BSc candidate). Topic: Decadal changes in body size & wing shape in bumble bees.

### **Dr. Rob Longair, [longair@ucalgary.ca](mailto:longair@ucalgary.ca)**

- Rob Longair presented a paper on Vespid Wasps of Canada at the International Congress on Entomology in Orlando, Florida in September 2016
- Rob is a member of the Biodiversity Advisory Committee of the City of Calgary until November 2017
- Christine Sosiak, who recently graduated with a B.Sc. double major in Zoology and Geology, including independent projects on ants with Rob Longair, was selected to attend “The Ant Course”, a 10-day intensive field and lab course in August 2016 sponsored by the California Academy of Sciences, at the E.O. Wilson Biodiversity Lab in Gorongosa National Park, Mozambique.

**Olds College** (Dr. Ken Fry, [esalberta@gmail.com](mailto:esalberta@gmail.com))

- Ken and one summer student continued with the Elm Bark Beetle monitoring program for the Society to Prevent Dutch Elm Disease and the Invasive Alien Species Surveillance program for StopDED and the CFIA. These programs have contributed several hundred specimens to the Olds College Insect Collection.

Olds College participated in the Ellis Bird Farm Bug Jamboree on August 6, 2016, showcasing entomology to the general public. Ken appeared on Alberta @ Noon on CBC Radio in June, July and August to address listener questions about insects.

### **Field Trips/Outreach**

**Dry Island Buffalo Jump Butterfly Count, July 3, 2016** (Dr. Charles Bird)

Charley has provided a write-up of the annual butterfly count in the Spring 2016 newsletter of the Alberta Lepidopterists’ Guild. Forty-seven participants, a new record, took part in the count, which has taken place annually since 1999. Thirty-two species (146 individuals) were identified, compared to 21 species and 141 individuals last year. In addition, four species of dragonflies and three species of damselflies were identified. Sixteen plant species were observed to be in flower.

The full report can be found at <http://www.albertalepguild.ca/wp-content/uploads/2016/08/ALG-NewsletterSpring2016.pdf>

**Ellis Bird Farm Bug Jamboree, August 6, 2016**

I have not found a report on the Bug Jamboree but judging by Ellis Bird Farm’s blog, the event was well attended, and based on the photo evidence featured well-known ESAB members John Acorn, Charles Bird and Ken Fry.

Photos of the event can be found at <http://www.ellisbirdfarm.ca/blog/ebf-bug-jamboree-2016-was-fun-for-all>

Submitted by Mark Oliver, Central Director  
27 October 2016

**2016**  
**Entomological Society of Alberta**  
**Southern Director's Report, October 27<sup>th</sup> 2016**

**Events and Outreach**

The 6<sup>th</sup> Annual Insect Discovery Day at the Alberta was held at the Bird of Prey Centre on August 13, 2016. Below is an excerpt from the Lethbridge Herald regarding the event, which was well received and attended.

People of all ages were able to get up close and personal with some creepy crawlers this weekend. On Saturday, the Alberta Birds of Prey Centre in Coaldale hosted its sixth annual Insect Discovery Day at the Alberta Birds of Prey Centre. The popular event gives visitors the chance to learn more about some of the insects that live in Alberta. Entomologists were present to help teach visitors how to safely capture insects and properly identify them.

In addition, there was also a pond dipping and butterfly catching station, among other fun activities. Colin Weir, managing director and founder of the Alberta Birds of Prey Foundation, noted that while this day proves to be a lot of fun, it's equally educational. He said it allows people with bug phobias or uncertainties the opportunity to see and learn about the insects in a safe environment. To coincide with the event, sponsor AltaLink announced it has donated \$50,000 to the foundation that will go toward developing a walking trail around the wetland. "It's going to allow them to connect with the wildlife around the wetland in a way that they weren't previously able to," said Nikki Heck, AltaLink's environmental advisor. "Over the past 25 or 30 years, we've always been known for our work with hawks, falcons, eagles and owls and that's what people come here to see, but there's a lot more for people to see and experience here," said Weir. "The greatest, unrealized or underutilized asset we have here is the water and the wetlands and we've never had any trails that follow the shoreline here." Weir said the trail will allow visitors to the centre to see the variety of wetland birds that are attracted to the site. Construction is already under way for the 650-foot path and is expected to be completed in one month.

The Helen Schuler Nature Center hosted an exhibit on bumble bees during the summer of 2016.

A bumble bee box building workshop was held during Ed Gregor Stewardship Day in Blairmore on June 4, 2016. Participants produced and took home over 50 bee houses during the event.

**People**

Diana Wilches MSc thesis title: "Effects of extreme temperatures on the quarantine stored product pest, *Trogoderma granarium* (Khapra Beetle) and on its symbiotic bacteria". Supervisors: Kevin Floate (AAFC - Lethbridge), Paul Fields (AAFC - Winnipeg) and Rob Laird (U of Lethbridge).

Vincent Hervet PhD thesis title: “Host range and multitrophic interactions between the parasitoid *Cotesia vanessae* (Hymenoptera: Braconidae) and noctuidae (Lepidoptera) hosts in north america”. Supervisors: Kevin Floate (AAFC) and Rob Laird (U of Lethbridge).

Gregory Holmes MSc thesis title: “Interactions between a leaf-galling wasp and its invasive hawkweed hosts”. Supervisors: Rose De Clerck-Floate (AAFC) and Rob Laird (U of Lethbridge).

Catalina Fernandez MSc thesis title: Ecological interactions between *lygus* (Hemiptera: Miridae) and their nymphal parasitoids peristenus (Hymenoptera: Braconidae) in southern alberta. Supervisors: Héctor Cárcamo (AAFC) and Rob Laird (U of Lethbridge).

Haley Catton was hired as a Research Scientist, Cereal Crop Entomology with AAFC this year in Lethbridge.

Andony Melathopoulos who was a postdoc in Shelley Hoover and Ralph Cartar’s labs has started a faculty position at Oregon State University.

### **News and Noteworthy**

September 6, 2016 - Accolades

PhD student Vincent Hervet was recently awarded the Robert J. O’Neil Outstanding PhD in Biological Control Award from the International Organization for Biological Control – Neararctic Regional Section.

Respectfully Submitted,

Megan Evans

**2016**  
**Entomological Society of Alberta**  
**Webmaster's Report**

Since the October 2015 meeting, the site has been updated with the 2016 Board information. The 2015 Proceedings have been posted but I have not received the 2013 or 2014 Proceedings for posting.

Blacksun has migrated the site to a new server which appears to have caused a temporary problem uploading files by FTP. However I am still able to upload files via Blacksun's control panel.

Job openings were posted for a summer technician at the Royal Alberta Museum, an Instructor, Invertebrate Biology, in the Department of Biological Sciences, University of Calgary, a tenure-track position in Parasitology at the University of Alberta, and a permanent EG-04 technician position in the cereal crop entomology lab at Agriculture and Agri-Food Canada in Lethbridge.

Information on deceased Honorary Members (Ruby Larson, Joe Gurba, and Evan Gushul) was transferred to the In Memoriam page (today!).

Information on the 2016 Annual Meeting was posted as received, and Paypal buttons were installed to receive registration and membership payments.

The redesign of the site is still pending.

As always I thank all those members who have provided information or pointed out changes that need to be made to the site, and I welcome these suggestions at any time.

Respectfully submitted  
Alec McClay, Webmaster  
October 27, 2016

**Entomological Society of Alberta  
Secretary's Report  
Fall Executive Meeting  
27 October 2017**

Report for the Period October 2, 2015 – October 27, 2016

A. I received/tracked thirteen (13) topics of discussion in my capacity as ESA Secretary:

1. George Evans passing
2. ESA tax liability
3. ESA Proof of Filing
4. Inform Alberta update
5. Scott's Directories Update
6. Robin Leech passing
7. Annual Meeting preparations
8. Regional Director Appointment
9. Kevin Judge Term end
10. ESC items of public outreach
11. Regional Director Nomination (Haley Catton)
12. ESA Annual Meeting Announcements
13. Joe Shemanchuck's wife passing (Oct. 16)

B. I retained discussions and correspondence conducted via email totaling two hundred and forty two (242) messages.

C. As Secretary I issued ten (10) Email & FaceBook notices to the executive or membership including Annual Meeting announcements.

D. InformAlberta, HealthLink Alberta, and Scott's Directories were provided updated Society contact information.

E. Letters/items retained

1. Letter of Announcement for ESC Awards
2. Society's Annual Return to the Province

F. Caretaking items:

- The FaceBook membership has 155 members up from 141 members. 16 postings (not including follow-ups to individual postings) were made to the group since October 16, 2014, down from 34 last year

Respectfully submitted,  
Ken Fry

**2016  
Entomological Society of Alberta  
Treasurer's Report**

**Member Status - 2015**

Type	In good standing	Delinquent but on the books
Free library	20	
Library	1	1
Honourary	3	
Regular	35	41
Retired	1	
Student	21	45
<b>Total</b>	<b>81</b>	<b>87</b>

**AGM 2015 overview – Jasper, AB**

Registrations & ticket sales	\$4,080
Donations	\$1,000
Expenses	(\$4,693.24)
<b>Net profit</b>	<b>386.76</b>

**AGM 2015 attendance**

Regular	20
Student	16
Day	1
<b>Total</b>	<b>37</b>

**AGM 2016 attendance – as of October 26, 2016**

Speakers	2
Regular	23
Regular - After Oct 21	3
Retired	1
Single day - Friday	2
Single day - Saturday	1
Student	2
Student - late	1
Student - not presenting	6
Student - presenting	21
<b>Total</b>	<b>62</b>

**Member Status - 2016**

Type	In good standing	Delinquent but on the books
Free library	20	
Library	1	1
Honourary	3	
Regular	42	31
Retired	3	
Student	38	29
<b>Total</b>	<b>107</b>	<b>61</b>

**Income Statement**  
**Entomological Society of Alberta**  
**Reporting period: 2016-01-01 to 2016-10-24**  
**Created: 2016-10-24**

<u>Accounts</u>	<u>Balance</u>
<b>Revenue</b>	
Uncategorized Income	5,480.00
Interest - GIC Term Deposits	-83.57
Membership Dues	100.00
Interest Income - Accrued, GIC	626.28
<b>Total Revenue</b>	<b>6,122.71</b>
<b>GROSS PROFIT</b>	<b>6,122.71</b>
<b>Operating Expenses</b>	
Bank Service Charges	218.96
Awards, Grants & Scholarship Donations*	150.00
Paypal Fees	3.22
<b>Total Operating Expenses</b>	<b>372.18</b>
<b>NET PROFIT</b>	<b>5,750.53</b>

\*Rola Kutby travel award 2015, cheque cleared February 2016

**Balance Sheet**  
**Entomological Society of Alberta**  
**As of: 2016-10-24**  
**Created: 2016-10-24**

<u>Account</u>	<u>Balance</u>
<b>Asset</b>	
Cash on Hand	9,243.50
Common Shares	733.05
<b>Total for Current Asset</b>	<b>9,976.55</b>
<b>Bank</b>	
Paypal	5,381.20
GIC term deposits	15,738.13
<b>Total for Bank</b>	<b>21,119.33</b>
	<b>Total Assets 31,095.88</b>
<b>Liability</b>	
	<b>Total Liabilities -</b>
<b>Equity</b>	
Previous Year(s) Earnings	25,345.35
Current Year Earning	5,750.53
<b>Total Equity</b>	<b>31,095.88</b>
<b>Total Liabilities and Equity</b>	<b>31,095.88</b>

**Caroline Whitehouse**  
 27 October 2016

## Photos



1.



2.



3.



4.



5.



6.



7.



8.

1. John Acorn. 2. Micky Ahn. 3. Robert Bercha. 4. Lincoln Best. 5. \_\_\_\_6. \_\_\_\_7. C. Sosiak. 8.\_\_\_\_



9.



10.



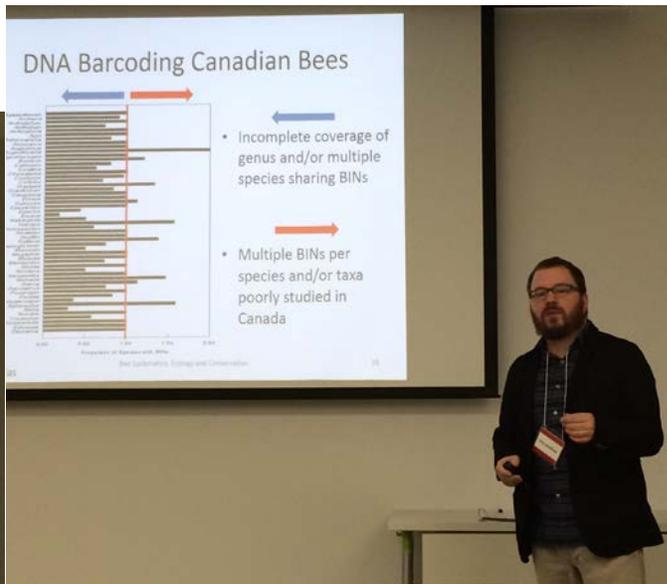
11.



12.



13.



14.

9. John Swann. 10. Jeff Goldberg. 11. Zachary MacDonald. 12. \_\_\_\_\_. 13. \_\_\_\_\_. 14. Chris Sheffield.

**Entomological Society of Alberta  
List of Members**

Last	First	Organization/Address	City
<b>Honorary Members</b>			
Ball	George	Dept. of Biological Sciences	Edmonton, AB
Byers	Bob	AAFC Research Centre	Lethbridge, AB
Shemanchuk	Joseph		

**Retired Members**

Beswick	Betty		Calgary, AB
Dolinski	Michael		Edmonton, AB

**Regular Members**

Acorn	John	University of Alberta	Edmonton, AB
Bahreini	Rassol	Alberta Agriculture and Forestry	Edmonton, AB
Barkley	Shelley	Alberta Agriculture	Brooks, AB
Barr	William	City of Edmonton	
Bercha	Robert		Calgary, AB
Best	Lincoln		
Briere	Charity		Red Deer
Brumec	Vesna		
Cárcamo	Héctor	AAFC Research Centre, Crop Sciences Section	Lethbridge, AB
Cartar	Ralph	Dept. of Biological Sciences, University of Calgary	Calgary, AB
Catton	Haley	Agriculture and Agri-Food Canada	Lethbridge, AB
Chelle-Anderson	Cheryl	Agriculture and Agri-Food Canada	Raymond, AB
Chen	Xuedong		Lethbridge, AB
Coker	Alex		
Cuny	Robert	Lakeland College	Lloydminster, AB
Daniels	Sheree	Agriculture and Agri-Food Canada	Lethbridge, AB

DeClerck-Floate	Rosemarie	AAFC Research Centre	Lethbridge, AB
Evans	Megan	University of Calgary	Calgary, AB
Evenden	Maya	Dept. Biological Sciences, U of A	Edmonton, AB
Flaherty	Leah	Grant MacEwan University	St. Albert
Floate	Kevin	AAFC Research Centre	Lethbridge, AB
Friesen	Kevin	Grant MacEwan	
Fry	Ken	Olds College	Olds, AB
Fulkerth	Christine	Olds College	Olds, AB
Galpern	Paul		
Gavin	Michael		
Gomez	Christina		
Heming	Bruce	Dept. of Biological Sciences	Edmonton, AB
Hilchie	Gerald	Dept. of Biological Sciences	Edmonton, AB
Holmberg	Robert	Centre for Science	Athabasca, AB
Hoover	Shelley	Agriculture and Rural Development	
Hoover	Trent		
Hossain	Mohammad		
Jones	Bradford	ESRD	
Judge	Kevin	Grant MacEwan University	Edmonton, AB
Kwok	Kevin		Medicine Hat, AB
Laird	Robert	University of Lethbridge	Lethbridge, AB
Larson	David	Augustana University College	Camrose, AB
Linowski	Ron	Medicine Hat College	Medicine Hat, AB
Longair	Robert	Dept. of Biological Sciences	Calgary, AB
McClay	Alec	McClay Ecoscience	Sherwood Park, AB
Meers	Scott	Alberta Agriculture	Brooks, AB
Mousseau	Tonya	Mount Royal University	Calgary, AB
Oliver	Mark		Calgary, AB
Pohl	Greg	Department of Natural Resources, Canadian Forest Service, Northwest Region	Edmonton, AB
Proctor	Heather	Dept. of Biological Sciences	Edmonton, AB
Qamar	Muhammad	Alberta Health Services	Hinton
Ranasinghe	Sunil	Alberta Sustainable Resource Development	Edmonton, AB
Reid	Mary	Dept. of Biological Sciences	Calgary, AB

Retzlaff	Philip		
Schwarzfeld	Marla	Dept. of Biological Sciences	Edmonton
Sexsmith-West	Maureen		Lethbridge, AB
Sheffied	Cory		
Sjolie	Dylan	University of Alberta, Biological Sciences Department	Edmonton, AB
Smith	Alexander	University of Alberta, Biological Sciences Department	Edmonton, AB
Spence	John	Department of Renewable Resources	Edmonton, AB
Sperling	Felix	Dept. of Biological Sciences	Edmonton, AB
Swann	John	University of Calgary	Calgary, AB
Thomson	Don		Calgary
Thyssen	Adrian		Edmonton, AB
Walter	Dave	U of A	
Whitehouse	Caroline	University of Alberta	Edmonton, AB
Williams	Daryl		

### Student Members

Ahn	Micky		
Amos	Jared	University of Alberta, Biological Sciences Department	14623 - 85 Avenue
Balcaen	Martine		
Batallas	Ronald	Department of Biological Sciences	Edmonton, AB
Batista	Philip	Dept. of Biological Sciences	Edmonton, AB
Bird	Heather	University of Alberta	Arrowwood, AB
Correal	Diana Maria Wilches	AAFC Research Centre	Lethbridge, AB
Domnich	Ilan		
Dufton	Shelby		
Dupuis	Julian Rowe	Dept. of Biological Sciences	Edmonton, AB
Elekwa	Darlington		Calgary, AB
Fagua	Giovanny	Department of Biological Sciences	
Fernandez	Diana Catalina	University of Lethbridge	Lethbridge, AB
French	Rowan		
Ghavami	Hadi		
Glass	Haley		
Goulding	Megan		

Grocock	Nicholas		
Hervet	Vincent	University of Lethbridge, Department of Biological Sciences	Lethbridge, AB
Hoefele	Danielle	University of Alberta	
Holmes	Gregory	University of Lethbridge	Lethbridge, AB
Hummel	Jeremy	University of Alberta	Edmonton, AB
Jones	Kelsey		
Jorgensen	Amanda		
Klutsch	Jennifer	University of Alberta	Edmonton, AB
Kohler	Monica	University of Alberta	Edmonton, AB
Kutby	Rola		
Lachowsky	Leanna	University of Calgary	Calgary, AB
Lebunasin Arachchige	Pasan		
Leo	Sarah		
MacDonald	Zachary	University of Alberta	Edmonton, AB
MacInnis	Donna		
Mader	Caitlin		
Marshall	Valerie		
Mcpike	Sarah		
Meehan	Matthew		
Murphy	William		
Musso	Antonia		
Oliver	Tom		Calgary, AB
Pain	Rebecca		
Perry	Alexander		
Philipson	Laurens	University of Lethbridge	Patricia, AB
Piekarski	Patrick	University of Calgary	DeWinton
Piitz	Mark	University of Calgary	Calgary
Punko	Rosanna	Alberta Agriculture and Forestry	Westlock, AB
Retzlaff	Jennifer		
Robinson	Samuel	University of Calgary	Calgary, AB
Ross	Michael		
Schmitke	Michaela		Lethbridge, AB
Sekhon	Jagdeep	University of Calgary	Calgary, AB

Shegelski	Victor		
Sosiak	Christine		
Sperling	Janet		Edmonton, AB
St. Onge	Amanda	University of Alberta	Edmonton, AB
Sturm	Ashton		
Subramaniam	Ravindran	University of Alberta	
Trevoy	Stephen	University of Alberta	Edmonton, AB
Vandervalk	Lynae	University of Alberta	Granum
Waytes	Riley		
Weeraddana	Chaminda de Silva	University of Alberta, Biological Sciences Department	Edmonton, AB
Woodman	Samuel	University of Lethbridge	Lethbridge, AB
Zembal	Tamara	Augustana University College	Gibbons, AB

### Library Subscriptions

Archives, Entomological Society of Alberta	Agriculture and Agri-Food Canada, Lethbridge Research Station	Lethbridge, AB
Athabasca University College Library	Athabasca University College	Athabasca, AB
Augustana University College Library	Augustana University College	Camrose, AB
Cameron Library, University of Alberta	Cameron Library, 5th floor, Periodicals, University of Alberta	Edmonton, AB
Colorado State University Libraries	Colorado State University Libraries	Fort Collins, CO
Concordia University College Library	Concordia University College	Edmonton, AB
Glenbow Alberta Institute	Glenbow Alberta Institute	Calgary, AB
Grande Prairie Regional College Library	Grande Prairie Regional College	Grande Prairie, AB
Lakeland College Library	Lakeland College	Vermilion, AB
Lethbridge Research Centre	Agriculture and Agri-Food Canada, Lethbridge Research Station	Lethbridge, AB
Medicine Hat College Library	Medicine Hat College	Medicine Hat, AB

N.A.I.T. Library	N.A.I.T.	Edmonton, AB
National Library of Canada	National Library of Canada, Serials Records Section, Acquisitions and Bibliographical Services	Ottawa, ON
Northern Forestry Centre Library	Canadian Forest Service, Northern Forestry Centre	Edmonton, AB
Olds College Library	Olds College	Olds, AB
Provincial Museum and Archives	Provincial Museum and Archives	Edmonton, AB
Red Deer College Library	Red Deer College	Red Deer, AB
S.A.I.T. Library	S.A.I.T.	Calgary, AB
Strickland Library	University of Alberta	Edmonton, AB
University of Calgary Library	University of Calgary	Calgary, AB
University of Lethbridge Library	University of Lethbridge	Lethbridge, AB

## **The Entomological Society of Alberta**

The Entomological Society of Alberta was organized November 27, 1952, at a meeting held in Lethbridge, Alberta, as an affiliate of the Entomological Society of Canada. A certificate of incorporation was obtained under the Societies Act of Alberta on February 19, 1953.

The membership of about 70 paid-up members at that time consisted mainly of Dominion (Federal) entomologists at the Science Service Laboratories in Lethbridge (now an Agriculture and Agri-Food Canada Research Station), the Suffield Research Station, the Forest Zoology Laboratory in Calgary, and students and staff from the University of Alberta.

The objective of the Entomological Society of Alberta (ESAB) shall be to foster the advancement, exchange, and dissemination of the knowledge of insects in relation to their importance in agriculture, horticulture, forestry, public health, industry, the environment, and for its own sake, among the people of the province of Alberta.

Membership is open to anyone interested in Entomology. Annual dues are \$20.00 (\$10.00 for students and retired members). Contact the Treasurer via the society website:

<http://www.entsocalberta.ca/esa.htm>

