

PROCEEDINGS OF THE 58TH ANNUAL MEETING OF THE



Entomological Society of Alberta

October 14th-16th 2010
Lethbridge, Alberta

CONTENT

Entomological Society of Alberta Board of Directors for 2010	3
President's Address	4
Program of the 58th Annual Meeting of the Entomological Society of Alberta.....	5
Oral Presentations and Abstracts	9
Poster Presentations and Abstracts	25
Index to Authors	28
Executive/Board of Directors Meeting.....	31
Minutes of the Entomological Society of Alberta AGM.....	34
Report of the Regional Director to the Entomological Society of Canada	37
Northern Director's Report	39
Central Director's Report.....	43
Southern Director's Report	46
Webmaster's Report.....	48
Secretary's Report	49
List of Members	53
Photos.....	58

Entomological Society of Alberta Board of Directors for 2010

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Local Organizing Committee.....Rose De Clerck-Floate (co-chair)
.....Hector Carcamo (co-chair)
.....Brian Van Hezewijk
Program Committee.....Kevin Floate
.....Rob Bouchier
Registration and Budget Committee.....Kimberly Rondeau

President's Address

First, I'd like to thank all of you for attending, and I thank those of you who have presented talks and posters at this, our 58th annual meeting. I also thank the Plant Pathology Society of Alberta, and the Western Forum for Pest Management, for meeting jointly with us. I thank our local arrangements committee, made up of Emily Barnewall, Hector Carcamo, Rose De Clerk-Floate, and Brian Van Hezewijk; the scientific program committee, made up of Rob Bouchier and Kevin Floate; and our one-person finance committee made up of Kim Rondeau. I also thank Derrick Kanashiro and Robin Leech for serving as our photographers at this meeting. As well, I'd like to thank our banquet speaker, Colin Weir, from the Alberta Birds of Prey Centre, and the staff of the Coast Hotel, for making this such an enjoyable and rewarding meeting.

At this time I'd also like to thank the society membership, for putting their trust in myself and the rest of the executive, to manage the society's affairs for another year. I acknowledge the work of past and future executive members, for keeping this society going, and moving it forwards. In particular I recognise outgoing Treasurer Kimberley Rondeau, and outgoing Editor Emily Barnewall; both of you have done so much work for the society, and we thank you.

It's not easy finding people willing to donate their energies to a local society such as ours. So many of us feel squeezed in this modern world of science where our machines set the pace. We're becoming slaves to the vast electronic and bureaucratic webs we've constructed. It seems like a luxury for many of us, to once in a while get out into the field or forest, or for that matter to get to a regional meeting like this. Despite the machines that run our lives, we're still human and we still need connections with nature and with other humans who are after all a part of nature too. We've seen in the last couple of days, the important role our society plays in that.

It's about connection - bringing people and ideas together to help us move forwards.

I'll stop there - I look forward to seeing you all in Calgary/Kananaskis in 2011.

Greg Pohl
ESAB 2010 President

Program of the 58th Annual Meeting of the Entomological Society of Alberta

Thursday, October 14, 2010

- 17:30 Executive Meeting (Chez Van-Hezewijk)
19:30 Registration open (Hallway outside Southern)
19:30 – 22:00 Reception (Southern)

Friday, October 15

- 07:30 Registration open (Hallway outside Southern room)

08:00 Opening and Welcome
Greg Pohl, President, ESAB
André Laroche, President, PPSA
Héctor Cárcamo, President, WFPM

ESAB-PPSA-WFPM 2010 JOINT SYMPOSIUM **ARTHROPOD-PATHOGEN INTERACTIONS**

- 08:15 **Introduction to the Symposium**
(Moderator Rob Bouchier)

08:20 **Phytoplasma research: a bridge between plant pathology and entomology**
Olivier, C.Y.

08:55 **Development of soil bacteria for biological control of green foxtail**
Boyetchko S.M., and Hynes, R.K.

09:30 **What's going on inside wheat stems? The interactions between pathogens and a nefarious herbivore**
Weaver, D., Sun, Z., Wenda-Piesik, A., Grey, W.E., Dyer, A.T., and Morrill, W.L.

10:05 **COFFEE**

CONTRIBUTED PAPERS SESSION 1

Moderator – Kathryn Rochon

- 10:30 **How might foraging bumble bees discern nectar production rate from nectar standing crop?**
Cartar, R.V., Foster, D.J., and Pengelly, C.J.

10:45 **Changes in bumble bee abundance and diversity in response to clearcut logging in the foothills forest.**

Farmer, A.M., and Cartar, R.V.

- 11:00 **Influences of grazing on the abundance of bee pollinators and their floral resources**
Evans, M.M., Cartar, R.V., and Wonneck, M.
- 11:15 **Quarantine assessment of *Rhinusa pilosa* as a potential biological control agent for *Linaria vulgaris***
Barnewall, E.C., and De Clerck-Floate, R.
- 11:30 **Hares or Tortoises? How to choose an optimally dispersing biological control agent.**
Van Hezewijk B., and Bouchier, R.
- 11:45 **Operational Biocontrol with a Tortoise**
Bouchier, R., and Van Hezewijk, B.
- 12:00 **LUNCH (on your own)**

CONTRIBUTED PAPERS SESSION 1

Moderator – Alexandria Farmer

- 13:30 **Artificial nutrient hotspots and their effects on the appearance of *Brassica napus* and the abundance of *Ceutorhynchus obstrictus*.**
Blake, A.J., Dosdall, L.M., and Keddie B.A.
- 13:45 **Field pea nodulation and nitrogen dynamics in relation to pea leaf weevil, insecticide seed treatment and urea amendment**
Cárcamo, H., Herle, C., Larson, T., and Lupwayi, N.
- 14:00 **Parasitism of *Delia radicum* (Diptera: Anthomyiidae) puparia in intercrops of canola and wheat**
Hummel, J.D., Dosdall, L.M., Clayton, G.W., Harker, K.N., and O'Donovan, J.T.
- 14:15 **Seasonal Distribution and Phenology of the Cereal Leaf Beetle, *Oulema melanopus* (Coleoptera: Chrysomelide) in Southern Alberta**
Kher, S., Cárcamo, H.A., and Dosdall, L.M.
- 14:30 **Potential for sex pheromone-based communication disruption of the red clover casebearer (*Coleophora deauratella*) in red clover (*Trifolium pratense* L.)**
Mori, B. A., and Evenden, M. L.
- 14:45 **Feasibility of an Area Wide Pest Management (AWPM) Programme for Tea Tortrix *Homona coffearia* Nietner (Lepidoptera: Tortricidae) in Tea in Sri Lanka: A reinvention of wheel?**
Walgama, R S., De Seram, C., and Nandakumara, S.

15:00 COFFEE AND POSTER VIEWING

CONTRIBUTED PAPERS SESSION 2

Moderator – Emily Barnewall

- 15:30 **Antixenosis and antibiosis resistance to and olfactory responses of *Delia radicum* L. (Diptera: Anthomyiidae) associated with lines developed through *Sinapis alba* L. x *Brassica napus* L.**
Tansey, J.A., and Dosdall, L.M.
- 15:45 **Evaluation of beauvericin as a marker for *Beauveria bassiana* virulence and its implication for insect pest management in greenhouses**
Rajput, S., Fry, K.M., and Keddie, B.A.
- 16:00 **Material benefits of sexual cannibalism in a primitive acoustic insect**
Judge, K.A., De Luca, P.A., and Morris, G.K.
- 16:15 **Fixed Precision Sampling Plan for the Rocky Mountain Wood Tick, *Dermacentor andersoni*.**
Rochon, K., and Lysyk, T. J.
- 16:30 **Mismatch between habitat choice and offspring success in mountain pine beetles**
Reid, M.L., and Trzcinski, M.K.
- 16:45 **Annotated List Of The Ants Of The Wagner Natural Area**
Leech, R., and Glasier, J.
- Progress Report On The Spiders Of The Wagner Natural Area**
Leech, R., and Buckle, D.
- Strepsiptera From The Wagner Natural Area, And Other Species From Alberta**
Leech, R., and Taylor Leech, L.
- Two More Pholcidae Species (Araneae) Introduced To Alberta**
Leech, R., and Taylor Leech, L.
- 18:30 **BANQUET** (Southern)
 Cocktails at 18:30
 Dinner at 19:00
- After Dinner Speaker: **Colin Weir**
 Alberta Birds of Prey Centre 25 years of volunteer wildlife rescue.
- Awards Presentations
 Student Travel Grants, Undergraduate Award in Entomology

Saturday, October 16

CONTRIBUTED PAPERS SESSION 3

Moderator – Kevin Judge

- 08:00 **Butterfly monitoring in Edmonton: how, why, and what have we learned?**
Acorn, J.
- 08:15 **Ants (Hymenoptera: Formicidae) of Alberta: An Update.**

Glasier, J.R.N.

- 08:30 ***Paraclemensia* leafcutter moths in Alberta (Lepidoptera: Incurvariidae)**
Pohl, G.R., Jaeger, C., Richard, D., and Nazari, V.
- 08:45 **Contributions to the knowledge of the Latridiidae (Coleoptera) of Alberta, Canada**
Wood, C.M., Hammond, H.E.J., Langor, D.W., and Spence, J.R.
- 09:00 **Deep mitochondrial DNA lineage divergences within *Dermacentor albipictus* (Acari: Ixodidae) do not indicate distinct species.**
Leo, S.S.T., Pybus, M.J., and Sperling, F.A.H.
- 09:15 **Rock-crawlers, ice-crawlers, and bark-crawlers: observations on the ecology of *Grylloblatta campodeiformis***
Esch, E.D., Spence, J.R., and Langor, D.W.
- 09:30 **Bunker Bugs: Insect Diversity in Sand Traps at the Lewis Estates Golf Course, Edmonton, Alberta.**
LeCourtois, C.
- 9:45 **Coffee**
- 10:00 **Saproxyllic beetle responses to aggregated retention patches in boreal white spruce stands**
Lee, S.-I., Spence, J.R., and Langor, D.W.
- 10:15 **Colonization of the George Lake forest by *Pterostichus melanarius*; mechanisms and impact on native carabid community.**
Bourassa, S., Spence, J.R., Jacobs, J., Lee, S., and Hartley, D.
- 10:30 **A *carabid* outbreak? ... Mundare, meanders, measurements and musings**
Spence, J., Bourassa, S., and Esch E.
- 10:45 **Can highly managed forests support a diverse invertebrate fauna? Spiders, Carabid beetles and moths in Irish plantations and native woodlands.**
Oxbrough, A., French, V., Irwin, S., Kelly, T.C., and O'Halloran, J.
- 11:00 **ENTOMOLOGICAL SOCIETY OF ALBERTA
ANNUAL GENERAL MEETING**

Oral Presentations and Abstracts
(Alphabetically by presenting author)

1. Butterfly monitoring in Edmonton: how, why, and what have we learned?

Acorn, J.

Dept. of Renewable Resources, University of Alberta, Edmonton, T6G 2H1

The history of butterfly monitoring in Edmonton can be characterized by three periods. Early on, specimen collecting produced a thorough checklist, with distributional and phenological information for some 83 species. Following the publication of books on the Alberta butterflies, Canada Day Butterfly Counts generated additional records, and much enthusiasm, but resulted in controversy over quality of the data, and where it should be published. Most recently, Pollard Counts are providing much better baseline surveys for future comparisons. Evidence suggests, however, that additional effort is needed to detect additions or deletions to the fauna, and that Pollard Count results should be interpreted in a local context, with limited generalizability.

2. Pre-release impact assessment of a stem-galling weevil, *Rhinusa pilosa*, on four western Canadian yellow toadflax populations.

Barnewall, E.C.^{1,2}, and De Clerck-Floate, R.²

¹ University of Lethbridge, Lethbridge, Alberta, Canada

² Agriculture and Agri-food Canada, Lethbridge Research Centre, Lethbridge, Alberta, Canada

Yellow toadflax, *Linaria vulgaris* (L.) Mill. (Plantaginaceae), is a highly invasive plant in North America originating from Eurasia. *Rhinusa pilosa* Gyllenhal (Coleoptera), a stem-galling weevil, is one of two agents currently being evaluated as a potential biocontrol agent for yellow toadflax. Multiple introductions of *L. vulgaris* to North America are suspected, hence, any insects used for biocontrol may encounter multiple host genotypes upon release. Two pre-release impact assessments of *R. pilosa* were conducted in quarantine on four Western Canadian toadflax populations. Impact was examined by comparing intra- and inter-population plant responses to weevil gall induction and development, quantified with stem height, flower and lateral stem production, and above and below ground biomass. The first study evaluated the ability of *R. pilosa* to attack and develop on the different populations as well as the response of these populations to low insect densities. Preliminary results indicate that *R. pilosa* can successfully induce galls and develop on all populations tested. Low densities of the agent negatively affected one population while the other three populations were not significantly different between the control and treatment plants. The second study used a high density of *R. pilosa* on one susceptible Canadian toadflax population. Results indicated that stem height and number of flowering stems was reduced in galled versus control plants. Overall, these results suggest that *R. pilosa* could be an effective biocontrol agent against diverse populations (and genotypes) of *L. vulgaris*.

3. Artificial nutrient hotspots and their effects on the appearance of *Brassica napus* and the abundance of *Ceutorhynchus obstrictus* (Oral)

Blake, A.J.¹, Dosdall, L.M.¹, and Keddie, B.A.²

¹Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB

²Department of Biological Sciences, University of Alberta, Edmonton, AB

The cabbage seedpod weevil, *Ceutorhynchus obstrictus* (Marsham) (Coleoptera: Curculionidae), is a serious pest of canola both in North America and Europe. It is an invasive species in North America and was first recorded in Alberta in 1995. Oviposition by female *C. obstrictus* occurs in

the developing pods of canola where larvae complete their development. This feeding commonly results in yield losses of 20%. Nitrogen and sulfur have both been shown to affect the spatial distribution and abundance of *C. obstrictus*. Nitrogen and sulfur affect the floral and foliar reflectance of canola and both qualities are important host selection cues for *C. obstrictus*. In order to test this mechanism, artificial nitrogen and sulfur hot spots were created in a commercial field of canola in a controlled fully factorial experiment. The abundance of *C. obstrictus* adults was assessed using yellow bowl traps placed within each hotspot, while larval abundance was determined through the examination of larval exit holes. The visual appearance of canola plants in the vicinity of each hotspot was assessed with a series of photographs. Nitrogen application resulted in foliage that appeared significantly more saturated and bluer, and in areas that received no additional sulfur fertilization, flowers appeared significantly greener. With nitrogen fertilization a significant decline was observed only in the number of *C. obstrictus* males. These results suggest that visual cues could partially explain the observed relationships between nitrogen, sulfur and *C. obstrictus*.

4. Colonization of the George Lake forest by *Pterostichus melanarius*; mechanisms and impact on native carabid community.

Bourassa, S.¹, Spence, J.R.¹, Jacobs, J.², Lee, S.¹, and Hartley, D.¹

¹ University of Alberta, Department of Renewable Resources.

² Université du Québec à Montréal

The presence of the European carabid *Pterostichus melanarius* Ill. was first recorded in Edmonton in 1959. This species is now transcontinental and dominates the carabid fauna in many anthropogenic environments where it was shown to compete for resources with its native relative *Pterostichus adstrictus*. A pitfall trap grid was established at the George Lake Field Station in 1991 to monitor the extent of *P. melanarius* invasion in the aspen forest and its potential impact on native species. The grid started at the road verge where the population was highest and extended 950 m in the forest. Overtime, population size of *P. melanarius* increased in the forest interior, away from the road verge. Additionally, the proportion of long-winged individuals decreased over time inside the forest suggesting a slow but steady establishment. Despite an increase in proportion of *P. melanarius* captured from pitfall traps, the impact on native species is unclear. The dynamic and mechanism of colonization will be discussed to address potential impacts on native carabid community.

5. Operational Biocontrol with a Tortoise

Bourchier, R., and Van Hezewijk, B.

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

Invasive plants, such as leafy spurge, toadflaxes and knapweeds affect very large areas across their introduced range of continental North America. When targeting these species with biological control agents the primary definitions of success have initially been establishment and subsequently the impact of the agents on the target weed within the release areas. Common to any biocontrol programme are extremely high densities of plants and hopefully insects, that likely never occur in the native habitat. Understanding this novel density relationship and the response of biocontrol agents to: 1) the density of conspecifics, and 2) variable plant densities is critical to predicting the impact of biocontrol agents at any spatial scale. Application of landscape ecology theory to weed biocontrol systems may provide insights into dispersal, which is a fundamental process for the persistence of biocontrol agents. However, in most biocontrol systems the invasive plant has a huge head start in distribution and density on the biocontrol agent. To understand persistence on a broader landscape, considerable work is required to first define often

novel density interactions and subsequent spread of biocontrol agents at a local scale. Successful biocontrol agents may also dramatically alter the relationship between their density and that of their target plants such that defining an appropriate landscape for study is a moving target. These issues will be discussed relative to the operational use of *Aphthona lacertosa* for the biological control of leafy spurge in Southern Alberta.

6. Development of soil bacteria for biological control of green foxtail.

Boyetchko, S.M. and Hynes, R.K.

Agriculture and Agri-Food Canada, Saskatoon Research Centre, Saskatoon, SK S7N 0X2.

The application of microorganisms for biological weed control (i.e. bioherbicides) has been a worldwide initiative for several decades. In 1991, research at Agriculture and Agri-Food Canada (AAFC) was initiated to develop bacteria as bioherbicides against green foxtail. Discovery began with *in vitro* testing using a laboratory bioassay of hundreds of bacterial strains and continued with plant growth pouch bioassays, ultimately leading to the selection of three bacterial strains. These bacteria showed broad-spectrum activity against other grass weed species and their ability to control herbicide-resistant wild oat and green foxtail populations confirmed that their modes of action differed from existing chemical herbicides. *Pseudomonas fluorescens* strain BRG100 was selected for detailed assessment and development as a bioherbicide, with the aim of registering and commercializing it. Optimization of fermentation parameters investigating nutritional factors that promote i) bacterial cell production and ii) efficacy have been conducted. Pre-emergent soil application of BRG100 when formulated into a pesta granule resulted in significant reductions in green foxtail growth in the field. Several improvements to the pesta formulation have been made in order to preserve and extend shelf life beyond one year. Current and future research is focusing on formulation improvements, application and delivery, and development of molecular markers for environmental risk assessment.

7. Field pea nodulation and nitrogen dynamics in relation to pea leaf weevil, insecticide seed treatment and urea amendment.

Cárcamo, H., Herle, C., Larson, T. and Lupwayi, N.

Lethbridge Research Centre, AAFC, Lethbridge AB

The pea leaf weevil (PLW) (*Sitona lineatus*) is a potential pest of field peas in southern Alberta and Saskatchewan. *Sitona* species (broad nosed weevils) feed on foliage of their specific Leguminaceous hosts as adults and on nodules as larvae. Feeding on nodules may affect nitrogen fixation by Rhizobia and have important implications for nitrogen (N) dynamics in the soil and plant and potentially affect yield; in turn, the amount of available soil N at seeding can affect nodulation and damage by the weevil. We conducted a greenhouse study to quantify nodulation, soil and plant N content and nodule damage by weevil larvae in relation to soil N amendment, Cruiser (Thiamethoxam) insecticide and crop stage of nodule assessment. The experimental design consisted of a split plot, with crop stage as the main plot (early flower and late = 6 days later) and 3x2 factorial within each assessed crop stage (split) (1) pea leaf weevil eggs (+PLW = 40 eggs/pot, -PLW = 0), (2) Cruiser insecticide seed treatment (+Cr = Thiamethoxam at 30 g/100 kg seed, -Cr = 0), (3) = N amendment (+N = 90 kg/ha, -N = 0). Despite low larval counts at harvest time, there were significantly more nodules damaged in pots with PLW than those without PLW. Pea leaf weevils reduced the number of tumescent (multi-lobed) nodules and Cruiser addition increased them regardless of other factors. Nitrogen amendment significantly increased soil available N (>99% nitrate) as expected and PLW presence significantly reduced it. PLW also decreased plant N content but interacted with Cruiser and soil N amendment. Plants

subjected to weevil feeding but with Cruiser protection had higher plant N than those without the seed treatment insecticide but only in the absence of the urea N amendment. The study illustrated the complexity of interactions that determine the economic impact of PLW on field pea production. These results, coupled with other controlled and field studies, suggest that either soil N amendment (such as manured fields) or seed treatment with Cruiser may reduce the potential impact of PLW on pea production, but further commercial field studies are required.

8. How might foraging bumble bees discern nectar production rate from nectar standing crop?

Cartar, R.V., Foster, D.J., and Pengelly, C.J.

Dept. Biological Sciences, University of Calgary.

Previous research has shown that bumble bee workers preferentially return to plants that have higher rates of nectar production. But flower-visiting bees encounter nectar standing crops, not nectar production rates. Hence our question: what information in nectar standing crop might allow a bee estimate a plant's rate of nectar production? In a study of 6 plant species (*Chamerion angustifolium*, *Delphinium glaucum*, *Geranium viscosissimum*, *Hedysarum boreale*, *Monarda fistulosa*, *Oxytropis monticola*) growing in the foothills of SW AB, we experimentally induced variation in nectar production rate of plants by defoliating some of their lower leaves. We measured nectar volumes in flowers from which pollinators had been excluded (to estimate rate of nectar production), and in flowers to which pollinators had free access (to estimate nectar standing crop). We fit threshold Weibull distributions to the nectar standing crops of individual plants. We used regression tree analysis to distinguish traits in the nectar standing crop that would honestly signal mean rate of nectar production. In all 6 species, we identified traits that significantly predicted a plant's rate of nectar production, but the traits differed between plant species. The traits all involved some combination of central tendency (mean, weibull α), spread (% empty flowers, maximum amount, SD), and distribution shape (Weibull β). We conclude that there is sufficient information in nectar standing crop for an attentive foraging bumble bee to discern rate of nectar production, and to respond appropriately.

9. Ants (Hymenoptera: Formicidae) of Alberta: An Update.

Glasier, J.R.N.

Department of Renewable Resources, University of Alberta, Edmonton, AB

Ants (Hymenoptera: Formicidae) are integral part of Alberta's terrestrial ecosystems. They are important as predators, as food sources, as seed dispersers, and in soil turnover. As well, they represent one of the most numerous and visible insect groups in the province. However, little work has been done on the ant fauna of Alberta. The last faunal survey took place in 1966, in which Janet Sharplin of the University of Alberta identified 40 species in 10 genera. As part of a community ecology study of ants on sand hills in central Alberta, a review and survey of the ant species of Alberta was undertaken. Here I report that we now know of 83 species in 14 genera and 3 subfamilies in the province. Numerous species level taxonomic problems remain, and additional taxa may still be uncovered, but we are now much closer to a checklist of the Alberta ants.

10. Rock-crawlers, ice-crawlers, and bark-crawlers: observations on the ecology of *Grylloblatta campodeiformis*

Esch, E.D.¹, Spence, J.R.², and Langor, D.W.²

1. University of Alberta, Department of Renewable Resources

2. Canadian Forest Services

New records of *Grylloblatta campodeiformis campodeiformis* challenge the classical understanding of the species group. *G. c. campodeiformis*, previously believed to be scarcely distributed in small ‘pocket-populations’, were collected at four of four study sites in 10-20% of the tree trunk traps set up to survey beetle diversity in the Northern and Central Rockies of Alberta. These insects have always been observed or collected on or adjacent to snow packs and talus; under rocks or at the soil surface near alpine meadows and streams; or if below tree-line, under rocks and logs in close association with rockslides; but never in standing, recently killed trees. Traps were placed on whitebark (*Pinus albicaulis*) and lodgepole (*P. contorta*) pines recently killed by the mountain pine beetle (1-3 years dead) in sub-alpine forests hundreds of meters from the tree line, and in one instance on a hill that crested well below the tree line. Gut content analysis indicated that *G. c. campodeiformis* was feeding on ambrosia beetles (Scolytinae: *Trypodendron spp.*), known associates of recently killed trees. These observations suggest that the realized niche of *G. c. campodeiformis* may be larger than previously recognized.

11. Influences of grazing on the abundance of bee pollinators and their floral resources

Evans, M.M.¹, Cartar, R.V.¹, and Wonneck, M.²

¹ University of Calgary, Calgary, AB.

² Agriculture & Agri-Food Canada, Calgary, AB.

The rough fescue grassland region is important for cattle grazing. Ranchers decide how many, what time in the season, and for how long cattle remain on their fields, resulting in a mosaic of range conditions and plant communities. Grazing is predicted to affect the plant community, and therefore flower abundance. Flower abundance should influence bee abundance, and given that bees and flowers are mutualists, the converse should also hold. But grazing may also directly affect bees, for example, by influencing nesting habitat, as hypothesized by many authors. We ask the question: what are the direct and indirect effects of grazing on bee populations? This study surveyed 14 pairs of pastures (1 heavily, 1 lightly grazed) in 2009 and 2010. Bees and flowers were censused throughout the season. Using path analysis, we found that bee abundance was directly affected by flower abundance, but only indirectly affected by grazing pressure, via grazing’s effect on flower abundance. That is, grazing affects flowers, which affects bees. We have no direct link between cattle grazing and bee abundance. It appears that managing cattle to affect flower abundance is the best way of maintaining abundant flower-pollinator communities in the rough fescue prairie, the signature landscape of Southern Alberta.

12. Changes in bumble bee abundance and diversity in response to clearcut logging in the foothills forest

Farmer, A.M., and Cartar, R.V.

University of Calgary, AB

This study examines how clearcut logging, and locally varying levels of clearcut logging in the foothills forest affects the abundance and diversity of bumble bees (Hymenoptera; Apidae; *Bombus*). Thirteen forested field sites (0.75 km radii circles) with clearcut levels ranging from 25% to more than 60% were established in eastern Kananaskis Country. Bumble bees were

censused along linear transects in clearcuts and adjacent forest remnants over the late summer (late June to early August). The effect of landscape-level logging on bumble bee abundance depended on habitat: in clearcuts, more logged landscapes contained more bees, while in forests, the opposite effect was true. Bee species richness was simply higher in clearcuts, with no landscape effects. Bee diversity (Simpson's Index) was unaffected by landscape or local logging. While logging appears to generally increase bee abundance and diversity, of particular conservation interest is the decreasing bee abundance within unlogged forests in the more heavily logged landscapes. Pollinator service to understory plants in unlogged forests in heavily logged landscapes may be of concern.

13. Parasitism of *Delia radicum* (Diptera: Anthomyiidae) puparia in intercrops of canola and wheat

Hummel, J.D.¹, Dosdall, L.M.², Clayton, G.W.³, Harker, K.N.⁴, and O'Donovan, J.T.⁴

¹ Department of Agricultural, Food and Nutritional Science, University of Alberta. *Current address:* School of Agriculture and Natural Sciences, Lethbridge College, 3000 College Drive S., Lethbridge, AB, T1K 1L6

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Intercropping of canola (*Brassica napus* L.) with non-host plants of root maggots (*Delia* spp.) (Diptera: Anthomyiidae) can reduce damage to canola taproots by these pests; however, intercrops of brassicaceous vegetables and *Delia* spp. non-host plants can also reduce parasitism rates of *Delia* puparia by some natural enemies. A field study at two sites in central Alberta in 2005 and 2006 investigated the effects of several intercropping regimes of canola and wheat (*Triticum aestivum* L.) on the major parasitoids of *Delia radicum* (L.) puparia. The major parasitoids of root maggot populations in western Canada are the rove beetle *Aleochara bilineata* Gyllenhal (Coleoptera: Staphylinidae) and the hymenopteran *Trybliographa rapae* Westwood (Hymenoptera: Figitidae). Mean parasitism rates of *D. radicum* puparia by *A. bilineata* and *T. rapae* ranged from 7.27 to 81.69% and 2.17 to 14.55%, respectively. Parasitism by *A. bilineata* was reduced by intercropping canola with wheat compared to monocultured canola in one site-year. Intercropping did not affect parasitism by *T. rapae*. Although parasitism of *D. radicum* puparia was largely unaffected by intercropping canola and wheat, previously reported results suggest that intercropping of these two crop species appears to be a favourable strategy for managing root maggot damage to canola.

14. Material benefits of sexual cannibalism in a primitive acoustic insect

Judge, K.A.^{1,3,*}, De Luca, P.A.², and Morris, G.K.¹

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The evolution of polyandry remains a key area of research because females of many species mate far more often than is predicted by theory. Explanations for polyandry fall into three general categories: 1) males provide material benefits to females during mating that increase fecundity, 2) females derive genetic benefits from mating that they pass on to their offspring, and 3) females accept multiple mates to avoid the costs inherent in exposure to coercive males. We investigated the material benefits hypothesis in *Cyphoderris buckelli* (Orthoptera, Haglidae), a primitive insect found in the forests of British Columbia. *C. buckelli* and its congeners have a unique breeding system in which females feed on the specialized hindwings of males in the early stages of copulation. We tested whether hindwing feeding provides material benefits to females by manipulating the nutritional quality of females' diet - restricted or ad lib food - and then provided females with four opportunities to mate over eight days. If hindwing feeding provides material benefits to females, then we predicted that food restricted females would increase their: 1) feeding rate, 2) damage done to male hindwings, and 3) mating rate relative to females provided ad lib food. As predicted, food restricted females were more likely to feed on male hindwings, did more hindwing damage and were more likely to copulate with males than females provided ad lib food. We discuss these results in the context of the evolution of polyandry and sexual conflict.

15. Seasonal Distribution and Phenology of the Cereal Leaf Beetle, *Oulema melanopus* (Coleoptera: Chrysomelide) in Southern Alberta

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The cereal leaf beetle, *Oulema melanopus* (Coleoptera: Chrysomelidae), is an invasive pest of cereals including oat, wheat and barley in western Canada. Native to Eurasia, the beetle was accidentally introduced to North America in 1962 and has since spread across cereal growing regions of the United States and Canada. It was discovered first in southern Alberta in 2005 and has been since recorded annually in crops of winter wheat and spring cereals such as oat and barley. Considering the expansion of its range over past few decades, it is important to understand its current distribution and seasonal phenology to predict its further spread in newly infested regions of Alberta and to design sustainable strategies for its control. Annual surveys to map the distribution of *O. melanopus* were initiated following its first discovery in southern Alberta. Studies on phenology of *O. melanopus* were also conducted to develop insights into field dynamics of the beetle and to understand critical growth parameters of various stages in its life cycle. Phenological parameters included seasonal oviposition, density and distribution of its life stages (egg, larvae and adults) on each of the three principal hosts (wheat, oat and barley), time of beetle migration into the field and peak seasonal activity of the pest under field conditions. Increasing activity of the pest in parts of southern Alberta is evident from our survey results, necessitating further critical monitoring of the pest.

16. Bunker Bugs: Insect Diversity in Sand Traps at the Lewis Estates Golf Course, Edmonton, Alberta.

LeCourtois, C.

Edmonton, Alberta

Bunkers are the last place most people want to visit on a golf course. At the Lewis Estates Golf Course insect diversity in bunkers is high despite constant disturbances. A sample of 619 insects included individuals from nine insect orders, representing an estimated 81 species. I sampled the

sand traps over 4 months and in random order, and compared insect diversity in the bunkers with respect to perimeter length, exposure direction, and sand depth. A majority of species found were associated with water, and since this golf course has a large number of water hazards, this is not unexpected. These insects may have entered the bunkers in order to increase their body temperatures, by basking on the warm substrate. However, the species with the greatest number of individuals were those that utilize sand or the grassy rim of the bunkers as a home or hunting ground. These included sucking bugs in the family Geocoridae, a variety of beetles including *Bembidion quadrimaculatum* (Carabidae), *Aphodius pinguellus* (Scarabaeidae), Anthicidae sp., and Curculionidae sp., as well as eight species of ants (abundant species included *Formica podzolica*, *F. neoclara*, *Myrmica incompleta*, *M. alaskensis*, and *Lasius neoniger*). Overall species richness is considered high for such a disturbed, man-made environment

17. Saproxylic beetle responses to aggregated retention patches in boreal white spruce stands

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Saproxylic beetles (i.e. beetles that depend on dead or dying wood during some part of their life cycle) are a diverse group of organisms that are well known to be threatened by traditional forestry activities. Green tree retention has been proposed and developed as a way of conserving biodiversity for the ecological sustainability. To understand the role of aggregated patches in relation to effects of sizes and surrounded matrices on saproxylic beetle assemblages, we compared beetles among two sizes of aggregated retention patches (0.20 and 0.46 ha) within backgrounds of different harvest intensity at the EMEND (Ecosystem Management Emulating Natural Disturbance) site. Window traps were deployed on girdled trees, snags and live trees in patches and surrounding matrices. Emergence traps were also placed on logs of two decay classes (DC 2 and DC 4) in the center of same patches. The data will provide information tools needed to develop effective conservation strategies.

18. Progress Report On The Spiders Of The Wagner Natural Area

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A large collection of spiders was made in the Wagner Natural Area in 1985. At that time, the senior author estimated that there were about 300 species of spiders collected. Between the spiders collected in 1985, and those collected in 2010, that number is close to being realized.

In March and April 2010, the Alberta Government and the Friends of the Wagner Natural Area gave permission to Robin and Lorie Leech to collect spiders and other invertebrates in the Wagner Natural Area, which is 6 km west of Edmonton on Highway 16. Collecting started on 1 May and continued till 31 August. We now have about 450 vials with several thousand spiders yet to be examined.

United Nations declared 2010 to be the International Year of Biodiversity. Our contribution the IYB is to declare that we now have 17 families with 232 species of described species and undescribed new species from the Wagner Natural Area. Many of the species we are finding are of northern and/or Arctic origins, giving more credence to either a wandering refugium during the Wisconsinan, or to a recent "fortress" created when all the surrounding lands

were cleared, and these organisms retreated to the Wagner Natural Area. A few selected photomicrographs will be shown.

19. Annotated List Of The Ants Of The Wagner Natural Area

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From 1 May till 31 August 2010, 19 species of ants in three subfamilies were collected in pitfall traps, yellow pan traps and a Malaise trap in the Wagner Natural Area, which is 6 km west of Edmonton on Highway 16. The three subfamilies, with the number of species in each, are presented: Subfamily Dolichoderinae: 1 species; Subfamily Formicinae: 13 species; and Subfamily Myrmicinae: 5 species. Distributions and other biological data are provided for each species. Specimens were collected by Robin and Lorie Leech, and were identified by James Glasier. Photomicrographs of selected species will be shown.

20. Strepsiptera From The Wagner Natural Area, And Other Species From Alberta

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During mid-July 2010, three male specimens of Strepsiptera were collected in the Malaise trap. These specimens are most likely new species from the families Halictophagidae (*Halictophagus* sp. nov) and Elenchidae (*Elinchus*, 2 sp. nov). Photomicrographs have been examined by Strepsiptera specialists in Holland and Texas, USA, and both specialists feel that these represent new species. Photomicrographs of the 4 specimens from the Strickland Museum, U of Alberta, are presented for comparison.

21. Two More Pholcidae Species (Araneae) Introduced To Alberta

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Last year we reported on 16 species of spiders introduced to Alberta. On 17 September 2010, two more species of introduced pholcid spiders were found in a ship's cargo container at an Edmonton oilfield service company. That total is now upped to 18 with the finding of the cosmopolitan *Crossopriza lyoni* (Blackwall, 1837), and the pantropical *Micropholcus fauroti* (Simon 1887). Pictures of each will be shown. These two new introductions emphasize the suggestion at last year's AES meeting, published earlier this year, of the need to establish a single-source data bank/checklist for introduced Alberta fauna, as British Columbia has done (www.efaua.bc.ca).

22. Deep mitochondrial DNA lineage divergences within *Dermacentor albipictus* (Acari: Ixodidae) do not indicate distinct species.

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Dermacentor albipictus (Packard) are single-host ticks that can reach severe infestation levels on their ungulates hosts. Genetic variation in the mitochondrial DNA of these ticks has been a source of taxonomic confusion, although their morphology and life history indicate the existence of a single species. To investigate this, we sequenced regions of two mtDNA genes (COI 27 and 16S rDNA), two nuclear genes (lysozyme and ITS-2), and two bacterial markers (17kDa lipoprotein of *Francisella tularensis* (Dorofe'ev) and 16S rDNA of *Francisella*-like endosymbionts from *D. albipictus* individuals collected across Western Canada and parts of the United States of America. We compared and related DNA sequence variation between genetic markers to variation in the morphology of spiracle plates. Both mtDNA regions indicated two deeply diverged lineages (mean difference of 7.1% for COI and 4.5% for 16S) that would normally be considered diagnostic of distinct species in DNA barcoding studies. However, nuclear gene sequences, bacterial endosymbionts and morphometric analyses revealed very little divergence and any variation that did occur within these markers do not mirror that observed in mtDNA. We conclude that the sampled individuals in this study represent a single species, *D. albipictus*, and reiterate the importance of integrative approaches in species delimitation.

23. Potential for sex pheromone-based communication disruption of the red clover casebearer (*Coleophora deauratella*) in red clover (*Trifolium pratense* L.)

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Coleophora deauratella (Coleophoridae: Lepidoptera) is an invasive pest of clover (*Trifolium* species: Fabaceae) throughout Canada. Red clover is widely grown for seed production, forage and use in crop rotations for soil improvement. Larval feeding by *C. deauratella* on red clover seed caused an estimated 80% and 99% seed loss in Ontario and the Peace River region of Alberta, respectively. To date, insecticide trials against *C. deauratella* illustrate that the cost of application is not offset by increased seed yield after treatment and there are no registered insecticides available to producers. As a result we investigated an alternative control strategy, sex pheromone-based communication disruption, to manage this pest. Sex pheromone-based communication disruption of *C. deauratella* was examined by application of synthetic sex pheromone in small plot trials. Rope dispensers (Shin Etsu, Japan) and puffers (Suterra, OR, USA) formulated with *C. deauratella* pheromone consisting of a 10:1 ratio of Z-7-dodecenyl acetate and Z-5-dodecenyl acetate were tested in the Peace River Region of Alberta. Moth capture was reduced in rope dispenser and pheromone puffer treated plots as compared to non-treated control plots. These results suggest that sex pheromone-based communication disruption could be incorporated into an integrated pest management strategy to control *C. deauratella*.

24. Phytoplasma research: a bridge between plant pathology and entomology

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Phytoplasmas are bacteria-like pathogens that cause hundreds of diseases worldwide, in hundreds of plant species, some of them being economically important. Phytoplasma diseases cause yield and quality reduction as well as poor plant growth. No resistance has been identified but tolerance and recovery phenomenon have been observed in several plant species. Phytoplasmas are a very unique group of pathogens because they inhabit two very different environments. They live and reproduce in the plant phloem and in most of the organs of their insect vectors. Phytoplasmas manipulate plant and vector metabolism to promote their propagation and spread. In plants, phytoplasmas express specific factors that directly disrupt host plant gene expression in order to by-pass plant defense responses. In vectors, phytoplasma transmission seems to rely on specific recognition mechanisms between insect gut proteins and phytoplasma membrane proteins. Overall, very little is known about those pathogenicity mechanisms. Phytoplasma disease control relies mostly on the chemical control of the vector population. Therefore, a large body of research has addressed vector identification and epidemiology in order to develop efficient and sustainable integrated pest control approaches. Recently, research on symbionts has opened the possibility of developing new control methods.

25. Can highly managed forests support a diverse invertebrate fauna? Spiders, Carabid beetles and moths in Irish plantations and native woodlands.

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Abstract: Plantation forests constitute a large proportion of the forest estate in many countries, particularly in the temperate regions of Europe. In addition, large scale deforestation has led to the fragmentation of natural forests within heavily managed agricultural landscapes. In light of this, it is important that the potential of plantations to support a diverse flora and fauna, particularly for forest specialist species, is assessed. We examined arthropod diversity in mixed and single species plantations of non-native conifers and native woodlands in Ireland to assess the potential of plantations to support forest species. Spiders and Carabid beetles were sampled with pitfall traps and moths with light traps among forest types. Environmental parameters measured included stand structure, soil attributes, plant richness and forest cover. Invertebrate species composition and richness differed between plantations and native woodlands, but responses also differed by taxonomic group. At the stand scale invertebrates were related to litter and vegetation cover, and forest type, but variables at the landscape scale (e.g. forest cover within 1km) were only important for moths. These findings suggest that forest policy aimed at promotion of biodiversity in plantations should support greater diversity of stand structure and tree species composition. The planting of more species of native provenance should also be encouraged.

26. *Paraclemensia* leafcutter moths in Alberta (Lepidoptera: Incurvariidae)

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The Incurvariid moth species *Paraclemensia acerifoliella* has recently been discovered in Alberta, feeding upon wild and cultivated saskatoon trees (*Amelanchier alnifolia*; Rosaceae). This marks the first report of the Lepidoptera family Incurvariidae in the province, as well as the first report of saskatoon as a host for *Paraclemensia*. Previously, this species was widely believed to be restricted to Sugar Maple (*Acer saccharum*; Aceraceae) in eastern Canada. The origin of *P. acerifoliella* in Alberta is discussed, and its biology and phenology on saskatoon is compared to that on Sugar Maple.

27. Mismatch between habitat choice and offspring success in mountain pine beetles

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The distribution of organisms across breeding sites has been used to infer habitat preferences and quality. The ideal free distribution predicts that organisms settle in a density such that fitness is equal across all sites, and deviations from this prediction provides insights into the processes of habitat choice. Habitat quality for mountain pine beetles (MPB), *Dendroctonus ponderosae*, is often described as tree diameter with the assumption that tree diameter predicts the quantity and quality of larval food (phloem) quality. We examined colonization density and reproductive success of MPB with respect to tree traits for naturally colonized trees at several sites in Banff National Park. Tree diameter did not consistently predict phloem thickness or recent growth rate (an index of phloem quality). Density of colonizing MPB increased with recent growth rate but not tree diameter or phloem thickness. However, offspring produced per female tended to decrease with recent growth rate after controlling for density. Thus, the trait used by females to select trees does not appear to favour offspring, suggesting the other factors are influencing host choice.

28. Fixed Precision Sampling Plan for the Rocky Mountain Wood Tick, *Dermacentor andersoni*.

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Adult, questing ticks can be collected using a variety of methods, but surveillance requires an adequate sampling plan. Data from dragging samples collected in 2008-2009 were used to estimate tick population density and Taylor's power law regressions were calculated for different quadrat lengths. Optimal sample size curves were determined for fixed levels of precision. At low tick density (0.1 tick/100 m²) the optimal quadrat length is 40 meters. When tick densities are greater, 10 meter quadrats should be used. The development of this type of sampling program allows investigators to obtain a statistically valid estimate of a population with optimal effort.

29. Evaluation of beauvericin as a marker for *Beauveria bassiana* virulence and its implication for insect pest management in greenhouses

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Conventional evaluation of entomopathogenic fungi for increased efficacy involves laborious and time-consuming methods using whole animals. To accelerate screening efforts, another approach is to screen based on fungal metabolites (i.e. mycotoxins) resulting in time- and cost savings. Beauvericin is a significant common metabolite of many entomopathogenic and phytopathogenic fungi, so toxicological studies should be executed when considering a biological agent such as *B. bassiana* for insect pest control. In this study, five isolates selected on the basis of western flower thrips whole animal virulence, ranging from low to high virulence, were evaluated for beauvericin production. Using HPLC, all isolates produced beauvericin ranging from concentrations of 26.6 µg/g to 2377.5 µg/g. Our results further indicated that there is a weak correlation between beauvericin production and whole animal virulence. A low concentration of beauvericin did not mean the isolate will exhibit a low degree of virulence. In this case, other screening tools such as *in vitro* morphological characteristics may be used. Although further research is required in examining more isolates, the uncoupling of whole animal virulence with beauvericin production may provide more flexibility in selecting isolates to control pests in different production systems.

30. A carabid outbreak? ... Mundare, meanders, measurements and musings

Spence, J., Bourassa, S., and Esch, E.

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At least two species of the carabid genus *Amara* were reported to have occurred in outrageously large populations that terrorized some in the agricultural zone of Alberta during summer 2010. This unusual event piqued the curiosity of many, including a number of ESA members. Inspired by this dialogue, we investigated and confirmed two examples of such unusual populations. Our data establish that these outbreaks indeed reflected unusual population size, relatively local phenomena and that they were associated with unusual behaviour of individual beetles. We suggest a hypothesis to explain these events based on our observations, and invite others to engage in reasoned speculation about the matter so that we may be better prepared for informative action if this happens again.

31. Antixenosis and antibiosis resistance to and olfactory responses of *Delia radicum* L. (Diptera: Anthomyiidae) associated with lines developed through *Sinapis alba* L. x *Brassica napus* L.

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The cabbage root maggot, *Delia radicum* L. (Diptera: Anthomyiidae) is a serious pest of canola in Canada. Canola (primarily *Brassica napus*) is susceptible to this insect. *Sinapis alba* L. is relatively resistant and a potential source of resistance to *D. radicum* in canola germplasm derived from intergeneric crosses. Results of comparisons indicate differences in the olfactory

responses of *D. radicum* among, and levels of antixenosis and antibiosis resistance expressed by some *S. alba* x *B. napus* lines.

32. Hares or Tortoises? How to choose an optimally dispersing biological control agent.

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For insect-plant interactions, dispersal can be an important process affecting the long-term dynamics of both populations. This is particularly relevant to the field of weed biocontrol which aims to correctly match a specialist herbivore with a target plant species such that a stable, low-density equilibrium will be achieved. There is, however, little information available to guide decisions with respect to the dispersal abilities of the insect agents chosen. To address this, an individual based simulation was constructed to explore how the interaction between plant and insect dispersal affects the dynamics of the two populations. We found that for a given rate of plant dispersal, turning angles and step-lengths that led to intermediate levels of insect dispersal produced the most stable dynamics. We also found, somewhat counter intuitively, that as plant dispersal increased, lower rates of insect dispersal were required to produce stable dynamics. However, population stability was generally quite sensitive to small changes in dispersal characteristics suggesting that accurate dispersal estimates are required to make reliable prescriptions for weed biocontrol agents.

33. Feasibility of an Area Wide Pest Management (AWPM) Programme for Tea Tortrix *Homona coffearia* Nietner (Lepidoptera: Tortricidae) in Tea in Sri Lanka: A reinvention of wheel?

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Tea tortrix is found throughout the year in many plantations. Outbreaks have been reported even during monsoonal periods with severe unrecoverable crop losses. In order to find out whether manual removal of egg masses and the subsequent reduction in the future generation have any observable impact on the crop, this study was initiated at Drayton estate, Kotagala, a tea plantation situated at high elevations. Tea leaf pluckers and their supervisors were trained in the removal of egg masses during harvesting rounds. It was announced that a poultry egg will be given for every 10 egg masses collected, provided that they do not drop below their harvesting norms for the day. This exercise proved to be extremely successful in controlling tea tortrix and data suggests there was a good control during the period of November 2008 to November 2009 without resorting to costly chemical applications. The cost of provision of poultry eggs for the manual removal of egg masses during this period was far less when compared to the cost of application of chlorfuazeuron before the exercise. With the cost of chemical applications and the inherent problems associated with their use, this simple method can be successfully employed where the pest problem is recurrent. As more and more growers of other plantations around this plantation have shown interest in the success achieved in this plantation and their willingness to extend this programme, this non technical, less sophisticated programme could be considered as a forerunner to an Area Wide Pest Management Programme of tea tortrix.

34. What's going on inside wheat stems? The interactions between pathogens and a nefarious herbivore.

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The *Fusarium* crown rot complex and the wheat stem sawfly are co-occurring pests of wheat grown in the Northern Great Plains of North America. Each causes multimillion dollar losses in this key crop. The pathogenicity of single isolates of three *Fusarium* spp., *F.*

pseudograminearum, *F. culmorum*, and *F. acuminatum*, obtained from colonized larval cadavers of wheat stem sawfly, was evaluated for sawfly larvae developing within growing spring and winter wheat plants in field experiments. All tested *Fusarium* isolates caused lethal effects in developing larvae inside stems under natural conditions, and could produce up to eighty percent larval mortality. The *F. pseudograminearum* and *F. culmorum* isolates caused greater larval mortality than the *F. acuminatum* isolate. The *Fusarium* isolates also produced disease symptoms in both spring and winter wheat plants, which included an increase in disease severity, a reduction in plant density, and yield loss. There were strong positive correlations between larval mortality and disease severity, which reflected the interchangeability of the *Fusarium* isolates between entomopathogenicity to sawfly larvae and phytopathogenicity to wheat plants. As widespread plant pathogens, *Fusarium* spp. are also causing endemic annual mortality in sawfly larval populations in growing spring and winter wheat fields.

35. Contributions to the knowledge of the Latridiidae (Coleoptera) of Alberta, Canada

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The minute brown scavenger beetles (Coleoptera: Latridiidae) of North America are scarcely known despite their abundance, economic impact on stored products, and wide geographical range. The subfamily Corticariinae poses many challenges for species-level identification, where examination of male genitalia is almost always required and thorough taxonomic revisions for North America are lacking. We examined Latridiidae from recent collections near Lac La Biche, Eureka River, George Lake, Waterton Lakes National Park, and the Ecosystem Management Emulating Natural Disturbance (EMEND) research site NW of Peace River, Alberta and additional museum voucher specimens. Five species of *Corticaria* Marsham, 1802 are new to science and being described. Seven species (*Corticaria dentiventris*, *C. elongata*, *C. orbicollis*, *C. pubescens*, *C. rubripes*, *Melanophthalma helvola*, and *M. inermis*) are new provincial records and an additional 12 species are confirmed for Alberta. Direct sampling (rearing, emergence traps, hand collection) of deadwood made it possible to examine habitat associations. We compared species occurrences between log and snag (standing dead tree) habitats using the chi-square goodness-of-fit test. *Cartodere constricta* ($\chi^2=37$, $p<0.001$) and *Corticaria elongata* ($\chi^2=34$, $p<0.001$) prefer logs, whereas *Latridius hirtus* ($\chi^2=16$, $p<0.001$) and 2 novel *Corticaria* species ($\chi^2=23$, $p<0.001$; $\chi^2=7$, $p<0.01$) prefer snags. Activity sampling (window traps, Lindgren funnel traps and pitfall traps) yielded additional species. Although we have doubled the known latridiid fauna of Alberta and provided new habitat associations, much remains unknown. Further

understanding of the latridiid fauna, taxonomy, ranges, ecological roles, and conservation status is needed for many regions of North America.

Poster Presentations and Abstracts
(Alphabetically by presenting author)

36. The Effects of Density of the Psyllid *Aphalara itadori* on Oviposition Patterns on Japanese Knotweed, *Fallopia japonica*

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Japanese knotweed (*Fallopia japonica*) is a large, perennial invasive plant which affects areas of the United Kingdom, Europe and North America. Infestations can outcompete native vegetation, reduce biodiversity, affect water quality via decreased stream flows, and damage man-made structures. The psyllid *Aphalara itadori*, a sap-feeding insect native to Japan, is a potential classical biological control agent for *F. japonica*. The purpose of this study was to determine how densities of the adult psyllid affect oviposition patterns on *F. japonica* in order to help predict distribution and impact in the field. We hypothesized that adult psyllids disperse in a density-dependent manner. We predicted that this should result in a more even distribution of eggs between plants at high psyllid densities, whereas at lower psyllid densities we expected higher aggregations of eggs on single plants. In a replicated experiment we tested two density treatments of 20 and 80 psyllids. Each density was randomly assigned to a cage with two single-stemmed, four-leaved *F. japonica* plants and allowed to oviposit for 48 hours. Plants were removed at the end of each trial and all eggs were counted. We found that in the low density treatment, eggs were significantly more aggregated on one plant than in the high density treatment. These results suggest that when *A. itadori* is released, a lower density will produce damage in a small proportion of plants within an area where as a higher density would produce uniform effects across a patch of *F. japonica*.

37. CLIMEX models for potential distributions of *Onthophagus taurus* and *Digitonthophagus gazella* (Scarabaeidae) in North America

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The dung beetles *Onthophagus taurus* and *Digitonthophagus gazella* (Scarabaeidae) are being assessed for introduction into Canada to accelerate the degradation of cattle dung on pastures. Both species lay single eggs in balls of fresh manure (i.e., brood balls), which may be buried beneath the pat in moist sandy soils from 10 (*O. taurus*) to 25 (*D. gazella*) cm deep. The fresh weight of one brood ball ranges from 1.6 (*O. taurus*) to 3.2-4.0 (*D. gazella*) g with one pair of beetles burying about 40 brood balls during their lifetime. In marked contrast, most species of dung beetles currently associated with cattle dung in Canada do not bury manure and are much less efficient degraders of dung.

We developed CLIMEX models that predict establishment of *Onthophagus taurus* across most of southern Canada, whereas *D. gazella* is predicted to remain restricted to the United States. Subsequent field studies show that *O. taurus*, but not *D. gazella*, can overwinter and complete a generation in southern Alberta. Several thousand adult *O. taurus* now have been released at sites in southern Alberta that will be monitored in future years to assess establishment success.

38. Consequences of *Wolbachia* bacteria in populations of the wasp, *Trichomalopsis sarcophagae* (Pteromalidae)

Floate, K.D. and Coghlin, P.C.

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

Trichomalopsis sarcophagae (Pteromalidae) is a parasitoid of muscoid flies that has been studied in our laboratory for several years as a possible biocontrol agent for house fly and stable fly. When our earlier work showed *T. sarcophagae* to be infected with *Wolbachia* bacteria (Kyei-Poku *et al.* 2006), we began a series of studies to determine if infections could be manipulated to improve the efficacy of the wasp as a biocontrol agent. Results indicate that females mate once and that crosses between infected males and uninfected females ($\sim^w \times \sim$) only produce male offspring (100% cytoplasmic incompatibility). All other crosses ($\sim \times \sim^w$, $\sim \times \sim$, $\sim^w \times \sim^w$) produce a F_1 sex ratio of 1.8:1 ($n = 5,065$ wasps). In a subsequent experiment, laboratory colonies of wasps ($n \approx 500 \sim + 300 \sim^w$ per colony) were started with infection levels of 5, 10, 25 and 50% (3 colonies/treatment). At a starting level of 5%, infections in two replicate colonies did not persist. Infections in the third replicate persisted at low levels for at least 18 generations. At a starting level of 10%, infections reached 20% after 10 generations and then increased to near fixation after 18 generations. Starting infection levels of 25 and 50% approached 100% after 8 and 5 generations, respectively.

Kyei-Poku G.K., M. Giladi, P. Coghlin, O. Mokady, E. Zchori-Fein and K.D. Floate. 2006. *Wolbachia* in wasps parasitic on filth flies with emphasis on *Spalangia cameroni*. *Entomologia Experimentalis et Applicata* 121:123-135

39. Fungicide application method' and the interpretation of mycorrhizal fungus-insect indirect effects

Laird, R.A.¹ and Addicott, J.F.²

¹ Department of Biological Sciences, University of Lethbridge

² Department of Biological Sciences, University of Calgary

Mycorrhizal fungi, by altering their host plant's physiology, can have indirect effects on insect herbivores. The 'fungicide application method' is a common approach used to investigate the indirect effects of mycorrhizal fungi on insects. This approach works by using initially mycorrhizal plants, and then generating a subset of these plants that are free of mycorrhizal fungi by applying fungicide to their roots. When insect feeding-bioassays are conducted using the resulting mycorrhizal and non-mycorrhizal plants, differences in insect performance are typically attributed to differences in mycorrhizal colonization per se, rather than the application of the fungicide. Thus, the fungicide application method relies on the assumption that there is no direct toxicity of the fungicide on the focal insect species, and no indirect effects on the focal insect resulting from effects of the fungicide on the host plant or on non-target soil micro-organisms. We tested this critical assumption by feeding *Zygogramma exclamationis* (Chrysomelidae) larvae on non-mycorrhizal *Helianthus annuus* (Asteraceae) plants whose roots were treated with a solution of the fungicide benomyl or with a distilled water control. Larvae fed on benomyl-treated plants had reduced survival, lower relative growth rate, and lower food conversion efficiency, compared to larvae fed on control plants. Hence, fungicides applied to roots can affect herbivorous insect performance even in the absence of the possibility of mycorrhizal fungi-mediated effects. We recommend caution when using fungicide application and suggest that selective inoculation is a preferable method of generating mycorrhizal and non-mycorrhizal plants when studying mycorrhizal fungi-insect indirect effects. [Originally published in *Acta Oecologica* 34, 214-220]

40. Effects of harvesting on population dynamics and reproductive biology of boreal wolf spiders

Pinzon, J.¹, Spence, J.R.¹, Langor, D.W.²

¹Department of Renewable Resources, University of Alberta, Edmonton, AB, Canada;

²Canadian Forest Service, Northern Forestry Centre, Edmonton, AB, Canada

Wolf spiders (Family Lycosidae) are a common component of ground-dwelling arthropods in the boreal forest, reaching sometimes very high abundances. Species in this group are mostly open-habitat species that rapidly colonize disturbed areas but are usually found also in undisturbed forests. Consequently, changes in their populations might be useful for assessing the impact of harvesting and for monitoring recovery processes post-disturbance. Spiders were collected at the EMEND land base near Peace River (northwestern Alberta) from stands harvested to different levels, from clear-cut to 75% retention and from unharvested stands. A new dominance analysis was used to evaluate changes in the importance of some common boreal species regarding this disturbance gradient. In addition, population dynamics and responses to harvesting linked to fitness parameters (size and number of eggs) were explored.

41. Effects of novel wheat germplasm on *Cephus cinctus* (Hymenoptera: Cephidae) damage and its parasitoid *Bracon cephi* (Hymenoptera: Braconidae)

Wu, X.^{1,2}, Cáracamo, H.A.², Beres, B.L.², Clarke, F.R.³, Depauw, R.M.³, and Pang B.¹

¹Laboratory of Entomology, College of Agriculture, Inner Mongolia Agricultural University, Inner Mongolia, China 010019

²AAFC, Lethbridge, Alberta, Canada T1J 4B1

³AAFC, Swift Current, Saskatchewan, Canada S9H 3X2

Plant genotype can affect interactions between herbivores and their parasitoids. To determine the effects of novel wheat germplasm on *Cephus cinctus* and its parasitoid *Bracon cephi*, ten wheat genotypes were planted near Coalhurst, ca. 10 Km west of Lethbridge, from 2003 to 2005. The novel experimental synthetic solid-stemmed hexaploid G9608B1-L12J11BF02, solid-stemmed AC Eatonia and hollow-stemmed durum AC Navigator reduced the infestation level and cutting damage by *C. cinctus*. On the other hand, another synthetic hexaploid B9973B03&AC4AW, hollow-stemmed cultivars AC Cadillac, McKenzie and AC Barrie were more susceptible to *C. cinctus* damage. Hollow-stemmed AC Cadillac and AC Barrie had the highest populations of *B. cephi* and arval parasitism followed patterns of *C. cinctus* infestation. AC Navigator had consistently the lowest population of *B. cephi*. The population of second generation *B. cephi* was more abundant than first generation regardless of germplasms. We conclude that wheat genotype did not have a direct effect on *B. cephi* populations but rather, effects were mediated indirectly through its herbivore host.

Index to Authors

(Bold page numbers indicate presenting authors)

Author	Abstract Number
Acorn, J.	1
Addicott, J.F.	39
Barnwell, E.	2
Beres, B.L.	41
Blair, L.	36
Blake, A.J.	3
Bourassa, S.	4 , 30
Bourchier, R.	32, 36, 5
Boyetchko, S.M.	6
Buckle, D.	18
Cárcamo, H.A.	7 , 15, 41
Cartar, R.V.	8 , 11, 12
Clarke, F.R.	41
Clayton, G.W.	13
Coghlin, P.C.	38
De Clerck-Floate, R.	2
De Luca, P.A.	14
De Seram, C.	33
Depauw, R.M.	41
Dosdall, L.M.	3, 13, 15, 31
Dyer, A.T.	34
Esch, E.D.	30, 10
Evans, M.M.	11
Evenden, M.L.	23
Farmer, A.M.	12
Floate, K.D.	37 , 38
Foster, D.J.	8
French, V.	25
Fry, K.M.	29
Glasier, J.R.N.	19, 9
Grey, W.E.	34
Hammond, H.E.J.	35
Harker, K.N.	13
Hartley, D.	4
Herle, C.	7
Hummel, J.D.	13
Hynes, R.K.	6
Irwin, S.	25
Jacobs, J.	4
Jaeger, C.	26

Judge, K.A.	14
Keddie, B.A.	3, 29
Kelly, T.C.	25
Kher, S.	15
Laird, R.A.	39
Langor, D.W.	17, 35, 40, 10
Larson, T.	7
LeCourtois, C.	16
Lee, S-I	17
Leech, R.	18, 19, 20, 21
Leo, S.S.T.	22
Lupwayi, N.	7
Lysyk, T.J.	28
Mori, B.A.	23
Morril, W.L.	34
Morris G.K.	14
Nandakumara, S.	33
Nazari, V.	26
O'Donovan, J.T.	13
O'Halloran, J.	25
Olfert, O.	37
Olivier, C.Y.	24
Oxbrough, A.	25
Pang, B.	41
Pengelly, C.J.	8
Pinzon, J.	40
Pohl, G.R.	26
Pybus, M.J.	22
Rajput, S.	29
Reid, M.L.	27
Richard, D.	26
Rochon, K.	28
Spence, J.R.	30, 4, 10, 17, 35, 40
Sperling, F.A.H.	22
Sun, Z.	34
Tansey, J.A.	31
Taylor Leech, L	20, 21
Trzcinski, M.K.	27
Van Hezewijk, B.	5, 32, 36
Walgama, R.S.	33
Watson, W.	37
Weaver, D.K.	34
Weiss, R.	37

Wenda-Piesik, A.	34
Wonneck, M.	11
Wood, C.M.	35
Wu, X.	41

**Minutes of the Entomology Society of Alberta
Executive/Board of Directors Meeting**

Location: Lethbridge, October 14, 2010

Meeting called to order at 18:00

Chair: Greg Pohl (President)

In Attendance: Brian Van Hezewijk (Past-President), Rob Longair (Vice-President), Stephane Bourassa (Northern Director), Mary Reid (Central Director), Ken Fry (Secretary), Fran Leggett (Southern Director), Kimberly Rondeau (Treasurer), Lloyd Dosdall (Regional Director to ESC), and Emily Barnwell (Proceedings Editor)

Regrets: Alec McClay (Webmaster)

1. Approval of agenda

MOVED by Greg, Seconded by Brian that the agenda be approved; Carried

2. Approval of April 15, 2010 Executive Meeting Minutes as amended

MOVED by Brian, Seconded by Stephane that the minutes be approved; Carried

3. Report from the Proceedings Editor (Emily Barnwell)

Emily reported that the proceedings volume for the Entomological Society of Alberta meeting held in Vermilion, AB in 2009 was completed. In an effort to prevent wasted paper, Emily printed only 60 copies this year, instead of one copy per member. Copies would not automatically be handed out at the registration desk, but those wanting a copy could take one. The Proceedings is also on the website, and more could be printed. Any leftover copies will be mailed to libraries.

MOVED by Greg, Seconded by Stephane to accept the Editor's report; Carried

4. Report from the Treasurer (Kimberly Rondeau)

Kim noted that there were several (7) new memberships recently sent, mainly to new members in the Red Deer area. The Society is in sound financial condition, with a small profit generated from the previous annual meeting in Vermilion. As of September 30, 2010 the total assets of the Society were \$21.3K. It was noted that some updates are needed to the ESA Website. Lloyd Dosdall volunteered to notify Alec McClay of these updates, namely that the Rules and Regulations section should be updated to reflect the increase in membership fees recently approved, and that the name of Peter Harris should be added as an Honorary Member

MOVED by Fran, Seconded by Emily to accept the Treasurer's report; Carried

5. Report from Southern Director (Fran Leggett)

Asking for ESA to support a kit for "Science for Schools". The amount is up to \$700.00. Fran will make a formal request to the Society. See attached full report for details.

6. Report from Central Director (Mary Reid)

See attached full report for details.

Proceedings of the 58th Entomological Society of Alberta Annual Meeting

7. Report from Northern Director (Stephane Bourassa)
See attached full report for details.
8. Regional Director to the ESC (Lloyd Dosdall)
See attached report for details.
9. Report from Webmaster (Alec McClay via Ken)
See attached report for details. It was noted that Peter Harris is not on honorary members list.
10. Report from Secretary (Ken Fry)
See attached report for details.

MOVED by Ken, seconded by Brian to accept the reports as submitted;
Carried

11. Fall Meeting Plans
Brian described the PPSA and WFPM organizations. \$500.00 raised by the ESA, \$6,000.00 raised in total by all organizations. Funds will be dispersed to 1) meeting room costs, 2) speaker costs, 3) social event costs, and 4) Western Forum luncheon. This meeting should result in a profit. Hector Carcamo is the ESA and WFPM signing authority. Pre-registration is 51 persons. If this assemblage of organization sis to meet again, it should be scheduled concurrently as it is a long string of meetings. There are new people from Red Deer attending this year.
12. Awards
No nominations for Carr or Honorary awards this year. There are six applicants for travel grants. The criteria used to distribute the awards are 1) if they have previously received an award, 2) distance from the meeting site, and 3) year of study. Awards were given to Sarah Leo, James Glasier, Meghan Evans, Swaroop Kher, and Alexandria Farmer. There was one applicant for the undergraduate award, Caroline Le Courtois, a student of John Acorn. We should have earlier deadlines to allow award recipient to attend if funding available.
13. AGM
Request from Kevin to discuss Bow Island Provincial Grazing Reserve Land sale to potato grower. Asked ALG to write a letter and should ESA write a letter. 13,600 acres (100 quarters) are at stake. Greg will bring it up at the AGM.
14. Nominations
Rob Longair prepared the following slate of nominees to go to the AGM: VP – Lloyd Dosdall, SD – Kathryn Beauchamp, Treasurer – Adam Blake or Robin Leech, Proc. Ed. – Kathryn or Brian, RDESC – Felix or Rose. Term periods are to be posted on the ESA website. The local organizing committee for each AGM should be tasked with preparing the Proceedings. The Society has a copy of Adobe Publisher but it is not a user-friendly product.

15. 2011 Meeting

Pollinator symposium and possible curation blitz with John Swann. Site to be determined, possibly the field station in Kananaskis or at the U. of C. Other suggestions were the Nature Centre in Red Deer or joint with ESS.

16. 2012 Meeting

ESC has been officially corresponded with to host the joint meeting. No local arrangements chair as yet. Coincides with the 90th anniversary of the UA Department of Entomology.

New Business

17. Archives

Fran investigated the possibility of having the Galt Museum serve as the archival host of the ESA. She noted that the Archives Society of Alberta has advisory services. Fran will contact them.

18. One Day Rate Policy

Brian raised this issue. Does this need to be a by-law or policy? Greg produced a document on hosting meetings in 2003 and will expand upon it for future use. Suggestions for day rates included \$40 for a half day and \$60-75 for the Friday. No free passes for volunteers.

19. Adjournment

MOVED by Rob, Adjourn the meeting at 20:39

**Minutes of the Entomological Society of Alberta
58th Annual General Meeting**

Lethbridge, Alberta November 16, 2010

Minutes prepared by Ken Fry, ESA Secretary

Attendees:

John Acorn	Rob Longair
Emily Barnewall	Lisa Lumley
Bill Barr	Alec McClay
Adam Blake	Boyd Mori
Stephane Bourassa	Sonya Odsen
Rob Bouchier	Jennifer Otani
Hector Carcamo	Anne Oxbrough
Rose De Clerck-Floate	Jaime Pinzoa
Lloyd Dosdall	Greg Pohl
Kevin Floate	Sunil Rajput
Ken Fry	Kateryn Rochon
James Glasier	Kimberly Rondeau
Gerald Hilchie	Joe Shemanchuk
Kevin Judge	John Spence
Swaroop Kher	Felix Sperling
Robert Laird	Jim Tansey
Carolinen LeCourtois	Brian van Hezewijk
Robin Leech	Ravindra Walgama
Fran Leggett	Charlene Wood
Sarah Leo	Xiuhua Wu

Meeting called to order at 11:35 am

1. Moment of silence for Mustapha Ahmed Kahn of LRC
2. Additions to agenda and approval
 - moved to accept, Brian VanHezewijk; seconded, John Spence
3. Approval of minutes from the Fall 2009 AGM
 - moved to accept, Fran Leggett; seconded, Hector Carcamo

CARRIED
4. Webmaster's Report (Greg Pohl for Alec McClay)
 - see attached report
 - Greg/Rob
5. Secretary's Report (Ken Fry)
 - see attached report
 - Brian/John Spence
6. Report from Regional Director to Entomological Society of Canada (Lloyd Dosdall)
 - None delivered at meeting, report subsequently submitted, see attached report

7. Treasurer's Report (Kimberly Rondeau)

- oral report on current meeting
- Hector reported on joint meeting funding arrangements indicating expenses will be subsidized by fund raising by all groups
- audited report for 2009 also presented
- moved to accept, John Spence; seconded, Lloyd Dossall

7. Nominations (Rob Longair): nominations were presented as follows:

- a. President – Rob Longair
- b. Past President – Greg Pohl
- c. Vice President – Lloyd Dossall
- d. Treasurer – Adam Blake
- e. Secretary – Ken Fry
- f. Southern Director – Kateryn Rochon
- g. Central Director Mary Reid
- h. Northern Director - Stephane Bourassa
- i. Proceedings Editor – Meghan Evans
- j. Webmaster – Alec McClay

There were no additional nominations from the floor. John Spence moved that nominations cease; seconded by Hector Carcamo. Nominated slate Acclaimed.

8. Appointment of society financial auditors

- Charlene Wood and Evan Esch accepted.

9. Resolutions: the following resolution was prepared and read by Evan Esch:

Be it resolved that the 58th Annual ESA was a resounding success by all conceivable metrics and that though the bar was set exceedingly high by the previous meeting, the 2010 ESA shall surely be remembered as a good time by all, whereas those in charge of local arrangements did an excellent job, and that Lethbridge is a fine city, regardless of its situation downwind of so many feed lots, whereas those in charge of the scientific program did an excellent job, and those who presented were superb, whereas those responsible for registration and finance were not only professional and efficient, but performed their services with a smile, whereas the joint session with the Plant Protection Society of Alberta was most agreeable and that plant science is almost as cool as bug science, whereas the Western forum for Pest Management was most definitely not pesky and most certainly excellent, whereas the staff at the Coast Hotel ensured we were all fed the highest grade food and tucked into bed bug-free beds which was heartily appreciated, whereas Colin Weir from the Alberta Society of Birds reminded us that birds are almost as cool as insects and spiders, and whereas the executive of the ESA, especially our esteemed President, who has been the harbinger of new and even more golden time for the ESA.

10. 2011 Meeting to be held in the central region, likely Calgary.

11. ESA will be co-hosting the national meeting in 2012. It was noted that 2012 is also the 60th anniversary of the ESA and the 90th anniversary of the Department of Entomology of the U. of A. Plea for assistance with the organisation of the meeting.

13. **New business**

13.1 Scholarships for graduate students. Item stricken due to lack of action/information.

13.2 Letter Regarding sale of provincial grazing reserve lands (Greg Pohl)

- Large parcel of grazing land to be sold for agriculture production
- Kevin Floate:
 - 100 quarters of land = 25 square miles
 - has public access
 - houses several species of endangered species
 - province not committed to preservation of land
 - "Let's go outside" radio show has podcast giving details
 - decision made October 26
- summary to membership of details of issue to be sent by Greg and Rob Longair or Kevin Floate

Moved that ESA draft a letter and send to Premier, ministers of agriculture and SRD, leaders of opposition parties, major newspapers regarding opposition of the /ESA to pending sale of grazing reserve lands; Greg Pohl, seconded Emily Barnewell

Carried

14. Society involvement with Birds of Prey Centre (Greg Pohl)

- Greg to provide information to Centre regarding resources ESA may provide to the Centre
- Can ESA access site to do field work? This will be pursued.

15. Question arose about day rates for meeting attendance

- Greg Pohl mentioned that this issue is being dealt with by executive and future local organising committees will accommodate this request.

16. President's Address

Greg Pohl read his presidential address as outgoing ESA President (see attached).

17. Adjournment

- move to adjourn by John Spence
- meeting adjourned at 12:07PM.

Entomological Society of Alberta
Report of the Regional Director to the Entomological Society of Canada
Fall Executive Meeting

Lethbridge, 14 October 2010

A principal focus of the ESC Executive over the past year has been to continue the search for a new editor of *The Canadian Entomologist* to replace Robb Bennett who is resigning as of October 2011. ESC President Maya Evenden approached at least 10 individuals to determine their interest in the position, but to date no replacement editor has been found. The Executive is considering making this a paid position, in the hope that this may then generate greater interest.

The ESC has been approached by the publishers, Taylor and Francis, to take on publishing *The Canadian Entomologist*. An ad hoc committee, chaired by Kevin Floate, evaluated the Taylor and Francis proposal and worked to draw comparisons with the current publisher (NRC Press) and a third publisher, Cambridge University Press. The Governing Board discussed all three options at considerable length, and decided that Cambridge University Press would best suit the interests of the ESC.

ESC members P. Bouchard, P. DeGroot, and R. West have worked to scan and post the Monograph series from 1976 to 1993 on our ESC website. This process involved negotiating an agreement between the ESC and Agriculture and Agri-Food Canada. The result has been the generation of considerable positive exposure for the ESC. Total costs associated with scanning *The Canadian Entomologist* and the Memoirs were approximately \$55,000; however, all of these costs have since been recouped and the ESC expects its publications will generate some \$20,000 next year.

More manuscripts were submitted to *The Canadian Entomologist* in 2010 than in 2007-2009. The rejection rate is approximately 50 to 60%. It is noteworthy that the impact factor of *The Canadian Entomologist* has increased steadily from 0.5 to near 1.0 during this period. Robb Bennett has been credited with helping improve the journal's quality during his tenure as editor.

The 2011 Joint Annual Meeting will be held in Halifax, NS, and in Edmonton in 2012. The Alberta meeting will coincide with the 90th anniversary of the founding of the Department of Entomology at the University of Alberta. The Entomological Society of Ontario and Canada Joint Meeting will celebrate the 150th anniversary of the founding of the ESO and the ESC.

The term of Aynsley Thielman, Chair of the Student Affairs Committee, ends this year, and Chandra Moffatt and Julia Mlynarek will jointly assume Aynsley's responsibilities.

The financial status of the ESC remains stable. There are approximately 540 members from Canada, the U.S.A., and other countries, and 367 subscribers to the journal. The total Society revenue for 2009 was \$206,000, and expenditures amounted to \$22,000. Interest on investments was \$16,500. Patrice Bouchard is resigning his role as Treasurer, and he will be replaced by Scott Brooks.

The ESC website remains increasingly popular, especially since posting of the Monograph series. Over 2.4 million hits and 1 million page views were recorded in the past year, with an average of 6,750 hits per day. This has more than doubled over the previous one-year period.

The Joint Annual Meeting of the Entomological Societies of Canada and British Columbia was held recently in Vancouver from October 31 to November 3, 2010. Symposia included sessions on mountain pine beetle, invasive insects, insect community ecology, a Mark Winston research retrospective, invertebrate conservation, arachnology, a Terry Shore memorial symposium, a graduate student symposium, and a symposium relating to the Biological Survey of Canada. Approximately 250 people registered at the meeting.

Respectfully submitted,
Lloyd Dosdall
Regional Director to the ESC

**Entomological Society of Alberta
Northern Director's Report
Fall Executive Meeting**

Lethbridge, 14 October 2010

Events:

June 29 to July 2nd, 2010, the University of Alberta held the 6th International Conference on the Biology of Butterflies.

July 3 to July 7, 2010, Edmonton hosted the 24th annual international conference of the Society for Conservation Biology.

September 23, 2010, Ken Raffa from the University of Wisconsin visited the U of A and gave two seminars: 1- Dynamics of a Tipping Point: Constraints, thresholds, and regime change in conifer-bark beetle interactions and 2- How symbiotic bacteria can facilitate biological invasions, and be used to manage them.

Students currently enrolled in Entomology at U of A:

Maya Evenden: 6 students, 1 PDF

Inka Lusebrink: PDF, chemical ecology of the mountain pine beetle invasion. Co-supervised with Nadir Erbilgin.

Tyler Wist: 3rd year, PhD, Chemically-mediated tritrophic interactions among *Caloptilia fraxinella* its ash hosts (*Fraxinus*) and parasitoid *Apanteles polychrosidis*

Joelle Lemmen: 3rd year PhD (rolled over from Master), Mechanisms of pheromone response plasticity in the long-lived moth *Caloptilia fraxinella* (Lepidoptera: Gracillariidae)

Caroline Whitehouse: 4th year MSc, Reproductive biology and life history trade-offs in the fir coneworm, *Dioryctria abietivorella* (Grote) (Lepidoptera: Pyralidae)

Marius Aurelian: 3rd year MSc, Semiochemical-based mass trapping of apple clearwing moth, *Synanthedon myopaeformis*.

Boyd Mori: 2nd year MSc, Development of a pheromone monitoring system for red clover casebearer (*Coleophora deauratella*).

Jessica Kwon: 1st year MSc, Development of a semiochemical-based attracticide to attract and kill two invasive pests of apple in British Columbia.

Graduated:

Christine Miluch: MSc,. Development of a semiochemical-based monitoring system for the diamondback moth *Plutella xylostella* (L.) (Lepidoptera; Plutellidae) in canola

Jens Roland: 4 students

Kurt Illerbrun: 4th year of MSc, effect of herbivory by alpine *Parnassius* butterfly larvae on the spatial dynamics of its host plant, *Sedum lanceolatum* the lance-leaved stonecrop. Kurt holds a QueenElizabeth II Scholarship.

Jennifer Waller: 3rd year MSc, dynamics of the parasitoid community of the forest tent caterpillar at the front of a host population 'traveling wave'. Jennifer holds a QueenElizabeth II Scholarship.

Amy Nixon: 3rd year MSc, forest structure and the role of Allee effects in preventing the spread of forest tent caterpillar outbreaks. Amy holds an NSERC PGS-M Scholarship and an Alberta Ingenuity Scholarship.

Amanda Doyle: 3rd year MSc, role of induced host-plant defense on population dynamics of *Parnassius smintheus* butterflies. Amanda holds an NSERC PGS-M Scholarship.

Heather Proctor: 2 students

Jeffrey Newton: 4rd year PhD, effects of climate change and grazing intensity on diversity and food-web structure of rangeland microarthropods. In March Jeffery received an Alberta Conservation Association Biodiversity Grant to look at ant-sternorrhynchan interactions.

Lindsey Wilson: 2st year MSc, effects of iron treatment for eutrophication on freshwater invertebrates. She holds an NSERC PGSM award.

Felix Sperling: 6 students, 2 PDF

Julian Dupius: 2nd year MSc, speciation and hybridization in swallowtail butterfly species complexes.

Benjamin Proshek: 3rd year MSc, population genetics of the endangered Mormon Metalmark butterfly (*Apodemia mormo*) in western Canada and adjacent United States.

Jason J. Dombroskie: 5th year PhD, systematics and phylogeography of leaf roller moths (Lepidoptera: Tortricidae) and computerized identification of all Lepidoptera subfamilies across Canada.

Marla Schwarzfeld: 5th year PhD, diversity and taxonomy of parasitic ichneumon wasps in Alberta (Hymenoptera: Ichneumonidae), with special reference to *Ophion* species. Marla holds an Alberta Ingenuity Fund scholarship, and a NSERC PGSD award. Her work is supported by the Alberta Conservation Association.

Bryan Brunet: 3rd year PhD, genomic architecture of species differences between spruce budworm of the *Choristoneura fumiferana* group in western Canada (Lepidoptera: Tortricidae).

Patrick James: Killam postdoctoral fellow (cosupervised with David Coltman), modeling of integrated population genomic landscape maps for the mountain pine beetle/ pine/ blue-stain fungal system.

Sarah Leo 2st year MSc., population genetics of winter ticks (*Dermacentor albipictus*) in Alberta

Graduated:

Lisa Lumley: 6th year, PhD, systematics of the *Choristoneura fumiferana* (Lepidoptera: Tortricidae) spruce budworm species complex.

Maria Djernaes: 5th year, PhD, morphology and behaviour of primitive Lepidoptera and Trichoptera. Marie holds an Alberta Ingenuity Fund scholarship.

Andrew Keddle: 5 students

Co-supervised with Harriet Harris

Jennifer Biliske 3rd year PhD, Investigating role of insulin signalling in *Wolbachia* - insect host interactions.

Philip Batista: 4th year PhD. Investigating the association of *Wolbachia* with cabbage seedpod weevil and its parasitoids.

Lesley Brennan: 5th year PhD. Investigating the expression of proteins in a mosquito cell line naturally infected with *Wolbachia*.

Defended:

Amanda Van Haga, MSc: The Use of Lysozyme-HCl to Control Chalkbrood Disease (*Ascosphaera apis* (Maassen ex Claussen) Olive and Spiltoir) in Honey Bees (*Apis mellifera* L.)

Adam Blake, MSc: The effects of soil and plant nutrients on the oviposition preference, larval performance and spatial dynamics of *Ceutorhynchus obstrictus* and its parasitoids.

Lloyd Dosdall: 6 students

James Tansey: PDF, determining the mechanisms of resistance in some genotypes of root maggot-resistant canola.

Defended:

Jeremy Hummel: PhD, defended September 2009. Investigations of wheat and canola intercrops on agronomic performance and dynamics of root maggots and beneficial insects.

Meghan Vankosky: Defended in 2010, The title of her thesis is: "Integrated Pest Management of *Sitona lineatus* L. (Coleoptera: Curculionidae) in Crops of *Pisum sativum* L. (Fabales: Fabaceae) in Western Canada". Meghan is currently working on her Ph.D. in entomology at University of Windsor, Windsor, ON.

Ravi Subramaniam: Defended MSC in March 2010. Thesis title: Identifying agronomic practices that conserve and enhance natural enemies of root maggots (*Delia* spp.)(Diptera: Anthomyiidae) in canola.

James Tansey: PhD, defended September 2009. Mechanisms of resistance in experimental canola germplasm to infestation by the cabbage seedpod weevil, *Ceutorhynchus obstrictus* (Marshall).

John Spence: 6 students, 1 PDF

Colin Bergeron: PhD, Boreal forest ecology and biodiversity of carabid beetles in relation with forest history revealed by dendrochronology.

Esther Kamunya: PhD, Insect ecology, biological diversity and conservation of moth in relation to partial harvest in the boreal forest (Lepidoptera).

Seung-Il Lee: PhD, 3rd year. Saproxylic beetle conservation in relation to partial harvest and retention patch size.

Jaime Pinzon: PhD, 5th year. Composition and structure of epigeal spider assemblages in mixedwood forest cover-types after variable retention harvests.

Charlene Wood: MSc, 3rd year. Investigation of saproxylic beetle habitat associations from dead trembling aspen (*Populus tremuloides*) snags (standing deadwood) and logs (fallen deadwood)

Evan Esch: MSc, 3rd year. Investigation of the life history traits of the mountain pine beetle, *Dendroctonus ponderosae* (MPB), in whitebark pines, *Pinus albicaulis*.

Anne Oxbraugh: PDF, investigation of the litter-dwelling invertebrate community, encompassing a range of functional groups (predators, herbivores, detritivores), in mixed forests in Canada and Ireland. Hold the INSPIRE IRCSET-Marie Curie International Mobility Fellowship in Science, Technology and Engineering.

Graduated:

Suzanne Abele: MSc, forest ecology, conservation biology, malacology (Gastropods, Bryophytes).

Matthew Pyper: MSc, boreal forest ecology, biodiversity, sustainable forest management (Carabidae).

John Acorn: 1 student

James Glassier: MSc, 2nd year. Ecology of ants in jackpine sandhill ecosystems. Co-supervised with Scott Neilsen. Has ACA Biodiversity Grant

Nadir Erbilgin: 5 students

Janet Ariss: MSc, 1st year. Effects of interactions between bacteria and fungi on mountain pine beetle (*Dendroctonus ponderosae*) reproduction in three host tree species.

Devin Goodman: PhD 2nd year: Reducing mountain pine beetle (*Dendroctonus ponderosae*) impact by managing stand vigor to increase tree defenses and resistance.

Jenny Lazebnik: MSc 1st year. Importance of plant volatiles for the induction of resistance to mountain pine beetle (*Dendroctonus ponderosae*) in neighbouring trees.

Ahmed Najar: MSc 2nd year. Role of plant growth and biomass intolerance and resistance of aspen to forest tent caterpillar (*Malacosoma disstria*) in western Canada.

Crisia Tabacaru: PhD 1st year. Reproductive success of mountain pine beetle (*Dendroctonus ponderosa*) in burned and unburned stands to determine whether beetles preferentially locate and breed in fire-injured trees.

Graduated Students:

Jessi Colgan: MSc graduated 2010: The relationship between jack pine budworm (*Choristoneura pinus pinus*), a mountain pine beetle fungal associate (*Grosmannia clavigera*) and a defense induction in jack pine seedlings (*Pinus banksiana*).

Respectfully submitted,
Stephane Bourassa
Northern Director

**Entomological Society of Alberta
Central Director's Report
Fall Executive Meeting**

Lethbridge, 14 October 2010

University of Calgary

Insect Collection (Manager: Dr. John Swann, jeswann@ucalgary.ca)

- About 200,000 pinned specimens in the equivalent of 75, 12 drawer cabinets (lots of expansion room)
- Large amounts of bulk collecting residues in alcohol from Waterton Lakes, Yoho, and Kootenay National Parks, Kananaskis area and U of C campus, smaller amounts from Ghana, and Fish Creek Provincial Park.
 - John has an ongoing faunal survey of Fish Creek Provincial Park in collaboration with faculty at St. Mary's University College.
- Numerous donations of material in the past year of which about 50% are Lepidoptera
 - Open invitation to anyone from the Alberta Lepidopterist's Guild to drop by and use/work in the collection.
- 12 -18 loans per year over the last 2 years and would be happy to receive requests from other researchers especially if its a 'please keep an eye out for material of the following taxa...'
- Several graduate students have been/are using the collection for their theses work and 6 independent study students completed undergraduate projects with the collection's material in the past year and a half with R. Longair.
- 5-7 volunteers at any time work on specimen preparation and general upgrading of the collections curation.

BioBlitz – July 2010 (*coordinated by R. Longair and J. Swann*)

The first annual (perhaps) Kananaskis BioBlitz was held at the University of Calgary Biogeoscience Institute Field Station at Barrier Lake over a 24-hour period from 2 pm on 17 July to 2 pm on 18 July. The BioBlitz was held in conjunction with the field station Open House. A variety of experts from various places and institutions helped identify vascular plants, fungi, birds, mammals, and other vertebrates as well as specific groups of invertebrates, including some insects. Particularly notable were findings for Lepidoptera with approximately 97 species of butterflies and moths identified. Residues from Malaise traps and yellow pan traps are available for interested researchers.

Courses

Insect Biodiversity Field Course (*R. Longair*)

This course ran in August 2010 at the Barrier Lake field station. Course may be in jeopardy due to funding changes and uncertainty of field station status. Likely will not run next year (first time in about 13 years). May or may not run in subsequent even years.

West Africa Field Course (*R. Longair*)

“Tropical Biology and Conservation in Ghana” field course (with major insect component) will run in May-June 2011. This will be the 5th time in 10 years.

New Insect Course

New non-majors course “Insects, Science and Society” now listed in UofC catalogue. Will be taught for the first time in Winter 2012.

Insect chapter for Ghana Tourist guide

R. Longair contributed a chapter on insects to a Tourist Guide for the Wechiau Community Hippo Sanctuary in northwestern Ghana. The tourist guide will be a first for West Africa as a high quality guide to local fauna and flora and includes chapters on the history, people and culture of the sanctuary, plants, insects, birds, “other animals” and the focus of the sanctuary, Hippos. Publication is expected early in 2011 and is supported by the Calgary Zoo.

Graduate and other research

Ralph Cartar Lab

Megan Evans, MSc. Cattle grazing and pollination communities in the rough fescue grassland.(co-supervisor: Mark Wonneck, Agriculture Canada)

Alexandria Farmer, MSc. Logging and invasive plant-pollinator interactions in foothills forest. (co-supervisor: Robin Owen, Mount Royal University)

Lindsay Zink, MSc. Pollination of canola by wild bees (co-supervisor: Mark Wonneck) [started Sept 2010]

Jeremy Fox Lab (community ecology)

Colin Olito, MSc. Alpine plant-pollinator networks

Lawrence Harder Lab Projects (plant-pollinator interactions)

Amiot, V. and L.D. Harder. Memory and energetics: are bumble bees memory-limited foragers?

Harder, L.D. and S.D. Johnson. Pollinator differential and flower colour diversity in */Hesperantha coccinea/* (Iridaceae).

Internicola, A. and L.D. Harder. Phenological aspects of deceit pollination of */Calypso bulbosa/* (Orchidaceae).

Internicola, A. and L.D. Harder. Handedness of bumble bees visiting spiral inflorescences.

Hobbhahn, N.C. The evolution of nectar production from deceit in *Disa* (Orchidaceae).

Liao, W.-J. and L.D. Harder. The influences of plant clonality on pollinator foraging.

Garibaldi, L.A., M.A. Aizen, A.M. Klein, S.A. Cunningham and L.D. Harder. Global growth and stability in agricultural yield decrease with pollinator dependence.

Lee Jackson Lab (aquatic ecosystems)

Madison Kobryn, MSc, Macroinvertebrate response to nutrient enrichment in rivers.

Rob Longair

Work on “pollen wasps” (Hymenoptera: Vespidae: Masarinae: *Pseudomasaris*) in Peter Lougheed Provincial Park.

Bumble bee collection in support of COSEWIC contract to Michael Otterstatter and Sheila Collas. Collections at Barrier Lake, UofC Ecology Reserve and Drumheller.

Mary Reid Lab (behavioural ecology of bark beetles and others)

Leanna Lachowsky, PhD. Sex ratio variation in mountain pine beetles.

Tony Russell Lab (animal morphology)

Tonya Mousseau, PhD. Taxonomy of Silphidae.

Jana Vamosi Lab (plant-pollinator interactions)

Lorraine Adderley, MSc., Pollinator competition and the evolution of selfing

Yvonne Davila, PhD, Diversity within plant-pollinator networks

Muir, Jennifer, MSc., Plant invasions, pollinators, and phylogenetic community structure

Steven Vamosi Lab (evolutionary biology)

Stephen Hausch (MSc student, co-supervised with J. Fox): Trait evolution and species coexistence in bruchine seed beetles

Chandra Venables (PhD student): Phylogenetics and phylogeography of predaceous diving beetles in the Tribe Agabini

Olds College (contributed by Dr. Key Fry)

The Society for the Prevention of Dutch Elm Disease has entered into an agreement with Olds College that will see Olds College become the repository of arthropod material acquired under the Alien Invasive Species Surveillance program conducted in cooperation with the Canadian Food Inspection Agency. This program seeks to detect alien invasive species (AIS) attacking urban forest trees. Baited traps have been placed at 17 locations deemed high risk for immigration of AIS and members of the Scolytinae, Cerambycidae, Buprestidae and Siricidae are retained. It is hoped that a robust, if not synoptic collection of these taxonomic groups associated with urban trees will be established for use by students, researchers, industry and the public. Undergraduate students are employed in the processing of the trap residues affording them an opportunity to explore the tree-associated insect fauna of Alberta.

NSERC-Canpolin Strategic Network <http://www.uoguelph.ca/canpolin/>

This network is addressing the decline of decline of pollinators in agricultural and natural environments. CANPOLIN working group 5 (Ecosystems) met for 4 days in August 2010 at Barrier Lake Field Station to discuss methodology, research priorities and objectives, and future research. In attendance were 8 faculty (Elizabeth Elle, Jana Vamosi, Ralph Cartar, Chris Cutler, Marcel Dorken, Chris Lortie, Erica Nol, Risa Sargent) and 2 postdocs (Yvonne Davila, Tom Woodcock), missing 12 other faculty from the working group. A CANPOLIN meeting is planned for early November in Calgary to set research priorities and methodologies for future studies of canola pollination.

Outreach

R. Longair spent several hours on two days of the Calgary Folk Festival (21 & 23 July) at the display booth run by ABC (Apiaries and Bees for Communities) helping present information about wild bees in the urban setting.

C. Bird, R. Cartar, K. Fry and M. Reid participated in the Bug Jamboree at Ellis Bird Farm in August.

Respectfully submitted,
Mary Reid
Central Director

**Entomological Society of Alberta
Southern Director's Report
October 2010**

Dan Johnson is the Canada Research Chair in Sustainable Grassland Ecosystems (2004). He has an opening for a graduate student working on Insect pathology and biological control, for reductions in pesticide use. He had an article in the Lethbridge Herald from the regular column, "The Public Professor": on June 19, 2010: "[Curiosity and fireflies](#)". How do people decide what to study?

Dan has a number of graduate students, Paul Irvin, Susan Entz and Meg McCluskie at this time working on entomological related topics.

Kevin Floate's student Graeme Taylor who is jointly supervised with Steve Perlman (U. Victoria, BC) has recently defended his thesis

Tim Lysyk has a postdoctoral fellow Kateryn Rochon working on ticks and Anaplasmosis.

Rose De Clerck-Floate has two Graduate students

1. Emily Barnewall; MSc at the U of L
Co-supervised by Cam Goater and Rose
Topic: investigation of the insect-host plant interactions and efficacy of a stem-galling weevil (*Rhinusa pilosa*) on yellow toadflax (*Linaria vulgaris*), and select non-target plants through histological and biological studies.
2. Haley Catton: PhD at UBC Okanagan, Kelowna
Co-supervised by Bob Lalonde and Rose.
Topic: the population level interactions of the root weevil *Mogulones cruciger*, on the weed Houndstongue and other members of the borage family.

Hector Caracamo has the following graduate students

1. Meghan Vankosky, MSc student
Dept Agricultural, Food and Nutritional Sciences, U of A
Co-supervised by Lloyd Dosdall and Hector
Topic: Biology and Management of Pea Leaf Weevil in field peas

He also has a Ph.D graduate student from China Ms Xiuhua Wu, Inner Mongolia Agricultural University, and Laboratory of Entomology who will be working on Wheat stem Sawfly.

Brian Beres is working on his PhD supervised by Dean Spanner, Dept Agricultural, Food and Nutritional Sciences, U of A. His topic is Agronomic strategies to manage wheat stem sawfly

At the present time the University of Lethbridge and the Lethbridge Community College are not offering any courses in entomology. Bill Cade, President of the University of Lethbridge has finished his second term in 2010 and has stepped down as president. He does have a 2007-12 Natural Science and Engineering Research Council (NSERC) Research Grant to study Evolution of acoustical communication in insects. He has started a multi-year study on mating behaviour and genetic variation in field crickets. Kevin Judge is a postdoctoral fellow of Bill Cade's studying sexual selection, primarily using singing insects (e.g. crickets, katydids) as model organisms. Rob Laird is a new assistant professor at the University of Lethbridge who is interested in insect-plant-fungus systems. He is currently looking for a PhD student. The

Lethbridge Community College has on staff an entomologist, Jeremy Hummel. It does not appear that there are any specific entomology courses.

An Ontario based NGO called Scientists in School came out to Lethbridge in June 2008 and spent a week presenting science topics to children in kindergarten to Grade 6. The first training was in January 2010. We introduced last year 3 kindergarten programs: I can be a Scientist , Backyard Bugs and Marvelous magnets , 1 Grade 1; Structures, 1 Grade 2; Liquids, 1 Grade 3: Structures and 1 Grade 4: Plants can be Amazing . The group recently met and we now have 8 presenters and are planning to add new modules including ones for grade 5 and 6. At least one of these will include insects and Mark Goettel will be the presenter. They hired a fund raiser and raised \$50,000 to date to help start the program. We have a co-coordinator in place named Wendy Ellert who helps liaise with the schools. Diane Gladwell continued the fund raising efforts during her last visit. Their website is www.scientistsinschool.ca and we will have a dedicated web site page shortly.

The **Helen Schuler Coulee Centre** runs a number of programs throughout the year which deal with insects and spiders. They had a program on social insects in March and received some help from our members. I tried to set up an insect Collection contest to be judged at the meeting this year. The staff from the centre seems to have issues with pinning the insects. We sent them the comment from Greg but we did not have a reply.

**Entomological Society of Alberta
Webmaster's Report
Fall Executive Meeting**

Lethbridge, 14 October 2010

As directed by the Board at the 2009 annual meeting, the main development for the ESA website in 2010 was the transition to a new domain name, www.entsocalberta.ca, from the previous hosting arrangement with the University of Alberta Department of Biological Sciences. The new domain is hosted at Blacksun.ca, a Canadian web hosting service based in Saskatoon. The transfer of all website files to the new domain was completed on January 9, 2010. Users who try to access the site at the old domain name are automatically redirected to the corresponding page at the new domain. Domain registration fees and hosting charges were paid up front for a five year period at a total cost of \$608.33, as the rates per year were substantially less than for shorter periods.

The site was also updated with an obituary for Ernest Mengersen, the 2008 Proceedings, an updated version of the membership form, the 2010 board members, the 2009 Frederick S. Carr Award winner Jan Scott, information on the 2010 annual meeting, student awards and travel grants.

Since the move to the new domain, the site has received an average of 69 visitors and 189 page views per day. The top 10 most accessed pages, in order, are: the 2005 and 2007 Proceedings, the main page, the recipients of the Frederick S. Carr Award, the 2010 annual meeting information page, the 2008, 1960, and 2005 Proceedings, the membership list, and the 2009 annual meeting program.

If you have any questions, concerns, or suggestions relating to the website, please contact the webmaster at any time.

Respectfully submitted,
Alec McClay
Webmaster

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

Lethbridge, 14 October 2010

Ken Fry

Report for the Period April 16 – October 14 2010

I received/tracked six (6) items in my capacity as ESA Secretary:

1. Minutes for Proceedings
2. Insect identification enquires
3. Media contact request
4. Carabid outbreak
5. Deerfoot hosting information
6. Aquatics enquiry

I retained discussions and correspondence conducted via email, including a total of 100 (100) messages.

As Secretary I issued thirteen (13) notices to the membership:

1. BioBlitz.....Apr. 21
2. Employment OpportunityApr. 21
3. Arthropod PhylogenyMay 5
4. AAFC Publication AvailabilityMay 10
5. New ESA website address.....May 17
6. President's UpdateMay 20
7. Volunteer speaker requestJun. 7
8. Annual Meeting announcement.....Sep. 1
9. Awards Announcement and request for nominations.....Sep. 13
10. COSEWIC call for applicationsSep. 17
11. Request for attendance confirmation.....Sep. 29
12. COSEWIC call for applicationsOct. 8
13. Second meeting announcementOct. 12

Letters/items retained

1. Invitation to ESC President to attend ESA Annual Meeting
Deerfoot Inn conference information

Entomological Society of Alberta
Secretary's Report
Spring Executive Meeting
Olds, 15 April 2010

Ken Fry

Report for the Period November 6 2009 – April 15 2010

I received/tracked eight (8) items in my capacity as ESA Secretary:

7. Domain Name Debate
8. Bulletin of the ESC executive listing request
9. Jan Scott Award prize discussion
10. Solicitation about benefits of membership
11. Discussion of webhosting
12. ESA endorsement of ESC Gold Medal nomination
13. Funding request
14. Nomination for ESA award

I retained discussions and correspondence conducted via email, including a total of seven hundred fifty-seven (757) messages.

As Secretary I issued nine (9) notices to the membership:

- | | |
|--|---------|
| 14. Roughley Obituary Notice..... | Nov. 10 |
| 15. Climate Change Letter | Nov. 23 |
| 16. ESC Award Nomination Request | Dec. 8 |
| 17. Council of Canadian Academies | Dec. 10 |
| 18. COSEWIC call for applications | Jan. 20 |
| 19. Strickland lecture announcement..... | Feb. 17 |
| 20. Shore Obituary | Mar. 22 |
| 21. Grasshopper Pamphlet..... | Mar. 22 |
| 22. CNC Employment Opportunity | Mar. 25 |

Letters/items retained

2. Letters of honorary membership to all past Carr Award winners: Janice Scott, John Acorn, Gary Anweiler, Charles Bird, D. Buckle, Ruby Larson, and Terry Thormin
3. ESA UG Award Certificate to Boyd Mori
4. Letter of support for Craig Gold Medal Nomination
5. Letter of support for WWF Climate Change Position

Spring Executive Meeting
Entomological Society of Alberta

April 15, 2010

Opening Balance January 2009

Assets

Cash (bank account)	\$14,234.29	
Term deposits	\$15,000.00	
Common shares (Credit Union shares)	\$550.13	
Total Assets		\$30,105.84

Liabilities & Equity

AGM 2008	\$8,165.32
Total Liabilities	\$8,165.32
Equity	\$21,940.52
Liabilities plus Equity	\$30,105.84

Vermilion, AB -- ESA Annual Meeting 2009

Costs

\$1,093.82	Lakeland College Facility, Catering
\$ 164.00	Accommodations for Guest Speaker
\$2,000.00	Student Travel Awards
\$ 77.53	Registration Desk Materials

Total Meeting Costs - \$3,335.35

Revenues

Registration Revenues + \$4,007.53

Total	<u>+ \$672.18</u>
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Other Transactions

Credits:

Investment Interest	\$417.50
Membership renewals	\$515.00

Debits:

AGM 2008	\$8,165.32
Proceedings	\$ 666.97
ESA Spring Exec Meeting	\$ 59.75
Bank Charges	\$ 32.25
MC/VISA Transaction Charges	\$ 15.26

Closing Balance December 31, 2009:

Assets

Cash (bank account)	\$6,821.89
Term deposits	\$15,000.00
Common shares (Credit Union shares)	\$577.30

Total Assets	<u>\$22,399.19</u>
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Liabilities & Equity

Total Liabilities	\$0.00
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Equity	\$22,399.19
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Liabilities plus Equity	<u>\$22,399.19</u>
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List of Members

Last	First	Organization
Acorn	John	
Adamson	Judy	City of Red Deer
Ball	Kay	
Ball	George	
Barnewall	Emily	University of Lethbridge, AAFC
Barr	William	City of Edmonton
Batista	Philip	
Battigelli	Jeff	Paragon Soil & Environmental Consulting Inc.
Biliske	Jennifer	
Blair	Leah	AAFC
Blake	Adam	
Bourassa	Stéphane	University of Alberta
Bourchier	Rob	AAFC Research Centre, Crop Sciences Section
Brons	Gloria	Butterfly Wings n' Wishes
Brunet	Bryan	
Bryan	Nora	
Byers	Bob	AAFC Research Centre
Byrtus	Gary	
Cárcamo	Héctor	AAFC Research Centre, Crop Sciences Section
Cartar	Ralph	Dept. of Biological Sciences, University of Calgary
Clarkson	Christopher	
Cobb	Tyler	
Crowe	Michael	Lakeland College
Craft	Trevor	City of Red Deer
Cuny	Robert	Lakeland College

Davies	Milton	
DeClerck-Floate	Rosemarie	AAFC Research Centre
Digweed	Scott	
Dolinski	Michael	
Dombroskie	Jason	
Dosdall	Lloyd	Department of Agricultural, Food, and Nutritional Science, University of Alberta
Dupuis	Julian Rowe	
Erb	Stephanie	AAFC Research Centre
Esch	Evan	University of Alberta
Evans	Megan	University of Calgary
Evenden	Maya	Dept. Biological Sciences, U of A
Farmer	Alexandria	University of Calgary
Feddes-Calpas	Janet	
Floate	Kevin	AAFC Research Centre
Foster	Danusha	University of Calgary
Fry	Ken	Olds College
Gaberel	Michelle	Augustana University College
Glasier	James	University of Alberta
Goettel	Mark	AAFC Research Centre
Gooding	Ronald	
Griffiths	Graham	
Gurba	Joe	
Gushul	Evan	
Harris	Peter	
Heming	Bruce	
Heming	Karin	
Herle	Carolyn	AAFC Lethbridge
Hilchie	Gerald	

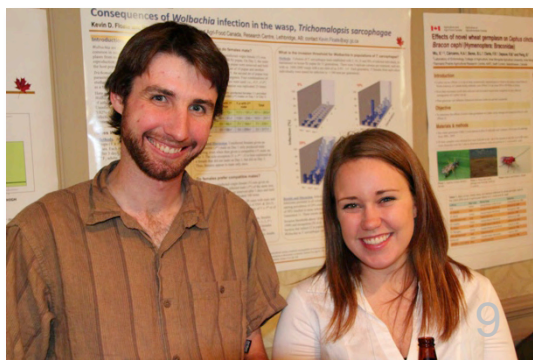
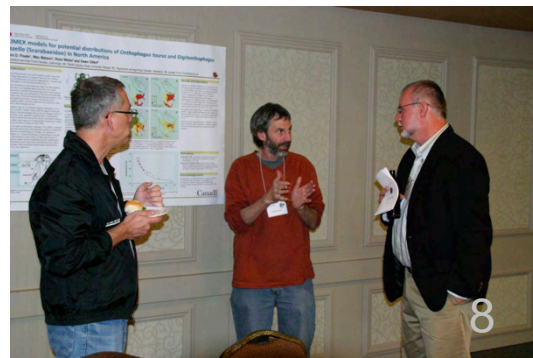
Hindmarch	Trevor	
Hole	Jim	Hole's Greenhouses and Gardens Ltd.
Holmberg	Robert	Centre for Science
Honsameddin	Elkrwe	
Hossain	Mohammad Babul	
Hummel	Jeremy	University of Alberta
Hundsdoerfer	Anina	Alberta Sustainable Resource Development
Ivie	Tyler	Bayer Crop Science Inc.
Johnson	Elaine	City of Red Deer
Jones	Jim	
Judge	Kevin	University of Lethbridge
Kanashiro	Derrick	AAFC Research Centre
Katzell	Susan	City of Red Deer
Kaufman	Reuben	
Keddie	Andrew	
Kher	Swaroop	University of Alberta
Lachowsky	Leanna	University of Calgary
Laird	Robert	University of Lethbridge
Langor	David	Department of Natural Resources, Canadian Forest Service, Northwest Region
Larson	David	Augustana University College
Larson	Tracy	AAFC Research Centre
Larson	Ruby	
Lecourtois	Caroline	
Lee	Seung-II	University of Alberta
Leech	Robin	Alberta Society of Professional Biologists
Leggett	Fran	AAFC Research Centre
Lehman	Ken	City of Red Deer
Lemmen	Joelle	University of Alberta

Leo	Sarah	
Linowski	Ron	Medicine Hat College
Longair	Robert	Dept. of Biological Sciences University of Calgary
Lumley	Lisa	University of Alberta
Lvie	Tyler	
Mark	Michelle	University of Alberta
Maximchuk	Mike	Alberta Sustainable Resource Development
McClay	Alec	McClay Ecoscience
Miluch	Christine	
Moir	Grant	City of Red Deer
Mori	Boyd	University of Alberta
Newton	Jeffrey	University of Alberta
Odsen	Sonya	
Ono	Hideji	Forest Health Consulting
Otani	Jennifer	AAFC
Oxbrough	Anne	University of Alberta
Pengelly	Christian	University of Calgary
Peterson	Jason	4023 Hamilton Hall, 8888 University Drive
Phillips	Iain	Saskatchewan Watershed Authority
Pinzon	Jaime	Dept. of Renewable Resources University of Alberta
Pohl	Greg	Department of Natural Resources, Canadian Forest Service, Northwest Region
Pritchard	Gordon	
Proctor	Heather	
Proshek	Benjamin	
Rajput	Sunil	Alberta Innovates Technology Futures
Ranasinghe	Sunil	Alberta Sustainable Resource Development
Reid	Mary	
Rice	Adrianne	Northern Forestry Centre, Canadian Forest Service, Natural Resources Canada

Rochon	Kateryn	Agriculture and Agri-Food Canada
Rondeau	Kimberly	
Saunders	Chris	City of Edmonton
Schwarzfeld	Marla	
Sexsmith-West		Grant's Plants Tree Service
Sharpe	Andrea	
Shemanchuk	Joseph	
Spence	John	Department of Renewable Resources University of Alberta
Sperling	Felix	
Sperling	Janet	
Stevenson	Margaret	City of Red Deer
Subra	Ravi	
Subramaniam	Ravindran	University of Alberta
Tansey	James	University of Alberta
Van Haga	Amanda	
Van Hezewijk	Brian	Agriculture and Agri-Food Canada
Vankosky	Meghan	University of Alberta
Veenstra	Kevin	City of St. Albert
Waelchli	Fred	
Waller	Jennifer	University of Alberta
Walgama	Ravindra	
Walsh	Peter	Lakeland College
Walter	Dave	U of A
Wheeler	Jenny	City of Edmonton
Whitehouse	Caroline	University of Alberta
Wist	Tyler	University of Alberta, Biological Sciences Department
Wood	Charlene	University of Alberta
Wu	Xiuhua	

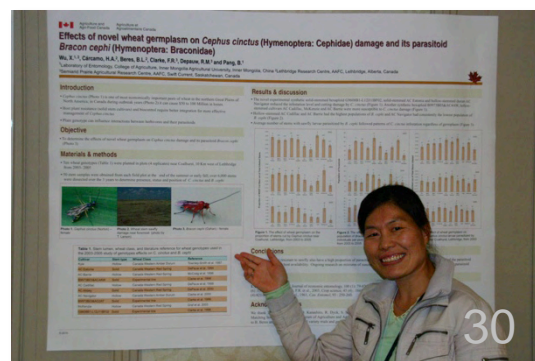
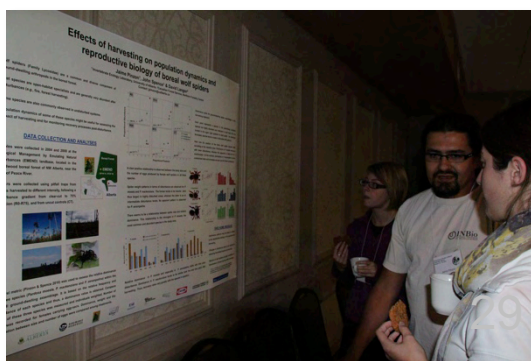
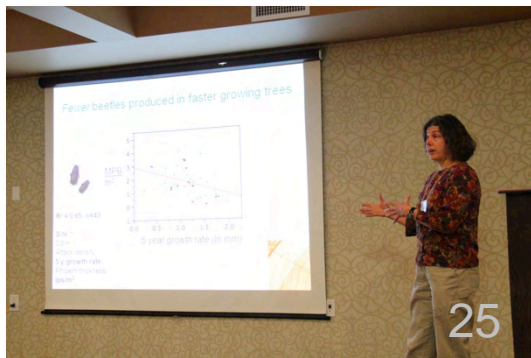
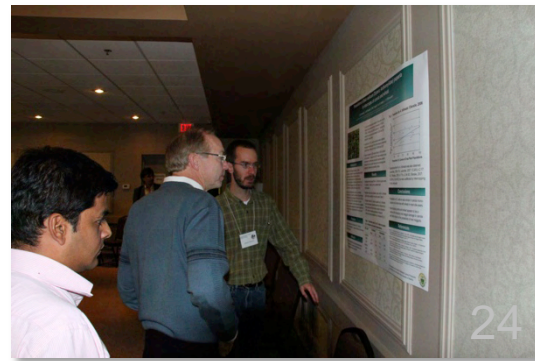
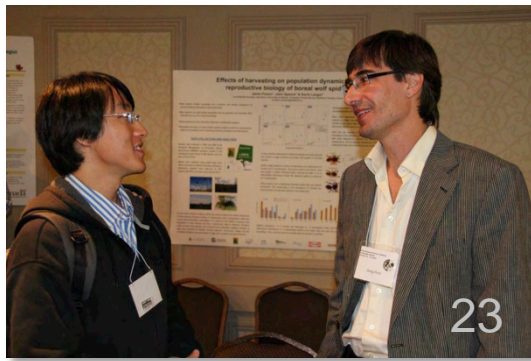
Photos











Key to Photos

1. The venue
2. Sampath Walgama, Joe Shemanchuk and Carolyn Herle
3. Kevin Floate and Rob Longair
4. Ralph Cartar and Kim Rondeau
5. Alex Farmer, Rosa and Hector Carcamo, Val and Gordon Pritchard
6. AGM Business Meeting
7. Leah Blair
8. Kevin Floate, Rob Bouchier and David Weaver
9. Thomas Barchyn and Leah Blair
10. Ralph Cartar and James Glasier
11. John Acorn
12. Travel Award recipients: Swaroop Kher, Sarah Leo, Alex Farmer, Megan Evans and James Glasier with Brian van Hezewijk
13. Undergraduate Award in Entomology recipient: Caroline LeCourtois with Brian van Hezewijk
14. Lloyd Dosedall, Swaroop Kher and Sunil Rajput
15. Colin Weir (after dinner speaker) Alberta Birds of Prey Centre
16. Feathered, non-insect visitor from Birds of Prey Centre
17. Caroline LeCourtois and Sarah Leo
18. Greg Pohl and Barb Deneka
19. Jeremy Hummel, Kevin Floate, Lloyd Dosedall and Robin Leech
20. Dinner
21. Caroline Penniket, Kevin Judge and Ray Wilson
22. Dinner
23. Seung-Il Lee and Greg Pohl
24. Swaroop Kher, Lloyd Dosedall and Jeremy Hummel
25. Mary Reid
26. Kateryn Rochon
27. Emily Barnewall
28. David Weaver
29. Jaime Pinzon
30. Xiuhua Wu

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). Contact the Treasurer via the society website:

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

