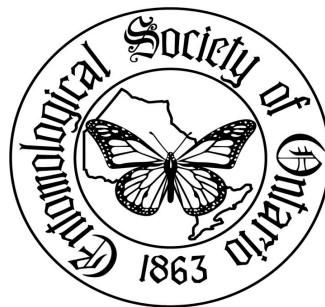


**Entomological Society of Ontario
The 147th Annual Meeting**

15th to 17th October, 2010

The Oakwood Resort at Grand Bend



Announcements



Congratulations to the newly elected Fellows

Professor Freeman McEwen: University of Guelph

Professor Bernard Philogene: University of Ottawa

Congratulation to the winners of the Entomological Society of Ontario travel awards:

Andrew MacFarlane: School of Environmental Sciences, University of Guelph, Guelph ON, N1G 2W1 (Undergraduate Award)

Jess Vickruck : Department of Biological Sciences, Brock University, St. Catharines, Ontario, Canada, L2S 3A1 (Graduate award)

Congratulation to the winners of the Entomological Society of Ontario photographic competition:

Amateur entomologist:

Winner: **Nikola Rahmé** for "Braconid Wasp"

Runner up: **S. Belanger** for "Bee and Fly"

Professional entomologist:

Winner: **H.M. Yeshwanth** for "Nesting Wasp"

Runner up: **H. M. Yeshwanth** for "Notodontidae Larva"

Judges:

Insect Systematics Lab, University of Guelph (Steve Marshall, David Cheung, Morgan Jackson), Max Skwarna, Ashley Crippen Photography/Toronto Entomologist's Association

Entomological Society of Ontario 147th Annual Meeting



The ESO 2010 Organizing Committee:

Local Arrangements:	Jeremy McNeil
Sponsorship:	Ian Scott, Bruce Broadbent
Program:	Jeremy McNeil
Registration:	Carrie Hay
Website & Graphic Design:	Ian Craig, Morgan Jackson
Judging:	Hannah Fraser

The ESO 2010 Executive:

President:	Gary Umphrey
President-Elect:	Hannah Fraser
Past President:	Cynthis Scott-Dupree
Secretary:	Nicole McKenzie
Treasurer:	Shiyou Li
JESO Editor:	Miriam Richards
JESO Technical Editor:	Sandra Rehan
Librarian:	Jim Brett
Newsletter:	Angela Gradish
Student Representative:	Michelle Locke
Website:	Morgan Jackson
Directors:	2008-2010: Hume Douglas, Kathleen Ryan
	2009-2011: Sigrun Kullik, Krista Ryall
	2010-2013: Rose Buitenhuis, Jeremy McNeil,

Entomological Society of Ontario 147th Annual Meeting



SCHEDULE OF EVENTS

Friday, October 15th

- 12:00 - 17:00 ESO Governing Board Meeting
- 18:00 - 20:00 Registration Desk in hotel lobby
- 19:00 - 23:00 Social Mixer...Cash Bar in the Clubhouse

Saturday, October 16th

Morning Session

- 07:30 - 08:30 Breakfast (Oak Dining Room)
- 08:00 - 08:45 Registration Desk in hotel lobby
- 08:45 - 09:00 Welcome and Opening Remarks (Terrace Room)
- Plenary Session
- 09:00 - 10:00 Sherah VanLaerhoven, University of Windsor
"Integrating principals of ecology into forensic entomology & the current paradigm shift"
- 10:00 - 10:15 Coffee Break
- 10:15 - 11:15 Amanda Moehring, The University of Western Ontario
"Sex, flies and videotape: the genetics of speciation"
- 11:15 - 12:15 President's Prize Student Oral Presentations

Entomological Society of Ontario 147th Annual Meeting



SCHEDULE OF EVENTS

Saturday, October 16th

- 12:15 - 13:30 Lunch (Oak Dining Room)
- 13:30 - 17:00 President's Prize Student Oral Presentations
- 17:00 - 17:30 Annual General ESO Meeting
- 18:30 - 19:30 All Poster Presentations.....with cash bar in the Terrace Room
- 19:30 - 22:00 ESO 2010 Banquet (Terrace Room)
- Speaker: Nusha Keyghobadi, University of Western Ontario
- "Landscape genetics across multiple spatial scales: case studies using insects"*

Sunday, October 17th

- 07:30 - 08:30 Breakfast (Dining Hall)
- 08:30 - 09:15 President's Prize Student Oral Presentations
- 09:30 - 10:15 Regular Oral Presentations
- 10:15 - 10:30 Coffee Break
- 10:30 - 11:00 Awards
- 11:00 - 12:30 Regular Paper Presentations
- 12:30 - 12:45 Closing remarks

Plenary lectures

Saturday, October 16th 9:00-11:15
Moderator: J. McNeil

9:00-10:00

“Integrating principles of ecology into forensic entomology & the current paradigm shift”

Sherah VanLaerhoven

Dept. of Biology, University of Windsor

Since the inception of forensic entomology approximately 130 years ago, patterns of insect colonization and changes in the communities on carrion have been documented numerous times and in numerous geographic locations around the world. Despite this, very little progress has been made towards understanding the mechanisms of community assembly and species interactions. This presentation will provide an overview of the discipline of forensic entomology, our current understanding of the carrion system, research directions and progress, and the paradigm shift occurring in the forensic science using *Regina v. Truscott* as an example.

10:00-10:15

Coffee Break

10:15-11:15

Amanda Moehring

Dept. of Biology, The University of Western Ontario

One of the great unanswered questions in biology is how new species are formed and maintained. Differences in the courtship and mating behaviour between populations are thought to be the first step leading to species isolation, yet the genetic basis of these traits remains unknown, creating a critical obstacle towards our understanding of the speciation process. Using the powerful genetic tools available in *Drosophila*, we found that a single locus for female preference is enough to induce, but not alleviate, female choosiness in a species-specific manner. Likewise, a single locus for the male trait could induce, but not alleviate, male unattractiveness in a species-specific manner.

Surprisingly, the genes for male trait and female preference are located very close together in the genome. This provides the first empirical evidence to support theoretical models that rely on genetic linkage to explain how novel trait/preference combinations and runaway sexual selection arise.

President's Prize Student Oral Presentations

Saturday, October 16th 11:15 – 17:00

Moderators: H. Douglas, C. Scott-Dupree

11:15 - 11:30

A phylogeny of Conopidae based on molecular and morphological character data

Joel Gibson, Scott Kelso and Jeffrey Skevington, Carleton University

11:30-11:45

Development and parasitism by *Aphelinus certus* (Hymenoptera: Aphelinidae), a parasitoid of soybean aphid, *Aphis glycines* (Hemiptera: Aphididae)

Andrew Frewin, Yingen Xue, John Welsman, A. Bruce Broadbent, Arthur Schaafsma and Rebecca Hallett, University of Guelph

11:45-12:00

New species concepts for Nearctic *Dasysyrphus* Enderlein (Diptera: Syrphidae) lead to increased diversity

Michelle Locke, Jeffrey Skevington and Stephen Marshall, Agriculture and Agri-Food Canada, Canadian National Collection of Insects, Arachnids and Nematodes

12:00-12:15

Does a male mosquito's sugar diet affect vitellogenesis in his mate?

Benyam Abraham and Fiona Hunter, Brock University

12: 15-13:30

LUNCH in the Oak Dining Room

13:30 - 13:45

Complex genetic structure of the pitcher plant midge across multiple spatial scales

Gordana Rasic and Nusha Keyghobadi, The University of Western Ontario

13:45 - 14:00

Ribosomal and mitochondrial DNA variation in *Anopheles* mosquitoes (Diptera: Culicidae) from Canada

Aynsley Thielman and Fiona Hunter, Brock University

14:00 - 14:15

Potential of the anthranilic diamide insecticide - Cyazypyr - as a seed treatment on spring Canola for control of flea beetles and its non-target effect on honey bees

Caleigh Irwin, Cynthia Scott-Dupree, Ron Harris, J. Tolman and Hanna Fraser, University of Guelph

14:15 - 14:30

Nesting biology and barcode analysis of two cryptic species within *Ceratina dupla*, with comparisons to *C. calcarata* (Hymenoptera: Apidae: Xylocopinae)

Jess Vickruck, Sandra Rehan, C.S. Sheffield and Miriam Richards, Brock University

President's Prize Student Oral Presentations

Saturday, October 16th 11:15 – 17:00

Moderators: C. Scott-Dupree and B. Sinclair

14:30 - 14:45

Can a native endoparasitoid, *Phasgonophora sulcata* (Hym: Chalcididae) be used for augmentative biological control of the emerald ash borer, *Agrilus planipennis* (Col: Buprestidae)?

Lucas Roscoe, Sandy Smith and Barry Lyons, University of Toronto

14:45 - 15:00

Sugar diet properties influence diet choice, longevity and temperature range selection in black flies

Daniel Antwi-Amoabeng and Fiona Hunter, Brock University

15:00 - 15:15

Coffee Break

15:15 - 15:30

Integrative taxonomy in the Syrphidae (Diptera): combined use of COI and morphological data to identify Nearctic *Platycheirus*

Andrew Young, S.A. Marshall and Jeffrey Skevington, University of Guelph

15:30 - 15:45

Lifetime reproductive success and selection for group living in the small carpenter bees

Sandra Rehan, Michael Schwarz and Miriam Richards, Brock University

15:45 - 16:00

Conversion of fresh poultry manure into soil amendment materials using saprophagous Diptera larvae

Nichelle Lomas, Stephen Marshall, Mike Dixon and Y. Zheng, University of Guelph

16:00 - 16:15

Implications of a cynipid galler shifting hosts from an endemic to an alien rose

Miles Zhang, Joseph Shorthouse, Laurentian University

16:15 - 16:30

Tolerance of Ontario codling moth, *Cydia pomonella* (L.) populations to registered insecticides

Kristy Grigg, Cynthia Scott-Dupree, Ian Scott, Ron Harris and Kathryn Carter, University of Guelph

16:30 - 16:45

The Staphylinidae of eastern Canada and adjacent United States. A new model for faunistic reviews and its role in understanding regional biodiversity

Adam Brunke, A. Newton, J. Klimaszewski, C. Majka and S. Marshall, University of Guelph

16:45 - 17:00

Plant histology reveals a missing link between parasitoids and gall inducers

Brandy Smallwood and Joseph Shorthouse, Laurentian University

Annual General Meeting
17:00-17:30
Terrace Room

Poster Presentation
Saturday, October 16th 18:30 – 19:30
Terrace Room

President's Prize Student Poster Presentations

Fine-scale genetic structure of an endangered population of the Mormon metalmark butterfly (*Apodemia mormo*) revealed using AFLPs

Lindsay Crawford, Sylvie Desjardins, Nusha Keyghobadi, The University of Western Ontario

Presence of *Oniscus asellus* (Crustacea: Isopoda) in temperate forests alters microbial communities and leaf litter mass loss

Lauren Des Marteaux, Sigrun Kullik, Marc Habash, Jonathan Schmidt, University of Guelph

Phenology of *Cerotoma trifurcate* (Coleoptera: Chrysomelidae) in Ontario

Cara McCreary, Arthur Schaafsma, Rebecca Hallatt, University of Guelph

Three's a crowd, but five's a colony: a method for determining sub-lethal effects of pesticides on *Bombus impatiens*

Andrew McFarlane, University of Guelph

Flower flies made easy: an open-access photographic key to the flower flies (Diptera: Syrphidae) of North America

G. Miranda, Andrew Young, S. Marshall, J. Skevington, M. Locke, University of Guelph

Building a host-parasitoid library for big-headed flies (Diptera, Pipunculidae) using molecular tools

Mistry, T.P., Skevington, J.H. and Kelso, S., Carleton University

Regular Poster Presentations

Mating behavior of pure and hybrid crosses of Hawaiian and Thai *Diploptera punctata* strains

Jasmine Farhan, Craig Harding, Jeremy McNeil, The University of Western Ontario

Sub-lethal effects of reduced-risk insecticides for wild blueberry pest management on alfalfa leafcutter bees (*Megachile rotundata*)

Angela Gradish, Cynthia Scott-Dupree, Chris Cutler, University of Guelph

Essential oils on animals: repellent effects on flies for pastured dairy cows

Guylain Grange and Simon Lachance

Effects of different methods of non-lethal tissue sampling on butterflies

Daria Koscinski, Lindsay Crawford, H. Keller, Nusha Keyghobadi, The University of Western Ontario

Proteomic analyses of Colorado potato beetle *Leptinotarsa decemlineata* (Say): using protein expression for insecticide-resistance detection

Ian Scott, K. Jurvic, V. Clarke, D. MacArthur, J. Tolman, K. Yeung, Agriculture and Agri-Food Canada

A survey of invertebrate populations in potential biofuel crops for Ontario

Jocelyn Smith and Rob Nicol, University of Guelph

The phenology of Western bean cutworm *Striacosta albicosta* (Smith) (Lepidoptera: Noctuidae) on conventional and transgenic corn in Ontario

Jocelyn Smith, Art Schaafsma, Christina DiFonzo, University of Guelph

Adult *Chrysochus asclepiadeus* (Col.:Chrysomelidae) herbivory of *Vincetoxicum* spp. (Apocynaceae) under variable shading conditions

Camille Twomey, University of Toronto

Does relatedness matter at the brink of sociality?

Miriam Richards, Marianne Peso, and Chris Course, Brock University

Banquet
Terrace Room
19:30-22:00

Banquet Speaker

“Landscape genetics across multiple spatial scales: case studies using insects”

Nusha Keyghobadi

Dept. of Biology, The University of Western Ontario

It has long been recognized that landscape influences patterns of genetic differentiation among populations, the ultimate expression of this being speciation by vicariance. Studies in the emerging field of landscape genetics take advantage of modern molecular and mapping tools to deepen our understanding of how the composition and spatial configuration of landscapes shape levels and patterns of genetic diversity within species. As in landscape ecological studies, patterns and processes in landscape genetics operate over a range of temporal and spatial scales. However, the role of scale has only recently started to receive attention in landscape genetics. I will present a unique case study of an alpine butterfly, the Rocky Mountain Apollo, in which consistent effects of landscape structure on genetic variation have been demonstrated across a range of spatial and temporal scales. I will also introduce a new study system, the insect inquilines of the carnivorous northern pitcher plant, as a model system to further explore questions of scale in landscape genetics.

President's Prize and Regular Oral Presentations
Sunday, October 17th 08:30 – 12:30
Moderators: J. Shorthouse and B. Broadbent

08:30 – 08:45

Control methods for insect pests on cuttings: a reduced risk approach!

Wendy Romero, Cynthia Scott-Dupree, Graeme Murphy, Theo Blom, Ron Harris, University of Guelph

08:45 – 09:00

Behavioural Mimicry in Syrphidae: a relationship between morphological mimetic fidelity and behaviour.

Heather Penney and Tom Sherratt, Carleton University

09:00 – 09:15

Cold comfort: the effects of snow cover on overwintering *P. isabella*

Katie Marshall and Brent Sinclair, The University of Western Ontario

Regular Oral Presentations

09:15 – 09:30

Melanderulus* should be synonymized with *Hesperempis

Jeff Cumming, Agriculture and Agri-Food Canada

09:30 – 09:45

Investigating the importance of plant volatiles and wind speed on the seasonal host species switching behaviour of the potato aphid, *Macrosiphum euphorbiae*

W. Marie Alexander and Jeremy McNeil

09:45 – 10:00

Bed bug population growth in our cities: a challenge for pest control professionals

Roger Fogain and Steve Graff, Abell Pest Control Inc.

10:00 – 10:15

The City of Toronto Biodiversity - a collaborative approach

Antonia Guidotti, Royal Ontario Museum

10:15 – 10:30

Coffee Break

10:30 – 11:00

Awards

11:00 - 11:15

Short-term diversity of mix-farmed solitary bees and wasps

Peter Hallett, Royal Ontario Museum

11:15 - 11:30

An interactive key to the fireflies of Ontario (Coleoptera: Lampyridae)

Stephen Luk, Stephen Marshall and M.A. Branham, University of Guelph

11:30 - 11:45

The effects of diet and abiotic conditions (temperature and daylength) on the development of true armyworm, *Pseudaletia unipuncta*, under laboratory and natural conditions

Angela Marinas and Jeremy McNeil, The University of Western Ontario

11:45 - 12:00

European Common Blue or future Global Common Blue? Predicting current and future range distributions of a newly introduced butterfly species to North America

Jeremy Newman, Maxim Larrivee and A. Thompson, Ottawa University

12:00 - 12:15

A microarray study on the gene expression of *Drosophila melanogaster* in response to multiple cold exposures

Jian Zhang, Katie Marshall, Tim Westwood, Melody Clark, Brent Sinclair, The University of Western Ontario

12:15 - 12:30

Guess what I had for dinner? Or Midgut contents of select insects

Joe Shorthouse, Laurentian University

12:30 - 12:45

Closing remarks

Abstracts of Oral Presentations

Abraham, Benyam and Fiona F. Hunter

Department of Biological Sciences, Brock University, St. Catharines ON

Does a male mosquito's sugar diet affect vitellogenesis in his mate?

Male mosquitoes transfer accessory gland proteins (AGPs) along with sperm during mating. In the female, these AGPs exert their influence on reproductive genes that control vitellogenesis and ovulation. We are testing the hypothesis that mates of males consuming different sugar meals (e.g. nectar or Homopteran honeydew) will exhibit varying levels of induction of key vitellogenic genes. The current study uses two-step RT-PCR to investigate how different sugar meals influence AGP-induced up-regulation of vitellogenin mRNA in *Anopheles stephensi*. Preliminary results will be presented.

Alexander, W. Marie and Jeremy N. McNeil

Department of Biology, The University of Western Ontario, London, ON, N6A 5B7

Investigating the importance of plant volatiles and wind speed on the seasonal host species switching behaviour of the potato aphid, *Macrosiphum euphorbiae*

In the fall, winged gynoparae (parthenogenetic females that produce the egg-laying oviparae) and males of the potato aphid, *Macrosiphum euphorbiae*, migrate from secondary summer hosts (such as potato) to the primary overwintering host (rose). We examined (i) the response of gynoparae to volatiles from primary and secondary host plants, and (ii) the response of males to volatiles of the primary host plant alone and when combined with the sex pheromone released by virgin oviparae. We wished to test that hypothesis that both gynoparae and males would have show a response to primary host plant volatiles, and that in the case of males this response would increase when a calling female was present. The assays were repeated over a range of wind speeds (0.5 to 4.0 m/s to test the hypothesis that the responsiveness of winged morphs would decrease at high wind speeds. The results obtained generally support our working hypotheses and the data will be discussed within the context of host switching by weak fliers insects.

Antwi-Amoabeng, Daniel and Fiona F. Hunter

Department of Biological Sciences, Brock University, St. Catharines ON

Sugar diet properties influence diet choice, longevity and temperature range selection in black flies

We investigated the relationship between concentration, composition and caloric content of sugar diets and the foraging decisions of female black flies (*Simulium venustum/verecundum* sp. complex). We further investigated how these sugar diet properties influence longevity and the temperature range selection of the flies within a thermal gradient. In paired diet choice experiments, diet choice was non-random. There was an overall diet effect on longevity ($p < 0.01$) and, although diet did not significantly influence the region of the thermal gradient selected by flies, it appears to be important in determining the limits of the temperature range that can be explored by the flies.

Brunke, Adam, A. Newton, J. Klimaszewski, C. Majka and S. Marshall
University of Guelph

The Staphylinidae of eastern Canada and adjacent United States - A new model for faunistic reviews and its role in understanding regional biodiversity

Despite their diversity, dominance, and the taxonomic maturity of some groups, Rove Beetles (Staphylinidae) remain difficult for non-specialists to identify. Recognizing this need, the staphylinid fauna of eastern Canada and adjacent United States was reviewed, and accessible, effective identification keys were created. The first project involved using new tools and resources to provide a key to the twenty-two subfamilies known from the region, a tribe/subtribe level key for the subfamily Staphylininae, and a species key to the twenty-five species of the subtribe Staphylinina. Forty-one new records are recognized and a species of *Platydracus* is described as new.

Cumming, Jeffrey M. ¹, Scott E. Brooks ¹, Toyohei Saigusa ²

¹ Canadian National Collection of Insects, Ottawa, ON

² Baikoen 2-7-1-402, Chuo-ku, Fukuoka-shi, 810-0035 JAPAN

Systematics of the *Hesperempis* genus group (Diptera: Empididae)

The *Hesperempis* genus group currently contains *Dryodromia* Rondani (with one western Palaearctic species), *Hesperempis* Melander (with two western Nearctic species and one eastern Palaearctic species) and *Melanderulus* Özdikem & Başar (= *Toreus* Melander) (with one western Nearctic species). Revision of the group indicates that it should now include only two genera, *Dryodromia* (with a new Chinese species) and *Hesperempis* (with a new eastern Nearctic species, a new western Nearctic species, and two new Japanese species). *Melanderulus* should be synonymized with *Hesperempis*. Phylogeny and zoogeography of this essentially Holarctic genus group will be discussed, including its probable relationship within the Empididae.

Fogain, Roger ¹ and Steven Graff ²

¹. Entomologist & ² Quality Assurance Manager, Abell Pest Control Inc., Etobicoke, ON

Bedbug population growth in our cities: a challenge for pest control professionals

There are increasing reports on the upsurge of bedbug (*Cimex lectularius*) infestation worldwide. Although the real cause of this population increase is yet to be determined, increased travel, resistance to Pyrethroids, and lack of research during the last 50 years are some of the of the main factors behind the increase. Pest control professionals have been caught by surprise by the rise of the pest and are struggling to help reverse the growth trend. This paper will discuss some of the tools available to the pest control industry to face the challenge and areas of investigation that require attention such as population genetics of bedbug, monitoring tools for early detection and need for new chemistry.

Frewin, Andrew J. ¹, Yingen Xue¹, John A. Welsman², A. Bruce Broadbent³, Arthur W. Schaafsma² and Rebecca H. Hallett¹.

¹ School of Environmental Sciences, University of Guelph, Guelph, ON, N1G 2W1

² Department of Plant Agriculture, Ridgetown Campus, University of Guelph, Ridgetown, ON, N0P 2C0

³ Southern Crop Protection and Food Research Centre, Agriculture and Agri-Food Canada, London, ON, N5V 4T3

Development and parasitism by *Aphelinus certus* (Hymenoptera: Aphelinidae), a parasitoid of soybean aphid, *Aphis glycines* (Hemiptera: Aphididae).

Soybean aphid (*Aphis glycines* Matsumura), a serious economic pest of soybean in North America, is primarily managed with insecticides. However, a number of natural enemies have the potential to regulate this pest. In 2007, *Aphelinus certus* Yasnosh, a soybean aphid parasitoid native to Asia, was found in commercial soybean fields in Ontario. To evaluate the potential of *A. certus* as a biological control agent, temperature-dependent developmental parameters and functional response to soybean aphid were determined.

Gibson, Joel F.^{1,2} Kelso, Scott¹, and Skevington, Jeffrey H.^{1,2}

¹ Agriculture and Agri-Food Canada, Canadian National Collection of Insects, Arachnids, and Nematodes, K.W. Neatby Building, 960 Carling Avenue, Ottawa, ON, K1A0C6, Canada

² Department of Biology, Carleton University, Ottawa, ON, K1S5B6, Canada

A phylogeny of Conopidae based on molecular and morphological character data

Conopidae is a fascinating family of parasitic flies. All species are endoparasitoids of adult insects as larvae. There has been little phylogenetic work completed on species of Conopidae. Genitalic and molecular characters have not yet been used to test species or generic concepts. We extracted DNA from 63 conopid specimens representing 25 genera. DNA sequence data from 12S, COI, cytochrome b, 28S, and AATS were included in a data matrix of over 5800 bp. To this was added a suite of morphological characters. Parsimony and Bayesian analyses recovered all four current subfamilies as monophyletic with strong support, as is the proposed subfamily Zodioninae. Stylogasterinae is recovered as sister to the remaining Conopidae.

Grigg, Kristy¹, Cynthia Scott-Dupree¹, Ian Scott², Ron Harris¹ and Kathryn Carter³

¹ School of Environmental Sciences, University of Guelph, Guelph, ON;

² Agriculture and Agri-Food Canada, London, ON;

³ OMAFRA, Simcoe Resource Centre, Simcoe, ON

Tolerance of Ontario codling moth, *Cydia pomonella* (L.) populations to registered insecticides

The codling moth (CM) is a major pome fruit pest throughout the world. Recent reports from growers in Ontario suggest decreased CM control using registered insecticides. This study investigates the effectiveness of currently registered and novel insecticides for CM management in orchards. Direct contact bioassays were conducted on male CM from orchards in Essex and Norfolk Counties during 2009 and 2010. Diet bioassays were conducted on CM larvae collected from damaged fruit and corrugated cardboard tree bands in orchards from both regions. The potential development of strain-tolerance in CM to selected insecticides was observed in some southern Ontario orchard strains.

Guidotti, Antonia

Royal Ontario Museum

The City of Toronto biodiversity series- a collaborative approach

The City of Toronto has put together a number of working groups to author a series of biodiversity booklets that are distributed for free through libraries. The first in the series, *Birds of Toronto*, was published in 2009. Professionals and amateurs work together with city staff to describe the habitat and fauna of the city. A checklist is

provided and images of resident and migrant species are included. The next booklets in the series (*Butterflies of Toronto* and *Spiders of Toronto*) are previewed.

Hallett, Peter

Department of Natural History, Royal Ontario Museum

Short-term diversity of mix-farmed solitary bees and wasps (1997-2007)

Total nests >25000. Annual species numbers grew for 5-7 years. Censused abundances varied, e.g., *Hylaeus* bees and *Passoloecus* wasps declined severely, and the Orchard Bee *Osmia lignaria* and Potter Wasp *Symmorphus cristatus* became pests. The issue is whether there is any loss of numerical diversity, whether defined annually (species numbers, Pielou evenness, bee/wasp species numbers or entropy ratios) or longterm ('farmed/pioneering' entropy ratio).

Irwin, Caleigh¹, C. Scott-Dupree¹, R. Harris¹, J. Tolman², and H. Fraser³

¹School of Environmental Sciences, University of Guelph, Guelph, ON, N1G 2W1

²Southern Crop Protection and Food Research Centre, Agriculture and Agri-Food Canada, London, ON, N5V 4T3

³Ontario Ministry of Agriculture, Food, and Rural Affairs, Vineland, ON, L0R 2E0

Potential of the anthranilic diamide insecticide - Cyazypyr - as a seed treatment on spring canola for control of flea beetles and its non-target effect on honey bees.

The striped flea beetle (SFB) and crucifer flea beetle (CFB) are two of the primary pests of canola in Canada. Cyazypyr, a reduced risk insecticide, could provide CFB/SFB control on canola as a seed treatment. Due to the systemic nature of seed treatments, the potential for insecticide exposure to bees foraging in flowering canola exists. The efficacy and biological persistence of three seed treatments were assessed, and sticky cards were used to determine if CFB and SFB have synchronous population dynamics. Honey bees were exposed to field grown treated canola flowers in a lab bioassay.

Locke, Michelle.^{1,2}, Skevington, Jeffrey H.¹ and Marshall, Stephen A.³

¹Agriculture and Agri-Food Canada, Canadian National Collection of Insects, Arachnids and Nematodes, K.W. Neatby Building, 960 Carling Avenue, Ottawa, ON, K1A 0C6.

²Department of Biology, Carleton University, Ottawa, ON, K1S 5B6.

³Department of Environmental Biology, University of Guelph, Guelph, ON, N1G 2W1.

New species concepts for Nearctic *Dasysyrphus* Enderlein (Diptera: Syrphidae) lead to increased diversity

There are 43 described species of syrphids in the genus *Dasysyrphus* Enderlein,

including ten from the Nearctic region. Morphological diversity within this group, particularly within *D. venustus* Meigen, was thought to be due to individual variation. Analysis of COI sequence data suggests that there are at least twice as many Nearctic species. Re-examination of morphology supports the notion that former *Dasysyrphus* concepts were too conservative and variation within species is minimal. New species concepts and a key for the Nearctic species are in progress. In addition, the first phylogenetic hypothesis for the group will be presented in collaboration with European systematists.

Lomas, N., S. Marshall, M. Dixon, and Y. Zheng
School of Environmental Science, University of Guelph.

Conversion of fresh poultry manure into soil amendment materials using saprophagous Diptera larvae

Conventional practices of treating and composting animal manure become less efficient when the farm produces animals, and manure, at an industrial scale. Current methods are too slow to effectively break down the tonnes of manure produced daily. In nature, saprophagous organisms are able to utilize the energy in the waste while converting it into compounds usable by other organisms. Several Diptera families have larvae that develop in manure greatly increasing the rate of its decomposition. *Musca domestica* and manure specialist species were selected and reared under laboratory conditions. The feasibility of using larvae as industrial-scale chicken manure-converters was investigated.

Luk, Stephen , Stephen Marshall, and Marc Branham
University of Guelph

An interactive key to the fireflies of Ontario (Coleoptera: Lampyridae)

Fireflies may seem familiar for the welcome glow they bring to warm Ontario evenings, but up until now, anyone trying to identify them would have found that Ontario's firefly fauna was far from familiar and in fact was inadequately known. Nineteen species (including two erroneous records) were previously recorded from the province, but our review has now confirmed the presence of twenty-three species and illuminated three new Canadian records. We will present an updated and comprehensively illustrated digital key to Ontario fireflies, a guide which can be used to identify most species occurring in eastern Canada and the northeastern United States.

Marinas, Angela and Jeremy McNeil, University of Western Ontario

The effects of diet and abiotic conditions (temperature and daylength) on the development of true armyworm, *Pseudaletia unipuncta*, under laboratory and natural conditions

The true armyworm, *Pseudaletia unipuncta*, a sporadic agricultural pest, is considered to be a migratory species in North America and migration is initiated in response to short days and low temperatures that are cues of future habitat deterioration. In contrast, the population in the Azores off the west coast of Portugal is non-migratory. The current study examines how diet and abiotic conditions affect development of migrant and non-migrant populations. Insects were fed either artificial pinot bean diet or natural host plants and reared either under controlled laboratory conditions (25°C; 16L:8D) or under insectary conditions in the field, spanning both the summer and fall months. Larval and pupal developmental times, as well as pupal and adult masses were obtained. This is the first step in a longer term project to determine if (i) adults, emerging at different times of the year, acquire and utilize lipid resources differently, and (ii) if migrants have evolved mechanisms to reduce costs of migratory flight on future reproduction, especially with respect to the essential fatty acids that can only be obtained from larval host plants.

Marshall, Katie E. and Brent J. Sinclair

Department of Biological Sciences, The University of Western Ontario

Cold comfort: the effects of snow cover on overwintering *P. isabella*

Along with changes in mean temperatures, temperate latitude winter habitats are predicted to substantially alter as snow cover declines precipitously. For ectothermic animals that overwinter underneath the snow layer, these snow cover decreases could alter overwintering energetics and physiology as temperature regimes change. We investigated the effects of snow cover on the freeze tolerant Arctiid caterpillar *P. isabella* and found that overwintering with snow cover led to decreased pupal mass. We modeled this relationship and found that freezing was a significant portion of this effect.

Newman, J.S.G., M., Larrivée, A.D., Thompson

Ottawa University

European Common Blue or future Global Common Blue? Predicting current and future range distributions of a newly introduced butterfly species to North America.

The European Common Blue butterfly (*Polyommatus icarus* (Rottemburg) was first observed in North America near Mirabel Airport, Quebec in 2005. Several colonies have

been found since on the north shore of the Montréal region. This recent introduction is an excellent opportunity to predict the range expansion patterns of a newly introduced species at several spatio-temporal scales. We used climatic and land use variables to model the current range distribution of *P. icarus* in North America using niche models. Its broad distribution in its native range from Finland to Morocco and the abundance of its host plant in North America, suggest that *P. icarus*' North American range could expand dramatically.

Penney, Heather and Tom Sherratt

Carleton University, 1125 Colonel By Drive, Ottawa, ON K1S 5B6

Behavioural mimicry in Syrphidae: a relationship between morphological mimetic fidelity and behaviour.

Morphological mimicry of hymenoptera by syrphid flies has been extensively studied. However, there has been very little formal study of behavioural mimicry in this group. Syrphids of varying degrees of morphological mimetic perfection were assayed for mimetic behaviours including wing wagging, mock stinging and leg waving. Based on our preliminary results, there is a strong positive association between the extent of mimetic fidelity and behavioural mimicry, with only good mimics such as those from the genera *Spilomyia* and *Temnostoma* engaging in behavioural mimicry. Interestingly, only good morphological mimics with short antennae engaged in leg waving behaviour (e.g. *Spilomyia longicornis*), while those with long antennae did not (e.g. *Spilomyia sayi*). The implications of these findings for the evolution and maintenance of imperfect mimicry will be discussed.

Rasic, Gordana and Nusha Keyghobadi

Department of Biological Sciences, The University of Western Ontario

Complex genetic structure of the pitcher plant midge across multiple spatial scales

The inquilines of the carnivorous purple pitcher plant (*Sarracenia purpurea*) offer a system with natural features that is ideal for genetic studies at multiple spatial scales. Here we describe microsatellite variation of the pitcher plant midge (*Metriocnemus knabi*) across five nested spatial scales replicated across two landscapes. Hierarchical AMOVA, spatial genetic analysis and relationship of individuals revealed differences in midge genetic structuring in two landscapes. Interestingly, the differences in genetic structure at the largest spatial scale (system of bogs) are driven by the ecological processes operating at the smallest spatial scale (leaf).

Rehan, Sandra¹, Michael Schwarz² and Miriam Richards¹

¹Department of Biological Sciences, Brock University, St. Catharines, ON

²School of Biology, Flinders University, Adelaide, Australia

Lifetime reproductive success and selection for group living in the small carpenter bees

The Australian small carpenter bee offers insights into the origins of sociality as this species is socially polymorphic, with both solitary and social colonies in sympatry. Nest collections over 32 months were censused to determine survival, reproduction and relatedness estimates to calculate lifetime reproductive success. We observed kin selection is the likely mechanism maintaining social behaviour in this species as social females have greater fitness than solitary bees due to indirect fitness benefits as a result of remaining to help their sister. Increased parasitism could select for social nesting through mutual benefit. Decrease relatedness would require manipulation to maintain social behaviour.

Romero, Wendy¹, Cynthia Scott-Dupree¹, Graeme Murphy², Theo Blom³, Ron Harris¹

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Control methods for insect pests on cuttings. A reduced risk approach!

In the Ontario floricultural greenhouse industry, attention has focused on controlling insect pests that may be coming in on imported cuttings. There is a major concern: the influx of what could potentially be large numbers of insect pests places constant pressure on integrated pest management programs. Using reduced risk control methods would permit growers to establish insect pest-free and insecticide residue-free cuttings from the outset. Hot water and reduced risk insecticides have been tested for the control of western flower thrips and silverleaf whitefly in chrysanthemum and poinsettia cuttings. An overview of the study and results obtained will be discussed.

Roscoe, Lucas E.¹, Sandy M. Smith¹, and D. Barry Lyons²

¹ Faculty of Forestry, University of Toronto

² Canadian Forest Service, Sault Ste. Marie, Ont.

Can a native endoparasitoid, *Phasgonophora sulcata* (Hym: Chalcididae) be used for augmentative biological control of the emerald ash borer, *Agrilus planipennis* (Col: Buprestidae)?

Phasgonophora sulcata Westwood (Hymenoptera: Chalcididae), a native koinobiont parasitoid of *Agrilus* and *Chrysobothris* species, may be a potentially important parasitoid of the invasive emerald ash borer (EAB) (*Agrilus planipennis*, Coleoptera: Buprestidae). Very little is known about both its phenology in relation to its

host and its fecundity. We examined the egg load and phenology of *P. sulcata* during one season to assess its potential for development as a biological control agent of EAB. The ovaries of female parasitoids at different ages were dissected to determine the number of mature eggs present throughout the parasitoid's lifetime. Ash trees infested with EAB were dissected bi-monthly throughout the summer of 2010 and the abundance of *P. sulcata* at different developmental stages was determined. Our results suggest that female *P. sulcata* have a high fecundity and that their lifecycle is well integrated with that of EAB. Thus, this native parasitoid should be considered for augmentative control against invasive EAB in North America.

Shorthouse, Joe D.

Department of Biology, Laurentian University, Sudbury, Ontario, P3E 2C6

Guess what I had for dinner? or Midgut contents of select insects

Commercial slides of internal insect anatomy are frequently of poor quality. To address this problem, students in the Introductory Entomology course at Laurentian University were challenged with the task of sectioning and staining select insects mounted in paraffin and preparing a report on the anatomy observed using cross and longitudinal sections. Each student was asked to include in their report a series of figures taken along the length of the digestive system. Figures of the contents of the mesenteron were both of scientific interest and aesthetically pleasing. This presentation highlights some of the figures made as part of this course exercise.

Smallwood, Brandy and Joseph Shorthouse

Laurentian University

Plant histology reveals a missing link between parasitoids and gall inducers

Diplolepis polita (Hymenoptera: Cynipidae) induces galls on leaves of *Rosa acicularis*. Several hymenopteran parasitoids attack inducer larvae and death of the inducers terminates gall maturation. Larvae of the ectoparasitoid *Glyphomerus stigma* (Hymenoptera: Torymidae) feed first on inducer larvae, then complete their development on gall tissues. Anatomy of galls inhabited by *G. stigma* were compared to those inhabited by inducers, using plant histological techniques. Phytophagous feeding by *G. stigma* results in the formation of nutritive tissues different from those in inducer-inhabited galls. These findings provide insight into the evolution of gall induction in Chalcidoidea.

Thielman, Aynsley and Fiona F. Hunter

Department of Biological Sciences, Brock University, St.Catharines, ON

Ribosomal and mitochondrial DNA variation in *Anopheles* mosquitoes (Diptera: Culicidae) from Canada

Many species of *Anopheles* mosquitoes are now recognized as complexes of isomorphic species, often differing in ecological and/or behavioural traits that influence their vector potential. Due to their potential medical importance, molecular methods for the identification of cryptic anopheline species have been developed. To assess the cryptic species status of *Anopheles* from Canada, ribosomal and mitochondrial DNA sequences (ITS2, ITS1, and COI) were examined and levels of intra- and interspecific variation determined. Levels of intraspecific variation varied greatly depending on sequence and species examined. Results of ITS2, ITS1, and COI analyses will be presented.

Vickruck, J. L., S. M. Rehan, C. S. Sheffield, M. H. Richards

Department of Biological Sciences, Brock University, St.Catharines, ON

Nesting biology and barcode analysis of two cryptic species within *Ceratina dupla*, with comparisons to *C. calcarata* (Hymenoptera: Apidae: Xylocopinae)

Three morphologically similar species of *Ceratina* Latreille are common in southern Ontario: *Ceratina calcarata* Robertson and two cryptic species superficially resembling *Ceratina dupla* Say (*Ceratina dupla* sensu stricto and *C. n. sp. near dupla*). DNA sequencing of 654 bp cytochrome oxidase subunit 1 revealed that *C. dupla* s. s. and *C. n. sp. near dupla* are distinguished by 5 fixed nucleotide differences. *Ceratina n. sp.* and *C. dupla* s. s. commonly nest in teasel (*Dipsacus fullonum*), while *C. calcarata* nests in raspberry (*Rubus* sp.). *Ceratina dupla* s. s. nested earlier than did *C. n. sp.*, sometimes producing a second brood.

Young, A.D., S.A. Marshall, J.H. Skevington

University of Guelph

Integrative taxonomy in the Syrphidae (Diptera): combined use of COI and morphological data to identify Nearctic *Platycheirus*

The Syrphidae is one of the best-known fly families because of its conspicuous diversity and the role of many species as pollinators. Despite this, there are still groups within the Syrphidae that are difficult to identify and are considered taxonomically problematic. One such group is the genus *Platycheirus* Lepeletier and Serville, in which the females of most of the 72 species known from the Nearctic region are indistinguishable from each other. We are addressing this issue through the use of morphological and molecular data, using mitochondrial DNA sequences to match

females to morphologically identifiable males. After associating both sexes, females will be re-examined for morphological characters to use in a new photographic key to both sexes of *Platycheirus*.

Zhang, Jian¹; Katie Marshall¹; Tim Westwood²; Melody Clark³; Brent Sinclair¹

¹The University of Western Ontario; ²The university of Toronto at Mississauga; ³British Antarctic Survey

A microarray study on the gene expression of *Drosophila melanogaster* in response to multiple cold exposures

In the field, insects suffer multiple cold exposures during winter. When exposed to repeated low temperatures, *Drosophila melanogaster* females showed an increase in survival, but a reduction in fitness. We used microarrays to analyse the gene expression of female *Drosophila melanogaster* after multiple, single sustained and single short cold treatments, which exposed the flies at 0 °C for repeated 2h, single 10h and single 2h respectively. We identified candidate genes that involved in recovery from cold, which may be associated with the repair of chilling injuries during recovery. Candidates included genes involved in ion transport and muscle activity after repeated exposures. Genes associated with reproduction were differentially regulated particularly after prolonged cold exposure. Our work also suggested a strong relationship between cold exposure and the immune system. We suggest that in fruit flies, chilling injuries after cold exposure may induce immune responses and contribute to recovery from cold.

Zhang, Miles Y. and Joseph D. Shorthouse

Laurentian University

Implications of a cynipid galler shifting hosts from an endemic to an alien rose

The gall wasp *Diplolepis trifurcata* (Hymenoptera, Cynipidae) induces stem galls on the wild prickly rose, *Rosa acicularis*. These conspicuous galls attract specialized parasitoids, forming a species-specific component community. Galls of *D. trifurcata* were found on large patches of feral dog rose, *Rosa canina*, on Manitoulin Island. *R. canina* is an introduced species from Europe and has dissimilar morphologies to *R. acicularis*. The same parasitoids associated with galls on *R. acicularis* are found in galls on *R. canina*, suggesting a host shift of the entire component community. The significance of these results is discussed in relation to adaptive radiation of *Diplolepis*.

Abstracts of Poster Presentations

Crawford, Lindsay A.¹, Sylvie Desjardins², Nusha, Keyghobadi¹.

¹Department of Biology, University of Western Ontario, London, ON

²I.K. Barber School of Arts and Science, University of British Columbia Okanagan, Kelowna, BC

Fine-scale genetic structure of an endangered population of the Mormon metalmark butterfly (*Apodemia mormo*) revealed using AFLPs

We investigated the genetic structure and diversity of an endangered Canadian population of the Mormon metalmark butterfly (*Apodemia mormo*) using AFLP markers generated from non-destructive samples of butterfly wing tissue. Despite the small geographic scale of the studied region (< 20 km) our analyses suggest that a high degree of spatial genetic structure exists within the population. Overall, the population exhibited low genetic diversity, while several of the more isolated sites appeared to be the most inbred. Future management should focus on increasing gene flow between the most isolated sub-populations by preserving and restoring as many habitat patches as possible.

Des Marteaux, Lauren, Sigrun Killik, Marc Habash, Jonathan Schmidt
University of Guelph, Guelph, ON

Presence of *Oniscus asellus* (Crustacea: Isopoda) in temperate forests alters microbial communities and leaf litter mass loss

Effects of isopod presence on temperate leaf litter mass loss and microbial communities were investigated. Inoculated leaf litter microcosms were either exposed, or not exposed to *Oniscus asellus* (L.) isopods for three weeks, after which the remaining leaf litter was used to determine: (1) microbial respiration rates, (2) pre- and post-leaching litter mass loss, (3) abundance of bacteria, fungi, and slime moulds, and (4) proportion of *Penicillium* colonies on fungal culture plates. Litter exposed to isopods had increased microbial respiration, post-leaching litter mass loss, and bacterial and slime mould abundance, while having lower fungal abundance and proportion of *Penicillium*.

Farhan, Jasmine, Craig Harding, and Jeremy McNeil
Department of Biology, The University of Western Ontario, London, ON

Mating behavior of pure and hybrid crosses of Hawaiian and Thai *Diploptera punctata* strains

The Pacific beetle cockroach, *Diploptera punctata*, is an unusual species for unlike most insects it is viviparous. It has, therefore, been used extensively as a model system

for studying the behavioural and physiological aspects of this rather unusual form of reproduction using colonies established from adults collected in Hawaii. However, populations have recently been found in Thailand and a recent publication suggests there may be some degree of reproductive isolate between the two populations. In this study, the courtship behaviour and mating success of the four possible combinations (H X H, H X T, T X H, T X T) were carried out. While the pure-line pairings resulted in >70 % matings, <15% of the between-line pairs successfully mated. Ethogrammes of the pure-line and between-line courtship behaviours will be presented, and the results discussed within the context of the cuticular hydrocarbon profiles of the two populations.

Gradish, Angela, Cynthia Scott-Dupree, Chris Cutler

¹School of Environmental Sciences, University of Guelph, Guelph, ON

²Department of Environmental Sciences, Nova Scotia Agricultural College, Truro, NS,

Sub-lethal effects of reduced-risk insecticides for wild blueberry pest management on alfalfa leafcutter bees (*Megachile rotundata*)

Alfalfa leafcutter bees (*Megachile rotundata*) are important managed pollinators of wild blueberry in Atlantic Canada. Blueberry spanworm (*Itame argillacearia*), a major defoliator of blueberry, is present mainly at bloom and controlled with insecticides. Therefore, larval leafcutter bees may be provided with contaminated pollen and nectar collected from treated flowers, possibly resulting sub-lethal effects on their development. The use of bee-friendly insecticides is therefore essential; however, few data exist on the toxicity of insecticides to *M. rotundata*. Our study investigated the potential sub-lethal effects of some insecticides currently registered for or with promise for use in spanworm management on wild blueberry.

Grange, Guylain and Simon Lachance

¹Lycée agricole Edouard Herriot, 01600 Misérieux, France

² Université de Guelph – Campus d’Alfred, 31 St-Paul St., Alfred, ON

Essential oils on animals: repellent effects on flies for pastured dairy cows

Flies are an important nuisance to pastured animals. In organic dairy production, synthetic insecticides are not allowed and alternatives to control or repel flies are needed. The efficacy of 6 essential oils (basil, lavender, lemongrass, pine, peppermint, geranium) and a carrier oil (sunflower) to repel flies was tested in the field. Lemongrass was the most efficient and most of the others showed a >80% repellency for at least 4 hours when applied to cows. Sunflower oil alone was significantly better at repelling flies than the control, but less efficient than when mixed with an essential oil. The number of flies was highly variable between cows. Essential oils could be formulated for use in organic animal production.

Koscinski, Daria , Lindsay Crawford, H. Keller, Nusha Keyghobadi
The University of Western Ontario, London, ON

Effects of different methods of non-lethal tissue sampling on butterflies

Non-lethal means of tissue collection are used within the context of genetic studies on threatened butterflies, although few studies have examined the impact of such sampling. We investigated the effects of wing clipping and leg removal on flight behaviour and long term survival of two butterflies, the cabbage white (*Pieris rapae*) and the inornate ringlet (*Coenonympha tullia*), in the wild. We followed each butterfly immediately after release and measured a variety of flight behaviours. All butterflies were also individually marked for mark-recapture analyses. We found no differences in flight behaviour or survival across treatments in either species.

McFarlane, A¹, A. Gradish¹, and C. Scott-Dupree¹

¹School of Environmental Sciences, University of Guelph, Guelph ON, N1G 2W1

Three's a crowd, but five's a colony: a method for determining sub-lethal effects of pesticides on *Bombus impatiens*

Bumble bees (*Bombus impatiens*) are important wild and managed pollinators of many crops in Ontario. For most of these crops, pesticides remain a necessary resource for pest management, and therefore, bumble bees may be exposed to them during foraging. As pesticides can have significant negative effects on bumble bees, the ability to accurately assess the impact of exposure using standardized tests is essential. Such tests exist for European bumble bee species, but due to differences in reproduction and behavior, species-specific methods may be required. Our objective was to develop a method for assessing sub-lethal effects of pesticides on *B. impatiens*.

McCreary, Cara M. ,Arthur W. Schaafsma, Rebecca H. Hallett
University of Guelph, Guelph, ON

Phenology of *Cerotoma trifurcata* (Coleoptera: Chrysomelidae) in Ontario

Phenology of the bean leaf beetle, *Cerotoma trifurcata* (Forster), although unknown in Ontario, differs throughout North America. Cage studies of *C. trifurcata* were conducted to determine the number of generations that occur in 3 different counties in southern Ontario. Soil and soybean root samples taken throughout the soybean growing season showed one cycle of eggs, larvae and pupae in 2 counties.

Miranda, G.F.G.; A. Young; S.A. Marshall; J. Skevington and M. Locke
University of Guelph, Guelph, ON

Flower flies made easy: an open-access photographic key to the flower flies (Diptera: Syrphidae) of North America

Adults of many species of Syrphidae are of considerable economic importance as pollinators. Due to their relatively large size, frequently colorful appearance and conspicuous habits, many syrphid genera are readily identifiable in the field with proper identification tools. This project aims to provide such a tool in the form of a photographic key to the Nearctic genera using hundreds of field photographs as well as high magnification photographs of specific morphological characters. The completed key will be submitted to the CJAI (Canadian Journal of Arthropod Identification), an online, open-access, and peer reviewed journal.

Mistry, T.P.; Skevington, J.H.; Kelso, S

Building a host-parasitoid library for big-headed flies (Diptera, Pipunculidae) using molecular tools

Pipunculidae are important parasitoids of leafhoppers and planthoppers (Auchenorrhyncha). Over 300 pipunculid species occur in North America, undoubtedly parasitizing at least that many species of hoppers. Despite this, there are only 17 documented host-parasitoid associations, mostly developed through lengthy rearing efforts. The present study identifies 27 new associations of pipunculids and their hosts. Larvae of big-headed flies were collected and dissected from hosts over two field seasons in Southeastern Ontario. The larvae were identified by matching their COI sequences with a developing database of identified adult big-headed fly sequences. This study demonstrates how we can rapidly develop a host-parasitoid library.

Scott, Ian, K. Jurvic, V. Clarke, D. MacArthur, J. Tolman, K. Yeung,
Agriculture and Agri-Food Canada, 1391 Sandford St., London, ON
Department of Biochemistry, University of Western Ontario, London, ON

Proteomic analyses of Colorado potato beetle *Leptinotarsa decemlineata* (Say): using protein expression for insecticide-resistance detection

The Colorado potato beetle (CPB) is a major pest of potato crops in Ontario. Control by chemical insecticides remains the mainstay for most growers, even though CPB have developed insecticide-resistance to more than 50 chemical classes in the past 60 years. Surveys employed to confirm resistance are very labor-intensive, relying on field collections and laboratory bioassays. A fast and efficient screening technique is desired for detecting specific genetic and protein expression in field populations. Proteins

associated with enhanced metabolism of insecticides may identify a developing problem before a chemical loses effectiveness in the field.

Smith, Jocelyn, Art Schaafsma, Christina DiFonzo
University of Guelph, Guelph, ON

The phenology of Western bean cutworm *Striacosta albicosta* (Smith) (Lepidoptera: Noctuidae) on conventional and transgenic corn in Ontario

Western bean cutworm (WBC) *Striacosta albicosta* (Smith) (Lepidoptera: Noctuidae) is a pest species of corn (*Zea mays* L.) and dry beans (*Phaseolus vulgaris* L.) considered to be native to the Midwest great plains area of the United States since first reported in 1887 (Smith 1887). Since 2000, western bean cutworms have steadily moved north and east through the Midwest Corn Belt and have been reported in Iowa, Minnesota, Illinois and Indiana. In 2006, WBC moths were first captured in pheromone traps in Michigan and Ohio (DiFonzo and Hammond 2008) and in Ontario in 2008 (Baute et al. 2009). The objective of this study was to evaluate the survival, phenology, and resulting damage of WBC on conventional and transgenic corn expressing various Bt-traits in Ontario.

Smith, Jocelyn and Rob Nicol
University of Guelph, Guelph, ON

A survey of invertebrate populations in potential biofuel crops for Ontario

Invertebrate populations were surveyed in plots of *Miscanthus*, switchgrass and big blue stem grasses throughout the summer of 2010 in southwestern Ontario. Grasses were sampled using pitfall traps, sweep nets, quadrat sampling and stalk-splitting. The objective of this study was to investigate the biodiversity of invertebrate populations in these crops and their potential beneficial or pest status in biofuel and field crop production in Ontario.

Twomey, Camille
University of Toronto, Toronto, ON

Adult *Chrysochus asclepiadeus* (Col.:Chrysomelidae) herbivory of *Vincetoxicum* spp. (Apocynaceae) under variable shading conditions

Vincetoxicum out-competes other vegetation and reduces floral and faunal diversity in Ontario. *Chrysochus asclepiadeus* is a candidate for effective biological control of invasive *Vincetoxicum* populations. I used an outdoor RCBD at the European Biological Control Laboratory in Montpellier, France to ascertain the effect of variable

shading on: 1) *C. asclepiadeus* herbivory of *Vincetoxicum*; 2) *Vincetoxicum*'s compensation for herbivory by *C. asclepiadeus*. Plant species from native and invasive populations were tested under variable shading conditions and under control and herbivory conditions. Data revealed species- and shading-dependent differences in speed and amount of defoliation as well as in plant compensation to herbivory.

Richards, Miriam¹, Marianne Peso^{1,2}, and Chris Course¹

¹Dept. Biological Sciences, Brock University, St. Catharines, ON

²Department of Biology, Macquarie University, New South Wales, Australia

Does relatedness matter at the brink of sociality?

The eastern carpenter bee of North America, *Xylocopa virginica*, is most often found nesting socially, but also may nest solitarily. In southern Ontario, Canada, near the northern edge of the species' range, the vast majority nest socially, in groups of 2-6 females. The high frequency of sociality suggests that this nesting strategy is favoured. Moreover, the habit of overwintering with siblings in the natal nest, combined with high rates of inherited nest reuse and the ability to discriminate between nestmates and non-nestmates, suggest that social nesting occurs in small, cohesive kin groups. This also implies that the high degree of reproductive skew among social females may be explained by kin selection, with subordinates helping to raise the brood of closely related dominants. However, several observations contradict this hypothesis: social nests produce no more brood than solitary nests; adult females frequently relocate to new nests, either temporarily or permanently; dominant foundress mortality and replacement rates are high, so broods often comprise the offspring of several females that may or may not be related; and a few females forego reproduction altogether, remaining quietly inside nests preparatory to overwintering a second time and becoming dominant foragers the following spring. Taken together, these and other observations suggest that solitary nesting is actually the higher fitness strategy, and concomitantly, that social nesting is not a strategy favoured by the benefits of kin-selected, cooperative nesting. An alternative hypothesis explaining the high frequency of social nesting is that social nesting is a response to severe competition for nests and nesting substrate, a repeated theme in studies of xylocopine bees at the brink of sociality. In *X. virginica*, nests are costly to construct and so are reused and refurbished for many generations. Females that move from nest to nest are likely assessing the quality of alternative locations, as well as opportunities for joining existing nesting associations. In this context, nestmate recognition may very well facilitate movements of related or familiar adults among nests, such that subordinate relatives are more likely to join related dominants. Thus although relatedness may not underlie efficient, cooperative brood-raising, it may lead to enhanced opportunities for subordinate bees to breed as replacements or to inherit nests the following spring.

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