

ES^CM^M2009

Winnipeg, 18-21 October

Program and Abstracts

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Schedule of Events

SATURDAY 17 OCTOBER

08:30 AM – 05:30 PM
Gateway, Mezzanine
Entomological Society of Canada Governing Board Meeting

02:00 – 05:00 PM
Salon C, 1st floor
Registration

SUNDAY 18 OCTOBER

09:00 AM – 01:00 PM
05:30 – 07:30 PM
Seventh floor foyer
Registration

09:00 AM – 01:15 PM
05:30 – 07:00 PM
Salon C, 1st floor
Presentation uploading

01:30 – 02:30 PM
Crystal Ballroom, 7th floor
Opening ceremonies

02:30 – 03:00 PM
Seventh floor foyer
Refreshment break

03:00 – 05:30 PM
Crystal Ballroom, 7th floor
Plenary Symposium: *CLIMATE CHANGE: FROM GEOLOGY TO ECOLOGY*

DINNER (ON YOUR OWN)

07:30 – 10:00 PM
Concert Hall, 7th floor
Welcome reception

07:00 – 09:00 PM
Salon A, 1st floor
NSERC — CANPOLIN Network meeting

MONDAY 19 OCTOBER

07:30 AM – 06:00 PM
Provencher Room, Main floor
Registration

07:30 AM – 12:00 noon
01:30 – 05:30 PM
Salon C, 1st floor
Presentation uploading

10:00 – 10:30 AM
04:00 – 06:00 PM
Provencher Room, Main floor
Refreshment breaks

08:00 AM – 12:00 noon
Taché, Mezzanine
President's Prize Oral Competition: *APPLIED AND BASIC ECOLOGY*

08:00 – 11:45 AM
Club Room, Lower level
Association of Natural Bio-Control Producers Paper Competition
President's Prize Oral Competition: *BIOLOGICAL CONTROL*

08:00 AM – 12:00 noon
La Vérendrye, Mezzanine
President's Prize Oral Competition: *BIODIVERSITY, CONSERVATION, SYSTEMATICS*

08:00 AM – 12:00 noon
Gateway, Mezzanine
President's Prize Oral Competition: *FOREST ENTOMOLOGY*

LUNCH (ON YOUR OWN)

MONDAY 19 OCTOBER (CONTINUED)

01:30 – 04:30 PM
Club Room, Lower level

Canadian Forum For Biological Control Symposium:
*PUTTING THE 'I' BACK INTO IPM — HOW TO INTEGRATE BIOLOGICAL CONTROL EFFECTIVELY IN
IPM PROGRAMS*

01:30 – 04:30 PM
La Vérendrye, Mezzanine

Canadian Forum For Biological Control Annual Business Meeting
GRADUATE STUDENT SYMPOSIUM

01:30 – 04:00 PM
Gateway, Mezzanine

Contributed Papers: *APPLIED ENTOMOLOGY*

04:30–06:00 PM
Provencher Room, Main floor

Poster Session: *PRESIDENT'S PRIZE POSTERS, CONTRIBUTED POSTERS*

DINNER (ON YOUR OWN)

07:30 – 10:00 PM
La Vérendrye, Mezzanine

Student Mixer (Students only)

08:00 – 10:00 PM
Gateway, Mezzanine

President's Reception (By invitation only)

TUESDAY 20 OCTOBER

07:30 AM – 10:00 AM
01:00 – 02:00 PM
Provencher Room, Main floor

Registration

07:30 AM – 12:00 noon
01:30 – 04:30 PM
Salon C, 1st floor

Presentation uploading

10:00 – 10:30 AM
04:00 – 04:30 PM
Provencher Room, Main floor

Refreshment breaks

08:15 AM – 12:00 noon
Gateway, Mezzanine

Symposium: *ARTHROPOD HOST-SYMBIONT RELATIONSHIPS:
DIVERSITY, DISTRIBUTION AND ECOLOGY*

08:25 AM – 12:00 noon
Taché, Mezzanine

Symposium: *PROTECTING STRUCTURES AND URBAN FORESTS FROM INSECTS*

08:00 – 11:45 AM
La Vérendrye, Mezzanine

Contributed Papers: *SYSTEMATICS, CONSERVATION, BIODIVERSITY*

LUNCH (ON YOUR OWN)

TUESDAY 20 OCTOBER (CONTINUED)

01:25 – 04:00 PM
Taché, Mezzanine

Symposium: *DIVERSITY IN FOREST ECOSYSTEMS*

01:25 – 04:00 PM
La Vérendrye, Mezzanine

Symposium: *POLLINATION BIOLOGY*

01:25 – 04:00 PM
Gateway, Mezzanine

Symposium: *ENTOMOLOGICAL ISSUES IN POTATO PRODUCTION*

04:30 – 05:00 PM
La Vérendrye, Mezzanine

Heritage Lecture:

THE HISTORY OF BEEKEEPING RESEARCH IN WESTERN CANADA

05:00 – 05:45 PM
Gateway, Mezzanine

Annual Business Meeting, Entomological Society of Canada

05:45 – 06:30 PM
Gateway, Mezzanine

ENTOMOLOGICAL SOCIETY OF CANADA NEW GOVERNING BOARD MEETING

06:00 – 07:00 PM
Crystal Ballroom, 7th floor

Banquet Cocktails

07:00 – 10:00 PM
Crystal Ballroom, 7th floor

Banquet and Awards

WEDNESDAY 21 OCTOBER

07:30 – 09:30 AM
Outside Club, Lower level

Registration

10:00 – 10:30 AM
Mezzanine foyer

Refreshment break

08:10 AM–12:30 PM
Club Room, Lower level

Symposium: *APICULTURE: BEE—VIRUS INTERACTIONS*

07:55–11:00 AM
Gateway, Mezzanine

Biological Survey of Canada Symposium: *TERRESTRIAL ARTHROPOD*

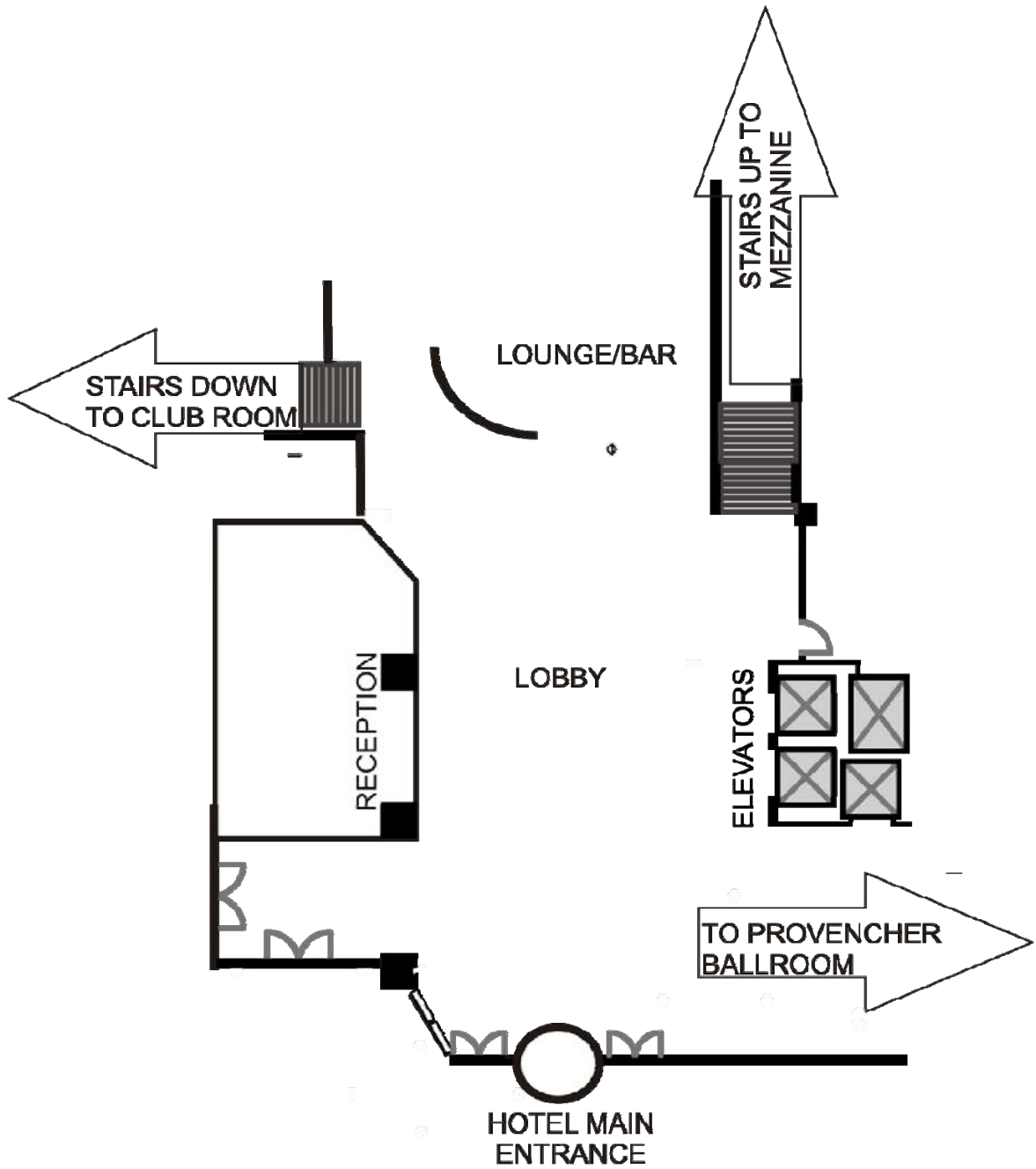
SURVEYS IN CANADA: PURPOSE, PROGRESS AND PLANS

08:00–11:45 AM
La Vérendrye, Mezzanine

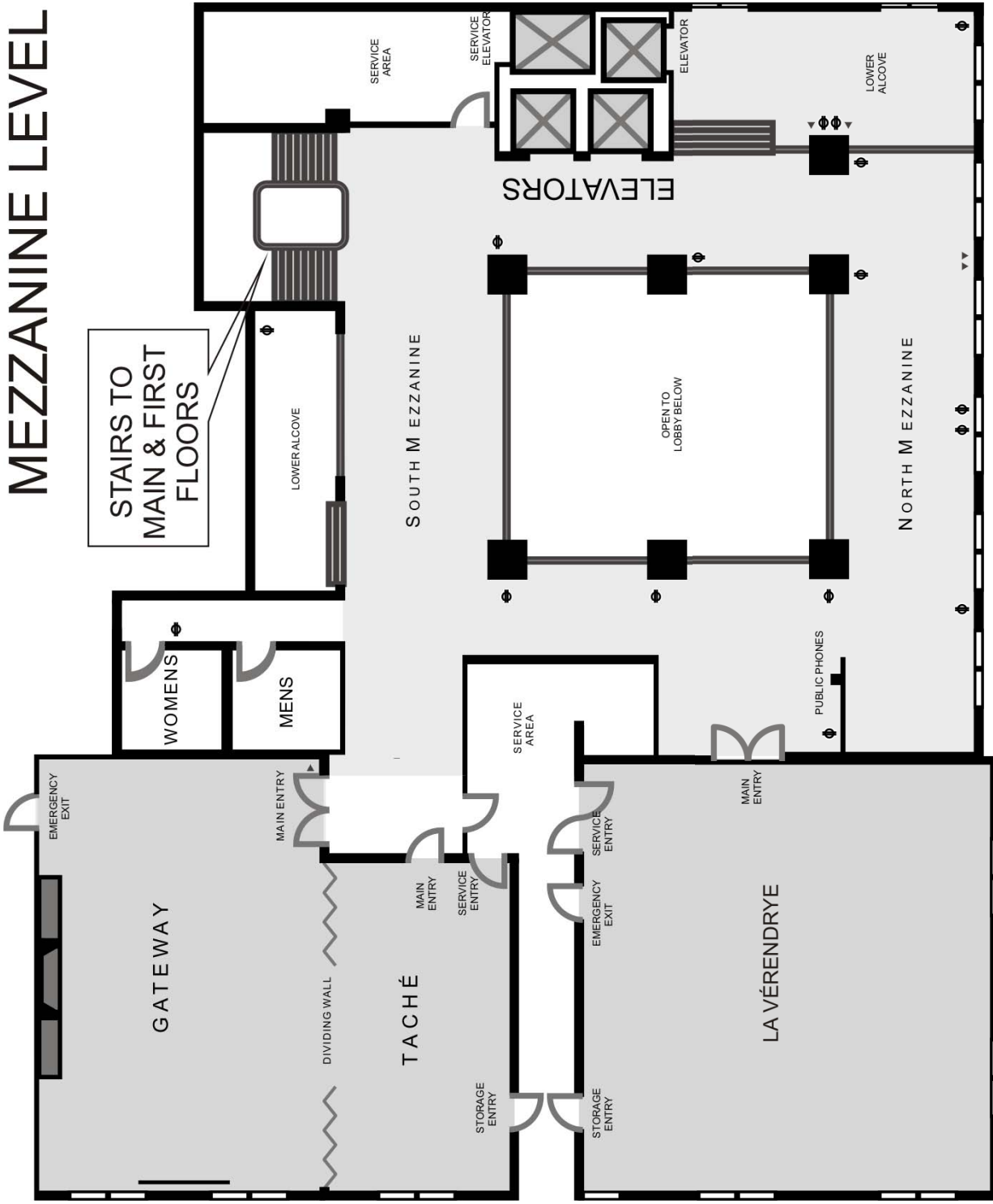
Contributed Papers: *BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR*

Floor Plans

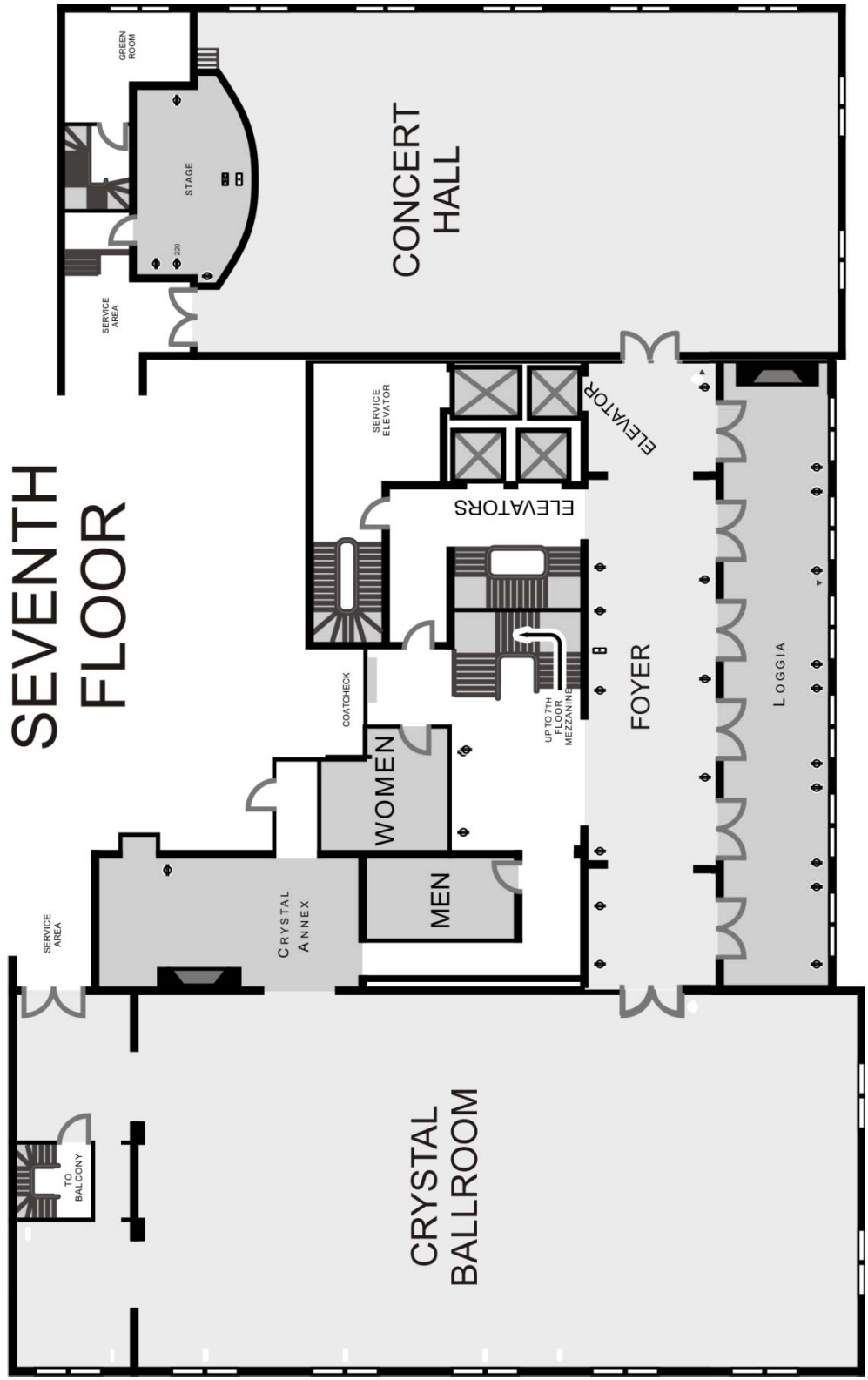
GENERAL LAY OUT OF HOTEL LOBBY AREA



MEZZANINE LEVEL



SEVENTH FLOOR



Greetings from the President, Entomological Society of Canada

Welcome to Winnipeg! I am sure you will find that the 2009 Local Organizing Committee has brought to you a well-organized, thought-provoking and enjoyable meeting.

There is unpredictability about meetings that I love. Travelling out of the office and lab shakes up our ideas, allows you to look at things in a new light. Sitting in a bar, or having coffee you meet people that you would never actively sought out to meet. Sandwiched between two talks you definitely wanted to see, will be an unforeseen gem. Yet those unexpected people and those unanticipated talks may change the course of your research.

The Local Organizing Committee has been preparing for over two years for the meeting. They have done an excellent job of organizing the meeting. I would like to thank all the volunteers that helped make this meeting possible and a special word of thanks to Brent Elliott (General Chair) and Neil Holliday (Scientific Chair) for all their work.

Paul Fields
President of ESC

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

Bienvenue à Winnipeg! Je suis certain que vous remarquerez que le Comité local d'organisation a préparé une réunion bien organisée, stimulante et amusante.

Il y a un côté imprévu aux réunions que j'adore. Voyager à l'extérieur du bureau et du laboratoire brasse vos idées, vous permet de voir les choses sous un angle différent. En vous assoyant dans un bar ou en buvant un café, vous rencontrez des gens que vous n'auriez jamais activement cherché à rencontrer. Ces rencontres entre deux conférences que vous tenez à voir peuvent devenir un joyau inattendu. Ces rencontres fortuites et ces conférences imprévues pourront peut-être changer le cours de vos recherches.

Le Comité local d'organisation prépare la réunion depuis plus de deux ans. Ils ont fait de l'excellent boulot à tout organiser. J'aimerais remercier tous les bénévoles qui ont rendu cette réunion possible et remercier tout spécialement Brent Elliott (président du Comité local d'organisation) et Neil Holliday (président du Comité scientifique) pour tout leur travail.

Paul Fields
Président de la SEC

Greetings from the President, Entomological Society of Manitoba

On behalf of the Entomological Society of Manitoba it is a pleasure to welcome you to the Joint Annual Meeting of the Entomological Societies of Canada and Manitoba. When I investigated the origins of the two societies I was surprised to see that technically the Entomological Society of Manitoba is actually older than its Canadian counterpart. The Entomological Society of Manitoba was founded in 1945. While the precursor to the Entomological Society of Canada was founded in Toronto in April of 1863 as the Entomological Society of Ontario, the Canadian Society was actually formed much later by members of the Ontario Society in November 1950. It struck me that our regional entomology societies and our national organization have a very rich and long tradition that now extends over three centuries, and that these annual meetings act as a flagship for our activities and accomplishments. As with any conference of this size there have been many members of the Entomological Society of Manitoba that have been working and planning for this event for several years now. I would like to acknowledge their efforts and especially the hard work of Neil Holliday, the scientific committee chair, and Brent Elliott, the local arrangements committee chair. I hope you enjoy the annual meeting and your stay in Winnipeg.

Richard Westwood
President of ESM

Mot de bienvenue du président de la Société d'entomologie du Manitoba

Au nom de la Société d'entomologie du Manitoba, il me fait plaisir de vous accueillir à cette réunion annuelle et conjointe des Sociétés d'entomologie du Canada et du Manitoba. Lorsque j'ai vérifié l'origine des deux Sociétés, j'ai été surpris de constater que techniquement la Société d'entomologie du Manitoba est plus ancienne que son homologue canadien. La Société d'entomologie du Manitoba a été fondée en 1945. Le précurseur de la Société d'entomologie du Canada a été fondé à Toronto en avril 1863 en tant que Société d'entomologie de l'Ontario. Ainsi, la Société canadienne n'a été formée que beaucoup plus tard par les membres de la Société ontarienne, soit en 1950. J'ai été touché par le long et riche passé de nos Sociétés régionales et de notre organisation nationale, une tradition qui s'étend sur trois siècles. Depuis, les réunions annuelles font l'éloge de nos activités et accomplissements. Comme pour toutes les conférences de cette envergure, des membres de la Société d'entomologie du Manitoba travaillent depuis plusieurs années à la planification de cet événement. Je voudrais souligner leurs efforts et plus particulièrement le travail acharné de Neil Holliday, le président du Comité scientifique, et de Brent Elliot, le président du Comité local d'organisation. J'espère que vous apprécierez cette réunion annuelle ainsi que votre séjour à Winnipeg.

Richard Westwood
Président de la SEM

Scientific Program

SUNDAY 18 OCTOBER 1:30–5:30 PM

CRYSTAL BALLROOM

01:30–02:30 OPENING CEREMONIES

CHAIR: BRENT ELLIOTT

01:30 **Paul Fields.** GREETINGS FROM THE ENTOMOLOGICAL SOCIETY OF CANADA

Richard Westwood. GREETINGS FROM THE ENTOMOLOGICAL SOCIETY OF MANITOBA

Maya Evenden. PRESENTATION OF ESC AWARDS

02:00 **Neil Holliday.** VIEWS OF ENTOMOLOGICAL EVOLUTION. Gold Medal Address

02:30–03:00 BREAK

03:00–05:30 PLENARY SYMPOSIUM *CLIMATE CHANGE: FROM GEOLOGY TO ECOLOGY*

CHAIR: NEIL HOLLIDAY

03:00 **James Teller.** HISTORY OF GLACIAL LAKE AGASSIZ AND CLIMATE SINCE THE LAST ICE AGE, AS REFLECTED IN LAKE SEDIMENTS

03:45 **Camille Parmesan.** INSECTS AND CLIMATE CHANGE: WHAT ARE THEY TELLING US AND WHERE ARE WE GOING?

04:30 **Shelley L. Hunt.** FUTURE SHOCK: INVASIVE INSECTS, CLIMATE CHANGE AND CANADA'S FOREST ECOSYSTEMS

05:15 DISCUSSION

MONDAY 19 OCTOBER 08:00 AM–12:00 NOON

TACHÉ

PRESIDENT'S PRIZE ORAL COMPETITION

APPLIED AND BASIC ECOLOGY

CHAIR: NOEL WHITE

08:00 **Daniel Antwi-Amoabeng, Fiona F. Hunter.** COMPLEMENTARY EFFECTS OF SUGAR FEEDING ON *ANOPHELES STEPHENSI* RESISTANCE TO *PLASMODIUM BERGHEI*

08:15 **Agnes Kwasniewska, Christopher Buddle, Charles Vincent, Sonia Gaul, Kenna Mackenzie.** EFFECTS OF HOST VOLATILES ON THE ACTIVITY AND BEHAVIOUR OF THE BLUEBERRY MAGGOT FLY

08:30 **Justin M. Renkema, C. Cutler, D. Lynch, K. MacKenzie, S. Walde.** MANAGEMENT OF BLUEBERRY MAGGOT (DIPTERA: TEPHRITIDAE) USING MULCHES IN ORGANIC HIGHBUSH BLUEBERRIES

08:45 **Krilen Ramanaidu, A. Gradish, C. Scott-Dupree, C. Cutler.** IMPACTS OF REDUCED-RISK INSECTICIDES ON INSECT PESTS AND POLLINATORS IN WILD BLUEBERRY

09:00 **Rasoul Bahreini, Robert W. Currie.** THE INFLUENCE OF POLLEN FEEDING ON TOLERANCE OF HONEY BEES AGAINST VARROA MITES

09:15 **Ahmed.Y. Abdelghany, S.S. Awadalla, N.F. Abdel-Baky, H.A. EL-Syraf, P.G. Fields.** EFFICACY OF DIATOMACEOUS EARTH, PEA FLOUR, PYRETHRIN AND METHOPRENE FOR THE CONTROL OF STORED-PRODUCT BEETLES

09:30 **Wolly Wijayarathne, Paul Fields.** DIAPAUSE INDUCTION IN THE LARVAE OF DIFFERENT POPULATIONS OF INDIANMEAL MOTH, *PLODIA INTERPUNCTELLA* (LEPIDOPTERA: PYRALIDAE)

09:45 **Duangsamorn Suthisut, Paul Fields, A. Chandrapatya.** BIOLOGICAL ACTIVITY OF ESSENTIAL OIL OF *ALPINIA CONCHIGERA* RHIZOME AGAINST *SITOPHILUS ZEAMAE* AND *TRIBOLIUM CASTANEUM*

10:00–10:30 BREAK

10:30 **Joseph J. Bowden, Christopher M. Buddle.** LIFE HISTORY CHARACTERISTICS OF THREE WOLF SPIDER SPECIES FROM THE YUKON TERRITORY, CANADA

10:45 **Julien Pompon, Y. Rahbe, F. Calevro, D. Quiring, C. Goyer, P. Giordanengo, Y. Pelletier.** THE RELATIONSHIP BETWEEN XYLEM CONSUMPTION, FECUNDITY AND THE OBLIGATE SYMBIONT IN *MACROSIPHUM EUPHORBIAE*

11:00 **Tharshinidevy Nagalingam, Neil Holliday.** TARNISHED PLANT BUG INJURY AND DAMAGE TO DRY EDIBLE BEANS

11:15 **James A. Tansey, Lloyd M. Dossdall, Andrew Keddie.** INCORPORATION OF NOVEL *CEUTORHYNCHUS OBSTRUCTUS* (COLEOPTERA: CURCULIONIDAE)-RESISTANT CANOLA GENOTYPES INTO MIXED CROPPING STRATEGIES AND ITS EFFECTS ON WEEVIL SPATIAL DYNAMICS

- 11:30 [Adam J. Blake](#), [Lloyd M. Dosdall](#), [B. Andrew Keddie](#). THE INFLUENCE OF CANOLA NUTRITION ON THE OVIPOSITION CHOICE AND LARVAL DEVELOPMENT PARAMETERS OF THE CABBAGE SEEDPOD WEEVIL
- 11:45 [Paul K. Abram](#), [Virginia K. Walker](#). TESTING THE REPRODUCTIVE TOXICITY OF ENGINEERED NANOPARTICLES: A *DROSOPHILA* MODEL

MONDAY 19 OCTOBER 08:00–11:45 AM

CLUB

ASSOCIATION OF NATURAL BIO-CONTROL PRODUCERS PAPER COMPETITION

PRESIDENT'S PRIZE ORAL COMPETITION

BIOLOGICAL CONTROL

CHAIR: MAHMOOD IRANPOUR

- 08:00 [Haley A. Catton](#), [R.G. Lalonde](#), [R.A. De Clerck-Floate](#). MODELING POPULATION-LEVEL EFFECTS OF NONTARGET ATTACK ON A NATIVE PLANT BY THE ROOT WEEVIL, *MOGULONES CRUCIFER*, A BIOCONTROL INSECT FOR HOUNDSTONGUE (*CYNOGLOSSUM OFFICINALE*)
- 08:15 [Michael J. Wogin](#), [B.R. Roitberg](#), [T. Haye](#), [D.R. Gillespie](#). INTRA-GUILD INTERACTIONS BETWEEN TWO PARASITOIDS OF THE CABBAGE SEEDPOD WEEVIL AND THEIR EFFECTS ON POPULATION DYNAMICS AND BIOLOGICAL CONTROL
- 08:30 [Emily C. Barnewall](#), [Rosemary De Clerck-Floate](#). PRE-RELEASE IMPACT ASSESSMENT OF A NEW BIOLOGICAL CONTROL AGENT FOR *LINARIA VULGARIS*
- 08:45 [Sarah Fairhurst](#), [Kelly M. Ablard](#), [Paul W. Schaefer](#), [Gerhard Gries](#). MECHANISM AND FUNCTION OF THE POST-COPULATORY RITUAL IN THE EGG PARASITOID WASP, *OEOENCYRTUS KUVANAE* (HYMENOPTERA: ENCYRTIDAE)
- 09:00 [Meghan A. Vankosky](#), [Lloyd M. Dosdall](#), [Héctor A. Cárcamo](#). EXPLOITING THE WEAKEST LINK: IDENTIFYING ENDEMIC PREDATORS AND PARASITOIDS OF *SITONA LINEATUS* EGGS IN SOUTHERN ALBERTA
- 09:15 [Gillian Andersen](#), [Kelly Ablard](#), [Regine Gries](#), [Grigori Khaskin](#), [Paul W. Schaefer](#), [Gerhard Gries](#). MALES OF THE EGG PARASITOID *OEOENCYRTUS KUVANAE* (HYMENOPTERA: ENCYRTIDAE) USE MARKER PHEROMONE TO GATHER A HAREM OF CHOOSY FEMALES
- 09:30 [Adela Danci](#), [Stephen Takács](#), [Matt Drake](#), [Paul W. Schaefer](#), [Gerhard Gries](#). PERFECT TIMING: HOW MALES OF THE PARASITOID WASP, *PIMPLA DISPARIS* (HYMENOPTERA: ICHNEUMONIDAE), PREDICT THE EMERGENCE OF PROSPECTIVE MATES FROM GYPSY MOTH, *LYMANTRIA DISPAR*, HOST PUPAE
- 09:45 [Lars D. Andreassen](#), [Ulrich Kuhlmann](#), [Peter G. Mason](#), [Neil J. Holliday](#). ECOLOGICAL CONSEQUENCES OF HOST SIZE SELECTION FOR THE STAPHYLINID (COLEOPTERA) PARASITOID, *ALEOCHARA BIPUSTULATA*
- 10:00–10:30 BREAK
- 10:30 [Andrea E.A. Stephens](#), [Judith H. Myers](#). PATTERNS OF HERBIVORE ABUNDANCE ON AN INVASIVE WEED: A TEST OF THE RESOURCE CONCENTRATION HYPOTHESIS
- 10:45 [Chandra E. Moffat](#), [David R. Gillespie](#). IMPACTS OF PLANT NUTRITION ON HOST-PARASITOID POPULATION DYNAMICS
- 11:00 [Raphaël Royauté](#), [Christopher Buddle](#), [Charles Vincent](#). STEPS IN ASSESSING BEHAVIOURAL SYNDROMES IN *ERIS MILITARIS*, AN AGRICULTURAL SALTICID SPIDER
- 11:15 [Thurkathipana Navaneethan](#), [Ralf-Udo Ehlers](#). IMPROVEMENT OF *STEINERNEMA FELTIAE* APPLICATION AGAINST DIAPAUSING CODLING MOTH LARVAE (*CYDIA POMONELLA*)
- 11:30 [Thurkathipana Navaneethan](#), [G. Mikunthan](#). SMALL SCALE PRODUCTION OF ENTOMOPATHOGENIC FUNGI USING LOW COST TECHNOLOGY

MONDAY 19 OCTOBER 08:00 AM–12:00 NOON

LA VÉRENDRYE

PRESIDENT'S PRIZE ORAL COMPETITION

BIODIVERSITY, CONSERVATION, SYSTEMATICS

CHAIR: ROBERT LAMB

- 08:00 [Joel F. Gibson](#), [Jeffrey H. Skevington](#). THE KEY TO UNLOCKING THE SCHIZOPHORA: PLACEMENT OF THE CONOPIDAE WITHIN THE EREMONEURAN DIPTERA BASED ON MTDNA AND NRDNA
- 08:15 [Christopher J. Borkent](#), [Terry A. Wheeler](#). MONOPHYLY OF THE SCIOPHILINI (DIPTERA: MYCETOPHILIDAE) AND GENERIC RELATIONSHIPS WITHIN THE TRIBE
- 08:30 [Aynsley Thielman](#), [Fiona F. Hunter](#). MORPHOLOGICAL AND MOLECULAR ANALYSES OF *ANOPHELES* (DIPTERA: CULICIDAE) MOSQUITOES FOR EVIDENCE OF CRYPTIC SPECIES IN CANADA
- 08:45 [Valérie Lévesque-Beaudin](#), [Terry A. Wheeler](#). NESTED PATTERNS OF BETA-DIVERSITY IN FOREST DIPTERA

- 09:00 **Jennifer Y. Rosati, Sherah L. VanLaerhoven.** THE EFFECT OF GLOBAL CLIMATE CHANGE ON RANGE EXPANSION OF THE INVASIVE BLOW FLY, *CHRYSOMYA RUFIFACIES* (DIPTERA: CALLIPHORIDAE): BEHAVIOURAL AND ECOLOGICAL IMPACTS WITHIN THE CARRION INSECT COMMUNITY
- 09:15 **Candice R. Grant, A. Richard Westwood.** ASSESSMENT OF INSECT DIVERSITY IN VARIOUS URBAN LANDSCAPES
- 09:30 **Jaimee M. Dupont, A. Richard Westwood.** CONSERVATION AND ENHANCEMENT OF POWESHIEK SKIPPERLING (*OARISMA POWESHIEK*) IN MANITOBA
- 09:45 **S. Meghan Marriott, David B. McCorquodale, Donna J. Giberson.** LOST AND FOUND LADY BEETLES: DOES THE ARRIVAL OF NON-NATIVE SPECIES COINCIDE WITH THE DECLINE OF NATIVE SPECIES?
- 10:00–10:30 BREAK
- 10:30 **Kristin I. Hynes, Cheryl L. Podemski.** DESIGN OF A RAPID BIOASSESSMENT PROTOCOL FOR BOREAL SHIELD LAKES
- 10:45 **Lara M. Bates, Britt D. Hall.** INVESTIGATING THE BIOACCUMULATION OF METHYLMERCURY IN SASKATCHEWAN WETLAND FOOD WEBS
- 11:00 **Sandra D. Gillespie, L.S. Adler.** FACTORS AFFECTING PARASITISM IN NATIVE BUMBLE BEES
- 11:15 **Pamela Craig, Christopher Cutler, Vilis Nams, Kenna MacKenzie.** INFLUENCE OF LANDSCAPE AND FIELD CHARACTERISTICS ON NATIVE BEES IN WILD BLUEBERRY HABITATS
- 11:30 **Jennifer L. Waller.** PARASITOID COMMUNITY SHIFTS ACROSS THE 'FRONT' OF AN ADVANCING FOREST TENT CATERPILLAR (*MALACOSOMA DISSTRIA*) OUTBREAK IN NORTHERN ALBERTA'S BOREAL FOREST
- 11:45 **Boyd Mori, Heather Proctor, Maya Evenden.** PHORETIC MITES ASSOCIATED WITH THE MOUNTAIN PINE BEETLE (*DENDROCTONUS PONDEROSAE*) IN ALBERTA

MONDAY 19 OCTOBER 08:00 AM–12:00 NOON

GATEWAY

PRESIDENT'S PRIZE ORAL COMPETITION

FOREST ENTOMOLOGY

CHAIR: IRENE PINES

- 08:00 **Joshua Jacobs, A. Latraverse, T. Work.** THE ROLE OF INSECTS IN WOOD DECOMPOSITION
- 08:15 **Leah Flaherty, Jon Sweeney, P. Andrew Morrison, Dan Quiring.** OVIPOSITION AND PERFORMANCE OF THE EXOTIC BROWN SPRUCE LONGHORN BEETLE (*TETROPIUM FUSCUM*) ON HOST TREES OF VARYING CONDITION.
- 08:30 **L. Jessie Colgan, N. Erbilgin.** INVESTIGATING INDUCED DEFENCE IN JACK PINE (*PINUS BANKSIANA*) SEEDLINGS AND THE INDIRECT INTERACTION BETWEEN JACK PINE BUDWORM (*CHORISTONEURA PINUS PINUS*) AND A MOUNTAIN PINE BEETLE-ASSOCIATED FUNGAL PATHOGEN
- 08:45 **Leanna Lachowsky, Mary Reid.** OVER-WINTERING MORTALITY OF MOUNTAIN PINE BEETLES, *DENDROCTONUS PONDEROSAE*
- 09:00 **Sunday Oghiakhe, Neil Holliday.** THE SPATIAL DISTRIBUTION, TUNNELLING HABITS AND FAT CONTENT OF OVERWINTERING NATIVE ELM BARK BEETLES, *HYLURGOPINUS RUFIPES* (COLEOPTERA: SCOLYTIDAE), IN AMERICAN ELM TREES
- 09:15 **Jonathan Veilleux, Jon Leferink, Neil Holliday.** ASSESSMENT OF THE BENEFITS OF RAPID REMOVAL OF ELM TREES INFECTED WITH DUTCH ELM DISEASE
- 09:30 **Dorthea Gregoire.** IMPACT OF THINNING AND PREVIOUS DAMAGE BY BALSAM WOOLLY ADELGID ON THE PERFORMANCE OF SPRUCE BUDWORM AND BALSAM FIR SAWFLY
- 09:45 **Meggy Hervieux, Christopher Buddle, Dan Quiring.** LARVAL SURVIVAL OF THE PALE-WINGED GRAY MOTH (*IRIDOPSIS EPHYRARIA*) AT DIFFERENT CROWN LEVELS
- 10:00–10:30 BREAK
- 10:30 **Debra Wytrykush, Kermit Ritland, Carol Ritland, Hesther Yeuh.** SIBSHIP STRUCTURE OF *PISSODES STROBI* (COLEOPTERA: CURCULIONIDAE) IN SPRUCE STANDS
- 10:45 **Caroline M. Whitehouse, W.B. Strong, M.L. Evenden.** MULTIPLE MATING OF FEMALE *DIORYCTRIA* IN BRITISH COLUMBIA CONIFER SEED ORCHARDS
- 11:00 **Joelle K. Lemmen, M.L. Evenden.** MECHANISMS OF PHEROMONE RESPONSE PLASTICITY IN MALE ASH LEAF CONE ROLLER MOTHS, *CALOPTILIA FRAXINELLA* (LEPIDOPTERA: GRACILLARIIDAE)
- 11:15 **Tyler J. Wist, R. Gries, I. Lusebrink, M.L. Evenden.** VOLATILE CUES FOR THE LOCATION OF *FRAXINUS* HOSTS BY FEMALE *CALOPTILIA FRAXINELLA* (LEPIDOPTERA: GRACILLARIIDAE)
- 11:30 **Tracy Zahradnik, Stephen Takács, Michelle Tsang, Ward Strong, Robb Bennett, Gerhard Gries.** USE OF ELECTROMAGNETIC FORAGING CUES BY CONOPHYTIC INSECTS

11:45 [Tamara A. Richardson](#), [S. Takács](#), [T. Zahradnik](#), [G. Gries](#), [W.B. Strong](#), [B. Staffan Lindgren](#). CUES MEDIATING CLONAL PREFERENCE OF *LEPTOGLOSSUS OCCIDENTALIS* IN A LODGEPOLE PINE SEED ORCHARD

MONDAY 19 OCTOBER 01:30–04:30 PM

CLUB

CANADIAN FORUM FOR BIOLOGICAL CONTROL SYMPOSIUM

PUTTING THE 'I' BACK INTO IPM — HOW TO INTEGRATE BIOLOGICAL CONTROL EFFECTIVELY IN IPM PROGRAMS

CHAIR: BRUCE BROADBENT

01:30 [Bruce Broadbent](#). INTRODUCTION TO THE SYMPOSIUM

01:35 [Michèle Roy](#), [Bruce Broadbent](#), [Thierry Chouffot](#). HOW TO INTEGRATE BIOLOGICAL CONTROL EFFECTIVELY IN SMALL BERRY IPM PROGRAMS

02:00 [Imre S. Otvos](#). HOW TO INTEGRATE BIOLOGICAL CONTROL EFFECTIVELY IN FORESTRY IPM PROGRAMS

02:30 [Héctor Cárcamo](#), [Lloyd Dosdall](#), [Owen Olfert](#). HOW TO INTEGRATE BIOLOGICAL CONTROL EFFECTIVELY IN FIELD CROP IPM PROGRAMS

03:00 CFBC ANNUAL BUSINESS MEETING

MONDAY 19 OCTOBER 01:30–04:30 PM

LA VÉRENDRYE

GRADUATE STUDENT SYMPOSIUM

CHAIR: AYSLEY THIELMAN

01:30 [Julia J. Mlynarek](#), [Terry A. Wheeler](#). PHYLOGENY OF THE TRIBE ELACHTERINI (DIPTERA: CHLOROPIDAE)

02:00 [Brian O. Ma](#). THE ROLE OF *ANOPHELES GAMBIAE* MOSQUITOES FEEDING DECISIONS ON VECTOR-BORNE DISEASE TRANSMISSION

02:30 [Anaïs Renaud](#), [J. Savage](#), [R.E. Roughley](#). BIODIVERSITY OF THE MUSCIDAE (DIPTERA) OF CHURCHILL (MB) IN THE CONTEXT OF ENVIRONMENTAL CHANGES

03:00 [Bianca Wohlfahrt](#). ANTAGONISTIC SELECTION ON AN ANTIPREDATOR DEFENCE: ONE PREDATOR TYPE AND THE COMBINED EFFECTS OF PREY PHENOTYPE AND ENVIRONMENT

03:30 [Graeme Taylor](#). HOST RANGE OF A MALE-KILLING BACTERIUM INFECTING FILTH FLY PARASITIDS

04:00 [Laura Timms](#). WHAT HAPPENS AFTER ESTABLISHMENT? USING GYPSY MOTH TO EXPLORE INDIRECT IMPACTS OF INVASIVE SPECIES ON NATIVE COMMUNITIES

MONDAY 19 OCTOBER 01:30–04:00 PM

GATEWAY

CONTRIBUTED PAPERS

APPLIED ENTOMOLOGY

CHAIR: TAZ STUART

01:30 [Robert C. Johns](#), [K. Ozaki](#), [H. Tobita](#), [S. Shimazu](#). ECOLOGICAL PROCESSES DRIVING FOLIAGE-AGE DIETARY MIXING WITHIN CONIFERS BY A GENERALIST HERBIVORE, THE ASIAN GYPSY MOTH

01:45 [Ayman M. Mostafa](#), [D. Tom Lowery](#). IDENTIFICATION AND LIFE CYCLE OF CLIMBING CUTWORMS (LEPIDOPTERA: NOCTUIDAE) FROM GRAPEVINES IN THE OKANAGAN VALLEY, BC

02:00 [G. Christopher Cutler](#). STIMULATORY EFFECTS OF INSECTICIDES ON INSECTS

02:15 [Simon Lachance](#), [P. Nampoothiry](#), [C. Scott-Dupree](#). EFFECTS OF THE VAPOUR PHASE OF ESSENTIAL OILS ON LARVAE, PUPAE AND ADULTS OF THE HOUSE FLY

02:30 [Jennifer Allen](#), [Mary Ruth McDonald](#), [Kevin Vander Kooi](#). OPTIMIZING SPRAY COVERAGE OF ONIONS FOR CONTROL OF ONION THRIPS, *THRIPS TABACI*

02:45 [Ian L. Wise](#), [N. Woodbeck](#), [S.L. Fox](#). AN ESTIMATE OF ECONOMIC LOSSES TO SPRING WHEAT CAUSED BY *SITODIPLOSI* *MOSELLANA* IN WESTERN CANADA, 2003-2008

03:00 [Brian Galka](#), [J. Saguez](#), [C. Vincent](#), [C. Olivier](#). LEAFHOPPERS IN QUEBEC VINEYARDS: IMPLICATIONS REGARDING PHYTOPLASMA DISEASES

03:15 [C.I. Keeling](#), [Dezene P.W. Huber](#), [H. Henderson](#), [M. Li](#), [E.L. Clark](#), [D.S. Ott](#), [J.D. Fraser](#), [J. Bohlmann](#), [The Tria Project Team](#). A LARGE EXPRESSED SEQUENCE TAG (EST) RESOURCE FOR THE MOUNTAIN PINE BEETLE, *DENDROCTONUS PONDEROSAE* (COLEOPTERA: CURCULIONIDAE: SCOLYTINAE)

03:30 **W. (Bill) G. Riel, T.L. Shore, C. Burnett, A. Fall.** SPATIAL RISK MODELS FOR MOUNTAIN PINE BEETLE IN ALBERTA AND SASKATCHEWAN

03:45 **Aziz Ajlan, Khalid Alhudaib, J.R. Faleiro.** MANAGING THE PROBLEM OF RED PALM WEEVIL, *RHYNCHOPHORUS FERRUGINEUS*

MONDAY 19 OCTOBER 04:30–06:00 PM PROVENCHER BALLROOM

POSTER SESSION

NOTES:

1. POSTERS ARE ARRANGED ALPHABETICALLY BY SURNAME
2. POSTER PRESENTERS SHOULD BE IN ATTENDANCE AT THEIR POSTER THROUGHOUT THE POSTER SESSION, AND PRESIDENT PRIZE CONTESTANTS SHOULD NOT LEAVE UNTIL THE JUDGES HAVE COMPLETED THEIR ASSESSMENT.

Abdelghany, Ahmed Y.; Awadalla, S.S.; Abdel-Baky, N.F.; EL-Syrafy, H.A.; Fields, P.G. THE IMPACT OF INSECTICIDES ON PENETRATION INTO JUTE AND POLYETHYLENE BAGS BY TWO STORED-PRODUCT INSECTS (President's Prize Competition)

Al Dhafer, Hathal M. TABANIDAE (DIPTERA) OF SAUDI ARABIA

Alsaqabi, S.M. DESCRIPTION OF MITE (*UROPODA* SP., MULLER, 1776) NESTING WITH RED PALM WEEVIL BEETLES (*RHYNCHOPHORUS FERRUGINEUS*) (COLEOPTERA : CURCULIONIDAE) BY SCANNING ELECTRON MICROSCOPY

Bostanian, Noubar J.; Hardman, J.M.; Thistlewood, H.A. THE EFFECTS OF FIVE 'REDUCED RISK INSECTICIDES' ON *NEOSEILUS FALLACIS* AND *GALENDROMUS OCCIDENTALIS* (ACARI: PHYTOSEIIDAE)

Burgher-MacLellan, Karen; Williams, Geoff; MacKenzie, Kenna; Shutler, Dave. ASSESSMENT WITH QUALITATIVE AND QUANTITATIVE REAL-TIME PCR OF *NOSEMA APIS* AND *NOSEMA CERANAE* CO-INFECTIONS IN WESTERN HONEY BEES (*APIS MELLIFERA*)

Campbell, K.A.; Giberson, Donna. AQUATIC HEMIPTERA OF DEROCHE POND NATURAL PROTECTED AREA, PRINCE EDWARD ISLAND

Carleton, Drew; Royer, Lucie; Hébert, Christian; Delisle, Johanne; Bauce, Eric; Quiring, Dan. THE *TELENOMUS* SPECIES COMPLEX ATTACKING HEMLOCK LOOPER (LEPIDOPTERA: GEOMETRIDAE) IN EASTERN QUEBEC AND WESTERN NEWFOUNDLAND (President's Prize Competition)

De Clerck-Floate, Rosemary, Floate, Kevin; Saunders, Paul. A TEST OF CONTAINMENT EFFICACY USING LIVING INSECTS IN A RELEASE AND RECAPTURE STUDY.

Du, Jing; Holliday, Neil. RESPONSES OF *ALEOCHARA BILINEATA* (COLEOPTERA: STAPHYLINIDAE) TO DIMETHYL DISULPHIDE

Evenden, Maya L.; Gries, Regine. COMPARISON OF COMMERCIALY-AVAILABLE SEX PHEROMONE LURES TO MONITOR DIAMONDBACK MOTH IN CANOLA.

Fattah-Hosseini, Somayeh; Allahyari, H. HOST PLANT RESISTANCE TO GREENBUG, *SCHIZAPHIS GRAMINUM* (HOMOPTERA: APHIDIDAE), ON FIVE WHEAT VARIETIES

Floate, Kevin D.; Tiberg, Karma. WHAT HAPPENED TO THE COPROPHILOUS INSECTS ASSOCIATED WITH BISON?

Floate, Kevin D. Watson, Wes. INTRODUCTION OF EXOTIC DUNG BEETLES INTO CANADA TO ACCELERATE DEGRADATION OF CATTLE DUNG

Gillespie, Dave; Mason, Peter; Broadbent, Bruce; Jenner, Wade; Andreassen, Lars; Hays, Tim; Kuhlmann, Ulli. DEFINING NON-TARGET COMMUNITIES IN ARTHROPOD BIOLOGICAL CONTROL PROGRAMS: APPROACHES AND SOLUTIONS

Leroux, Alicia M.; Holliday, Neil. POST-RELEASE ASSESSMENT OF *APHTHONA* SPP. (COLEOPTERA: CHRYSOMELIDAE) FOR LEAFY SPURGE CONTROL IN SOUTHWESTERN MANITOBA. (President's Prize Competition)

Liu, Suqui. Q.; McGarvey, B.D.; Scott, I.M.; Pariente, S. THE INSECTICIDAL ACTIVITY OF BIO-OIL FROM THE PYROLYSIS OF CANOLA, *BRASSICA NAPUS*, AND MUSTARD, *B. CARINATA* AND *B. JUNCEA*, STRAW

Locke, Michelle M.; Skevington, Jeffrey H.; Marshall, Steve A. REVISION OF NEARCTIC *DASYSYRPHUS* (DIPTERA, SYRPHIDAE) (President's Prize Competition)

Lusebrink, Inka; Evenden, M.L.; Erbilgin, N. MONOTERPENE EMISSION FROM MATURE PINE TREES SUBJECTED TO DIFFERENT ENVIRONMENTAL CONDITIONS AND TREATMENTS EMULATING MOUNTAIN PINE BEETLE ATTACK

MacLeod, Alyssa; Wheeler, Terry A. SYSTEMATIC REVISION OF NEARCTIC *TRITOXIA* (DIPTERA: ULIDIIDAE). (President's Prize Competition)

McDonald, Mary Ruth, Vander Kooi, K.; Taylor, A.G. INSECTICIDE SEED TREATMENTS FOR THE MANAGEMENT OF CARROT INSECT PESTS

Mori, Boyd; Gries, Regine; Otanni, Jennifer; Yoder, Calvin; Evenden, Maya. DEVELOPMENT OF A PHEROMONE-BASED MONITORING TOOL FOR THE RED CLOVER CASEBEARER (*COLEOPHORA DEAURATELLA*) IN ALBERTA. (President's Prize Competition)

Oghiakhe, Sunday; Holliday, Neil. TEMPERATURE DEPENDENT DEVELOPMENT OF IMMATURE STAGES OF THE NATIVE ELM BARK BEETLE, *HYLURGOPINUS RUFIPES* (COLEOPTERA: SCOLYTIDAE) (President's Prize Competition)

Olivier, Chrystel; Galka, Brian; Floate, Kevin. IDENTIFICATION OF SYMBIONT ORGANISMS IN LEAFHOPPER VECTORS OF PHYTOPLASMA

Peck, Stewart B. BEETLE DIVERSITY IN THE LESSER ANTILLES ISLANDS: HOW MANY SPECIES ARE REALLY THERE?

Pitt, Caitlin; Seybold, S.J.; Thommasen, A.T.; Huber, D.P.W. FUNCTIONAL CHARACTERIZATION OF CALIFORNIA FIVE-SPINED IPS, *IPS PARACONFUSUS* (COLEOPTERA: CURCULIONIDAE: SCOLYTINAE), CYTOCHROMES P450 EXHIBITING UP-REGULATION WITH FEEDING (President's Prize Competition)

Sabbahi, Rachid; Royer, Lucie. PARASITISM OF EASTERN HEMLOCK LOOPER IN FORESTS OF NEWFOUNDLAND AND LABRADOR

Tesfaendrias, M.T.; Vander Kooi, K.; McDonald, Mary Ruth. INTEGRATED PEST MANAGEMENT IN THE HOLLAND MARSH

Veilleux, Jonathan; Holliday, Neil. THE BANDED ELM BARK BEETLE, *SCOLYTUS SCHEVYREWI*, IN CANADA (President's Prize Competition)

Waller, Jennifer L. PARASITOID COMPETITION OR, "CAN PARASITIDS DISTINGUISH PREVIOUSLY PARASITIZED HOSTS?" (President's Prize Competition)

TUESDAY 20 OCTOBER 08:15 AM–12:00 NOON

GATEWAY

SYMPOSIUM

ARTHROPOD HOST-SYMBIONT RELATIONSHIPS: DIVERSITY, DISTRIBUTION AND ECOLOGY

CHAIR: HEATHER PROCTOR

08:15 **Heather C. Proctor.** INTRODUCTION TO THE SYMPOSIUM

08:30 **L. Nagel, T. Robb, Mark Forbes.** FLUCTUATING PARASITE-MEDIATED SELECTION AND VARIABLE RESISTANCE IN A SPECIALIST MITE-DAMSELFLY ASSOCIATION

09:15 **Barry M. O'Connor.** ECOLOGICAL ASSOCIATIONS OF MITES AND NATIVE BEES IN NORTH AMERICA

10:00–10:30 BREAK

10:30 **Terry D. Galloway.** PATTERNS IN LIFE HISTORIES OF FLEAS (SIPHONAPTERA)

11:15 **Sarah E. Bush, D.H. Clayton.** THE ECOLOGICAL BASIS OF COEVOLUTIONARY HISTORY: LESSONS FROM LICE

TUESDAY 20 OCTOBER 08:25 AM–12:00 NOON

TACHÉ

SYMPOSIUM

PROTECTING STRUCTURES AND URBAN FORESTS FROM INSECTS

CHAIR: KATHY CANO

08:25 **Kathy Cano.** INTRODUCTION TO THE SYMPOSIUM

08:30 **Patrick T. Coppes.** IPM IN STRUCTURAL PEST MANAGEMENT: AN EVOLVING CONCEPT

09:00 **Laurel D. Hansen.** CARPENTER ANTS AND THEIR MANAGEMENT

09:30 **Paul Fields.** ALTERNATIVES TO METHYL BROMIDE FUMIGATION IN FOOD PROCESSING FACILITIES

10:00–10:30 BREAK

10:30 **James F. Campbell.** PHEROMONE TRAPPING RED FLOUR BEETLE IN STRUCTURES: LIMITATIONS, IMPLEMENTATION AND INTERPRETATION

11:00 **Rory McIntosh, Jeff Gooliaff, Robert Moore.** A RISK-BASED APPROACH TO THE BANDED ELM BARK BEETLE: AN UNWELCOME IMMIGRANT TO SASKATCHEWAN

11:30 **Vince Nealis.** GYPSY MOTH: STILL INVASIVE AFTER ALL THESE YEARS

TUESDAY 20 OCTOBER 08:00–11:45 AM

LA VÉRENDRYE

CONTRIBUTED PAPERS

SYSTEMATICS, CONSERVATION, BIODIVERSITY

CHAIR: ROBERT ROUGHLEY

08:00 **Thomas J. Simonsen, Evgeny V. Zakharov, Marie Djernaes, Adam M. Cotton, Richard I. Vane-Wright, Felix A.H. Sperling.** PHYLOGENY, HOST PLANT ASSOCIATIONS AND DIVERGENCE TIME OF PAPILIONINAE (LEPIDOPTERA: PAPILIONIDAE) INFERRED FROM MORPHOLOGY AND SEVEN GENES

- 08:15 **Terry A. Wheeler**. TAXONOMIC IMPEDIMENTS: UNRAVELLING THE TAXONOMIC, PHYLOGENETIC AND ECOLOGICAL DIVERSITY OF CHLOROPID FLIES
- 08:30 **Jeffrey H. Skevington, Daniele Sommaggio**. "IF THE FLIES CAN TELL WHO'S WHO, WHY CAN'T WE?" ATTEMPTING TO REVISE THE TAXONOMY OF NEARCTIC *CHRYSOTOXUM* (DIPTERA, SYRPHIDAE)
- 08:45 **Bradley J. Sinclair, Igor Shamshev**. EARLY SPRING POLLINATORS: REVISION OF THE DANCE-FLY GENUS *ITEAPHILA* (DIPTERA: EMPIDIDAE)
- 09:00 **Mahmood Iranpour, Robbin Lindsay, Leanne Peixoto, Craig McFarlane**. MOLECULAR CHARACTERIZATION OF SOME *AEDEAS* AND *OCHLEROTATUS* SPECIES (DIPTERA: CULICIDAE) OCCURRING IN MANITOBA
- 09:15 **Lisa M. Poirier**. OCCURRENCE AND DISTRIBUTION OF *COQUILLETTIDIA* (= *MANSONIA*) *PERTURBANS* MOSQUITOES IN NORTHERN BRITISH COLUMBIA
- 09:30 **Fred Beaulieu**. OF LATIN, DINOSAURS AND MITES — SOME HAIR-TEARING AND ENCHANTED TALES AROUND A TAXONOMIST'S JOB
- 09:45 **Robin E. Owen, David B. McCorquodale**. EVOLUTION OF EUSOCIALITY IN THE HYMENOPTERA VIA NEST SHARING BETWEEN NON-RELATIVES: ALTRUISM WITHOUT KIN-SELECTION
- 10:00–10:30 BREAK
- 10:30 **Diana Robson**. INSECT VISITORS TO THE RARE WESTERN SILVERY ASTER (*SYMPHYOTRICHUM SERICEUM*) PLANT
- 10:45 **Jay M. Fitzsimmons, Ryan J. Burke, J.T. Kerr**. A MOBILITY INDEX OF CANADIAN BUTTERFLY SPECIES: TAPPING IN TO NATURALISTS' EXPERIENCE
- 11:00 **Janet Sperling, Danny Shpeley, Sarah Leo, Mike Jenkins, Felix Sperling**. *IXODES SCAPULARIS* AND *I. PACIFICUS* TICKS IN ALBERTA
- 11:15 **Donna J. Giberson**. NORTHERN COLLABORATIVE ENTOMOLOGY: COLLECTING AQUATIC INSECTS ON THE COPPERMINE RIVER, NU
- 11:30 **Peter G. Mason, Andrew M.R. Bennett, Jacques Brodeur**. ACCESS AND BENEFITS SHARING: THE IMPLICATIONS FOR ENTOMOLOGY AND BIOLOGICAL CONTROL

TUESDAY 20 OCTOBER 01:25–04:00 PM

TACHÉ

SYMPOSIUM

DIVERSITY IN FOREST ECOSYSTEMS

CHAIR: RICHARD WESTWOOD

- 01:25 **A. Richard Westwood**. INTRODUCTION TO THE SYMPOSIUM
- 01:30 **Neville N. Winchester**. DIVERSITY OF ARTHROPODS IN ANCIENT FORESTS: COUNTING THE UNCOUNTED
- 02:00 **Tim Work, F. Rénauld, J. Jacobs, S. Brais**. MANAGING DEADWOOD AND ARTHROPOD DIVERSITY IN BOREAL FORESTS UNDER INCREASING DEMANDS FOR WOODY BIOMASS FEEDSTOCKS
- 02:30 **Ken A. Baldwin**. DESCRIBING FOREST DIVERSITY IN CANADA: AN INTRODUCTION TO THE CANADIAN NATIONAL VEGETATION CLASSIFICATION (CNVC)
- 03:00 **Maxim Larrivière, J.T. Kerr**. ASSESSING AND PREDICTING GLOBAL CHANGE IMPACTS ON CANADIAN BUTTERFLY SPECIES DISTRIBUTIONS THROUGH THE CANADA GLOBAL CHANGE TRANSECT
- 03:00 **Jay R. Malcolm, Sandy M. Smith**. TAKING THE WOOD OUT (DEAD OR ALIVE): IMPLICATIONS FOR FOREST INSECT COMMUNITIES

TUESDAY 20 OCTOBER 01:25–04:00 PM

LA VÉRENDRYE

SYMPOSIUM

POLLINATION BIOLOGY

CHAIR: ROBERT CURRIE

- 01:25 **Robert Currie**. INTRODUCTION TO THE SYMPOSIUM
- 01:30 **Peter G. Kevan, L. Packer, D.J. Schoen, K.M. Ritland, E.E. Elle, J.C. Vamosi, J.T. Kerr, A.J. Weersink**. THE CANADIAN POLLINATION INITIATIVE: INTERDISCIPLINARY INSIGHTS AND ORGANIZATION
- 02:00 **Laurence Packer, C.S. Sheffield**. THE TAXONOMIC, ECOLOGICAL AND BEHAVIOURAL DIVERSITY OF BEES
- 02:30 **Mason W. Kulbaba, Anne C. Worley**. SELECTION BY HAWK MOTHS ON FLORAL DESIGN IN *POLEMONIUM BRANDEGEI*
- 03:00 **Kenna MacKenzie**. POLLINATION OF THE NORTH AMERICAN *VACCINIUM* CROPS, BLUEBERRY AND CRANBERRY

03:30 [Neal M. Williams, R. Winfree, C. Kremen](#). RESPONSE OF WILD BEES TO LANDSCAPE CHANGE AND ITS IMPLICATIONS FOR POLLINATION SERVICES

TUESDAY 20 OCTOBER 01:25–04:00 PM

GATEWAY

SYMPOSIUM

ENTOMOLOGICAL ISSUES IN POTATO PRODUCTION

CHAIR: YVAN PELLETIER

01:25 [Yvan Pelletier](#). INTRODUCTION TO THE SYMPOSIUM

01:30 [Joseph “Dick” Dickens](#). CHEMICAL SIGNALS IN THE COLORADO POTATO BEETLE

02:00 [Ian M. Scott, J.H. Tolman, D.C. MacArthur, Y. Pelletier](#). MONITORING INSECTICIDE-RESISTANCE IN COLORADO POTATO BEETLE POPULATIONS IN CANADA: PAST, PRESENT AND POTENTIAL APPROACHES

02:30 [Robert S. Vernon, W. van Herk, M. Clodius, J.H. Tolman, C. Noronha](#). WIREWORMS: WE CAN CONTROL THEIR DAMAGE, BUT CAN WE KILL THEM?

03:00 [Conrad Cloutier, Thi Thuy An Nguyen, Dominique Michaud](#). STUDYING APHID INTERACTIONS WITH PLANTS AND POTENTIAL STRESS FACTORS USING PROTEOMICS TECHNOLOGY

03:30 [Yvan Pelletier](#). POTATO RESISTANCE TO INSECTS

TUESDAY 20 OCTOBER 04:30–05:00 PM

LA VÉRENDRYE

HERITAGE LECTURE

CHAIR: NEIL HOLLIDAY

[Don Dixon](#). THE HISTORY OF BEEKEEPING RESEARCH IN WESTERN CANADA

TUESDAY 20 OCTOBER 05:00–05:45 PM

GATEWAY

ANNUAL BUSINESS MEETING, ENTOMOLOGICAL SOCIETY OF CANADA

WEDNESDAY 21 OCTOBER 08:10 AM–12:30 PM

CLUB

SYMPOSIUM

APICULTURE: BEE—VIRUS INTERACTIONS

CHAIR: RHÉAL LAFRENIÈRE

08:10 [Rhéal Lafrenière](#). INTRODUCTION TO THE SYMPOSIUM

08:15 [Suresh Desai, Young-Jae Eu, Robert W. Currie](#). INHIBITION OF DEFORMED WING VIRUS (DWV) REPLICATION IN HONEY BEES BY RNA INTERFERENCE

08:45 [Joachim R. de Miranda](#). CURRENT STATE OF HONEY BEE VIRUS RESEARCH IN EUROPE

09:30 [Ilan Sela](#). ASSOCIATION OF COLONY COLLAPSE DISORDER WITH ISRAELI ACUTE PARALYSIS VIRUS (IAPV): AN RNAI APPROACH TO CONTROL IAPV AND A POSSIBLE ROLE FOR VIRAL INTEGRATION

10:00–10:30 BREAK

10:30 [Diana Cox-Foster](#). UNRAVELLING THE PATHOGENS IN HONEY BEES UNDERGOING COLONY COLLAPSE DISORDER

11:15 [Eyal Ben-Chanoch, G. Yarden, N. Paldi](#). RNAI AT WORK IN REAL LIFE APPLICATIONS: TARGETING INVERTEBRATE PESTS AND BENEFICIAL ORGANISMS' DISEASES

11:45 [Martin A. Erlandson](#). VIRUSES AS BIOLOGICAL CONTROL AGENTS FOR INSECT PEST CONTROL

WEDNESDAY 21 OCTOBER 07:55 AM–11:00 AM

GATEWAY

BIOLOGICAL SURVEY OF CANADA SYMPOSIUM

TERRESTRIAL ARTHROPOD SURVEYS IN CANADA: PURPOSE, PROGRESS AND PLANS

CHAIR: DOUG CURRIE

07:55 [Doug Currie](#). INTRODUCTION TO THE SYMPOSIUM

08:00 [Cory Sheffield, Laurence Packer, Jason Gibbs, Sheila Dumesh, Lincoln Best, Nicholai de Silva](#). AN OVERVIEW OF THE BEES OF CANADA: DIVERSITY, DISTRIBUTION AND STATUS

08:15 [Terry D. Galloway](#). BIODIVERSITY OF LICE ON BIRDS AND MAMMALS IN MANITOBA

- 08:30 **K.G. Andrew Hamilton**. BORDER CONFLICTS - HOW LEAFHOPPERS CAN HELP RESOLVE ECOREGIONAL VIEWPOINTS IN CANADA AND THE USA
- 08:45 **Robert E. Roughley**. BEETLES OF CHURCHILL, MANITOBA
- 09:00 **Jeremy R. deWaard, Leland M. Humble**. BARCODE-ASSISTED ASSESSMENTS OF LEPIDOPTERAN DIVERSITY IN BRITISH COLUMBIA
- 09:15 **Virginia Anne Kowal, R.V. Cartar**. RESPONSES OF TERRESTRIAL ARTHROPOD COMMUNITIES TO ANTHROPOGENIC FOREST DISTURBANCES AT LOCAL AND LANDSCAPE SCALES
- 09:30 **Joseph D. Shorthouse**. FACTORS INFLUENCING THE DISTRIBUTION OF GALL-INDUCING CYNIPIDS ON WILD ROSES ACROSS CANADA
- 09:45 **Leland M. Humble, Serge Laplante, Tomislav Terzin**. DEVELOPING DNA BARCODE LIBRARIES FOR CERAMBYCIDAE
- 10:00–10:30 BREAK
- 10:30 **David E. Walter**. UNEXPECTED DIVERSITY IN BOREAL FOREST AND ASPEN PARKLAND MITES (ACARI: ORIBATIDA): RESULTS FROM THE ALBERTA BIODIVERSITY MONITORING INSTITUTE
- 10:45 **Dale Parker, Iain Phillips**. SASKATCHEWAN AQUATIC MACROINVERTEBRATE BIODIVERSITY SURVEYS AND DATABASE: PAST, PROGRESS AND PLANS

WEDNESDAY 21 OCTOBER 08:00–11:45 AM

LA VÉRENDRYE

CONTRIBUTED PAPERS

BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

CHAIR: PATRICIA MACKAY

- 08:00 **Robert J. Lamb, Patricia A. MacKay**. IS THE POPULATION STABILITY OF AN APHID A SPECIES TRAIT?
- 08:15 **Dave Gillespie, Abida Nasreen, Chandra Moffat, Peggy Clarke, Bernie Roitberg**. COMMUNITY-LEVEL EFFECTS OF EXTREME TEMPERATURE PERTURBATION
- 08:30 **Sandrine Girardoz, M. Kenis, D.L.J. Quicke**. MORTALITY FACTORS AFFECTING THE INVASIVE HORSE-CHESTNUT LEAF MINER, *CAMERARIA OHRIDELLA* (LEPIDOPTERA, GRACILLARIIDAE), IN SWITZERLAND
- 08:45 **Chris J.K. MacQuarrie, Barry J. Cooke**. LANDSCAPE SCALE POPULATION DYNAMICS OF MOUNTAIN PINE BEETLE
- 09:00 **Kathleen R. Aikens, Christopher M. Buddle**. HIDE AND SEEK IN FOREST CANOPIES: CAN ARTHROPODS FIND ENEMY FREE SPACE?
- 09:15 **Maxence Salomon, Karen Whitaker, Leticia Avilés**. COOPERATIVE FORAGING DYNAMICS ACROSS SOCIAL AND SUBSOCIAL SPIDERS
- 09:30 **Rob S. Bouchier, B. Van Hezewijk, R. Shaw, R. Tanner**. CHASING AFTER THE WORLD'S LARGEST FEMALE: POTENTIAL ESTABLISHMENT RANGE OF THE PSYLLID, *APHALARA ITADORI*, FOR BIOLOGICAL CONTROL OF INVASIVE KNOTWEEDS IN CANADA AND THE UNITED KINGDOM
- 09:45 **Brian Van Hezewijk, Rob S. Bouchier**. ARE TWO HEADS BETTER THAN ONE? THE INTERACTION BETWEEN A ROOT GALLER AND SEED-HEAD FEEDER IN THE BIOLOGICAL CONTROL OF DIFFUSE KNAPWEED
- 10:00–10:30 BREAK
- 10:30 **Tim Haye, Peter G. Mason, David R. Gillespie, Ulrich Kuhlmann**. HOST SPECIFICITY OF *TRICHOMALUS PERFECTUS*: CONFLICTS BETWEEN INSECT AND WEED BIOLOGICAL CONTROL?
- 10:45 **Léna Durocher-Granger, Guy Boivin**. DOES HOST FEEDING INFLUENCE SEX ALLOCATION IN AN EGG PARASITOID?
- 11:00 **Christine Noronha**. EFFICIENCY OF *TRICHOGRAMMA BRASSICAE* AS A BIOCONTROL AGENT OF THE EUROPEAN CORN BORER, *OSTRINIA NUBILALIS* (LEPIDOPTERA: CRAMBIDAE), IN POTATOES
- 11:15 **Ravindran Subramaniam, Lloyd M. Dossall, J.T. O'Donovan, K.N. Harker**. IDENTIFYING AGRONOMIC PRACTICES THAT CONSERVE AND ENHANCE NATURAL ENEMIES OF ROOT MAGGOTS (*DELIA* SPP.) (DIPTERA: ANTHOMYIIDAE) IN CANOLA
- 11:30 **Md. Habibullah Bahar, J.N. Stanley, P.C. Gregg, A. Del-Socorro**. DO GREEN LACEWINGS (*MALLADA SIGNATA*) ADD MORTALITY OF *HELICOVERPA ARMIGERA* ON TRANSGENIC *BT* COTTON?

Entomological Society of Canada Gold Medal

for

Outstanding Achievement in Canadian Entomology

presented to

Neil J. Holliday

at

Winnipeg, Manitoba, 18 October 2009



Médaille d'or de la Société d'entomologie du Canada

pour

souligner une contribution exceptionnelle en entomologie au Canada

présentée à

Neil J. Holliday

à

Winnipeg, Manitoba, le 18 octobre 2009



The 2009 recipient of the Entomological Society of Canada's Gold Medal Award for outstanding achievement in Entomology is Dr. Neil Holliday. This award recognizes his contribution as a scientist and Professor of Entomology in the areas of insect ecology, biological control and pest management. Neil has published 53 refereed journal articles that demonstrate his diverse research interests. His early work focused on basic questions in insect ecology such as the population dynamics of forest Lepidoptera and how carabid beetle communities respond to disturbance in northern forests. Neil's research program has also addressed fundamental problems faced by Manitoba producers and this research has been applied to integrated pest management in canola, potato, beans, and seed alfalfa. Included in his approach to integrated pest management is the study of biological control agents for potential introduction to Canada. Neil collaborates with researchers at Agriculture and Agri-Food Canada and the CABI research station in Switzerland to evaluate natural enemies for potential introduction to target invasive pests in Canada. Recent and ongoing research in Neil's laboratory on the biology and control of insect vectors of Dutch elm disease will protect urban forests and directly reduce the cost of control to communities as well as reduce the exposure of non-target insects to insecticides.

Neil is very active in the education and mentorship of undergraduate and graduate students alike. His dedication to undergraduate education at the University of Manitoba was recognized by his receipt of the University's Merit Award for Teaching in 1992 and a Students' Teacher Recognition Award in 2009. He has taught a variety of undergraduate courses at the University of Manitoba ranging from Principles of Ecology, to Introductory Agriculture and Insect Ecology and Insect Pest Management. Neil challenges his students to work hard which inspires them to have a lifelong interest in insects and their importance and role in the natural world. Neil's efforts at undergraduate education are not limited to the lecture hall, as 20 undergraduate researchers have completed research projects in his laboratory. Neil has served as a mentor to 32 graduate students, including the 5 graduate students currently in his laboratory. His graduate students have been well-supported by over \$1.2 million in grant support in the last 10 years. His former graduate students have populated research and technical positions in Canada and around the world. Neil also serves as the statistical resource person in the Department of Entomology at the University of Manitoba and has helped countless graduate students in the whole department to understand and improve their research approach to Entomology.

Neil feels strongly and is very active in outreach education targeting various producer groups and the general public. He has published over 73 extension publications and makes regular presentations on pest management to gardening clubs. These demonstrate Neil's broad knowledge of insects of Manitoba and the integrated pest management strategies used against pest species. The Department of Entomology also runs a "bug-line" to answer inquiries from the public about insects and Neil acquires funding to ensure the phone line is staffed each summer.

Neil has been active in academic and entomological service activities throughout his career. Most notably he has served as the Head of the Department of Entomology at the University of Manitoba for two terms and is currently serving a third term. In this role, he has fought tirelessly to maintain the Department of Entomology as the only such department in Canada. Through his efforts, a tentative agreement has been reached to increase the number of faculty in the department in the next few years. He has also served on many Faculty and University committees including Chair and Student Advisor to the Agroecology Undergraduate Program. Neil has served on the governing board and various committees of the Entomological Society of Canada and has been particularly active on the executive of the Entomological Society of Manitoba of which he has been president twice. He has had a major role in organization of every joint ESC/ESM meeting since 1986.

Neil's wide-ranging contributions to entomological research, the education of entomologists, pest management practitioners and the public, and his service to academia and entomological societies make him very qualified to receive the Gold Medal from the Entomological Society of Canada.

Le récipiendaire 2009 de la médaille d'or de la Société d'entomologie du Canada pour un accomplissement exceptionnel en entomologie est Dr Neil Holliday. Ce prix récompense sa contribution en tant que chercheur et professeur en entomologie dans les disciplines de l'écologie des insectes, de la lutte biologique et de la lutte aux ravageurs. Neil a publié 53 articles dans des revues scientifiques qui ont démontré ses intérêts de recherches diversifiés. Ses premiers travaux se sont concentrés sur les questions de base en écologie des insectes, telles que la dynamique des populations des lépidoptères forestiers et la façon dont les communautés de carabes répondent à la perturbation des forêts nordiques. Les recherches de Neil se sont également penchées sur des problèmes fondamentaux vécus par les agriculteurs manitobains et les travaux ont pu être appliqués ensuite à la lutte intégrée aux ravageurs dans le canola, les pommes de terre, les haricots et la luzerne de semence. L'étude des agents de lutte biologique en vue de leur introduction potentielle au Canada est incluse dans son approche de la lutte intégrée. Neil collabore avec des chercheurs d'Agriculture et agroalimentaire Canada et de la station de recherche du CABI en Suisse pour évaluer les ennemis naturels en vue d'une introduction potentielle au Canada, afin de lutter contre des ravageurs envahissants. Les travaux récents et en cours du laboratoire de Neil qui portent sur la maladie hollandaise de l'orme permettront de protéger les forêts urbaines et de réduire directement les coûts de contrôle pour les communautés, en plus de réduire l'exposition des insectes non ciblés aux insecticides.

Neil est très actif dans l'enseignement et le mentorat autant auprès des étudiants du baccalauréat que des étudiants gradués. Son implication dans l'enseignement au niveau du baccalauréat à l'Université du Manitoba a été reconnue grâce au prix du mérite pour l'enseignement décerné par l'université, qui lui a été remis en 1992, ainsi que grâce au prix de reconnaissance de l'enseignement décerné par les étudiants, qui lui a été remis en 2009. Il a enseigné une diversité de cours de baccalauréat à l'Université du Manitoba, allant de Principes d'écologie à Introduction à l'agriculture et Écologie des insectes et Gestion des insectes ravageurs. Neil encourage ses étudiants à travailler fort, ce qui les stimule à entretenir un intérêt durable pour les insectes et leur importance et rôle dans la nature. L'implication de Neil dans les études du baccalauréat ne se limite pas aux salles de classe, puisque 20 étudiants du baccalauréat ont complété des projets de recherche dans son laboratoire. Neil a servi de mentor à 32 étudiants gradués, incluant les 5 étudiants qui sont présentement dans son laboratoire. Ses étudiants gradués ont été supportés financièrement par plus de 1,2 million \$ en bourses depuis les 10 dernières années. Ses anciens étudiants gradués ont comblé des postes de chercheurs et de techniciens au Canada et à travers le monde. Neil est également une personne ressource en statistiques au département d'entomologie de l'Université du Manitoba et il a aidé un nombre incalculable d'étudiants gradués de tout le département à mieux comprendre et améliorer leur approche scientifique en entomologie.

Neil considère que l'enseignement à l'externe est important et il y est très impliqué auprès de groupes de producteurs diversifiés et du public en général. Il a publié plus de 73 documents de vulgarisation et il fait régulièrement des présentations sur la gestion des ravageurs dans des groupes de jardinage. Ces documents et présentations illustrent les vastes connaissances de Neil sur la faune des insectes du Manitoba et les stratégies de lutte intégrée pouvant être utilisées contre ces ravageurs. Le département d'entomologie gère également une ligne téléphonique d'information sur les insectes, pour répondre aux requêtes du public à propos des insectes et Neil s'assure d'obtenir les fonds nécessaires pour pourvoir la ligne téléphonique en personnel à chaque été.

Neil a été actif dans les activités académiques et en tant que ressource entomologique tout au long de sa carrière. Il a entre autres été à la tête du département d'entomologie de l'Université du Manitoba durant deux trimestres et il en est présentement à son troisième trimestre. Dans ce poste, il s'est battu sans relâche afin de conserver le département d'entomologie tel qu'il est, il s'agit du seul département semblable au Canada. Grâce à ses efforts, une tentative d'entente a été obtenue afin d'augmenter le nombre de facultés du département au cours des prochaines années. Il a également été impliqué dans plusieurs comités de la faculté et de l'université, incluant en tant que président et conseiller aux étudiants pour le programme d'agroécologie. Neil a siégé sur le conseil d'administration et différents comités de la Société d'entomologie du Canada et il a été particulièrement actif au sein du comité exécutif de la Société d'entomologie du Manitoba, au sein de laquelle il a été deux fois élu président. Il a joué un rôle majeur dans l'organisation des réunions conjointes des deux sociétés depuis 1986.

Les contributions variées de Neil dans la recherche en entomologie, l'enseignement aux entomologistes, aux intervenants en gestion des ravageurs et au public, ainsi que sa présence au sein du système universitaire et des sociétés d'entomologie, en font un candidat très qualifié pour recevoir la médaille d'or de la Société d'entomologie du Canada.

Previous recipients / Récipiendaires antérieurs

1962	R.F. Morris	1986	E.J. Leroux
1963	A.W.A. Brown	1987	J.N. McNeil
1964	R. Glen	1988	J.H. Borden
1965	M.L. Prebble	1989	M. Mackauer
1966	C.W. Farstad	1990	S. Tobe
1967	B.N. Smallman	1991	R.G.H. Downer
1968	W.G. Wellington	1992	G.B. Wiggins
1969	K.E.F. Watt	1993	No Award
1970	C.S. Holling	1994	T. Royama
1971	J.G. Rempel	1995	R.A. Brust
1972	R.W. Salt	1996	J. Kukalova-Peck
1973	B. Hocking	1997	P. Harris
1974	P.S. Corbet	1998	D.M. Rosenberg
1975	G.G.E. Scudder	1999	L. Masner
1976	B.P. Beirne	2000	B.J.R. Philogene
1977	J.A. Downes	2001	J. R. Spence
1978	R.W. Stark	2002	R.J. Lamb
1979	G.P. Holland	2003	H. Danks
1980	G.E. Ball	2004	J. Myers
1981	D.K. McE. Kevan	2005	P. Kevan
1982	E.G. Munroe	2006	R. Ring
1983	F.L. McEwen	2007	C. Gillott
1984	K.G. Davey	2008	B. Roitberg
1985	R.N. Sinha		

Entomological Society of Canada C. Gordon Hewitt Award

for

Outstanding Achievement

by a Canadian Entomologist under 40 years of age

presented to

Sherah VanLaerhoven

at

Winnipeg, Manitoba, 18 October 2009



Prix C. Gordon Hewitt de la Société d'entomologie du Canada

pour

souligner la contribution exceptionnelle

d'un entomologiste canadien de moins de 40 ans

présenté à

Sherah VanLaerhoven

à

Winnipeg, Manitoba, le 18 octobre 2009



The 2009 recipient of the C. Gordon Hewitt Award is Dr. Sherah VanLaerhoven. Sherah is an accomplished researcher who runs two strong programs in entomology; forensic science and biological control of insect pests in greenhouses. Sherah shares her enthusiasm for entomology through supervision and teaching of highschool, undergraduate and graduate students. She is particularly active in outreach extension activities through her collaborations in forensic entomology cases. Sherah has a strong record of service to the academic community and entomological societies.

Sherah received both her Bachelor of Science (BSc) and Master of Pest Management (MPM) degrees from Simon Fraser University. Her MPM research examined the succession of insect species attacking buried carrion in two regions of British Columbia. This research introduced Sherah to the field of forensic entomology that makes up a strong part of her current program. On completion of her MPM degree, Sherah moved to the University of Arkansas where her doctoral research examined the foraging and reproductive behaviour of the southern pine beetle, *Dendroctonus frontalis*. A postdoctoral position brought Sherah back to BC where she studied interactions between the plant community and omnivorous predator, *Dicyphus hesperus* as a project in the Biocontrol Network with Dr. David Gillespie. Biological control of greenhouse pests remains an important part of her current research program. In 2003, Sherah went to the University of Windsor as an Assistant Professor and to establish a Forensic Science program of which she is chair. This research has resulted in 41 refereed publications, 6 book chapters and 22 Forensic Entomology Case Reports. She has given a total of 188 oral presentations at meetings or media interviews.

As a teacher and a mentor, Sherah has attracted many students to work in her laboratory. She currently supervises six MSc students, four PhD students, one postdoctoral fellow and seven undergraduates. These students are supported by abundant research grant monies that have totaled over \$3 million since 2005. These funds support a wide range of research projects including: (1) fall insect succession on carrion in SW Ontario; (2) plant resistance to soybean aphid; (3) ecosystem response to perturbation at multiple spatial scales; and (4) an integrated system for conversion of wastes using black soldier fly larvae. Sherah teaches several courses targeting undergraduate and graduate students as well as the professional community. She regularly teaches courses for the Ontario Police College on collection and recovery of human remains.

Sherah has been active in service to several professional societies. She has served on the Board of Directors for the Entomological Societies of British Columbia and Ontario and as a member of the Entomological Society of Canada's Student Affairs Committee. She has also been involved in the organization of meetings for the Canadian Society of Forensic Sciences and for the Biological Control Network.

Sherah has received numerous awards in recognition of her research excellence. Most recently she was nominated for the Outstanding Faculty Research Award-Emerging Scholars/Researchers at the University of Windsor. Other awards from the University of Arkansas (2) and Simon Fraser University (3) have recognized her research excellence as a graduate student researcher. Sherah was also recognized as a leader in her field and for contributions to society in general by inclusion in Canada's Top 40 under 40 (Caldwell Partners, Globe & Mail, Air Canada) in 2006.

Dr. Sherah VanLaerhoven is clearly a young leader in entomology in Canada and is a richly deserving recipient of the C. Gordon Hewitt Award from the Entomological Society of Canada.

La récipiendaire 2009 du prix C. Gordon Hewitt est Dr Sherah VanLaerhoven. Sherah est une chercheuse accomplie qui gère deux programmes majeurs en entomologie : science médico-légale et lutte biologique aux insectes ravageurs des serres. Sherah partage son enthousiasme pour l'entomologie grâce à la supervision et à l'enseignement à des étudiants du niveau secondaire, du baccalauréat et des niveaux gradués. Elle est particulièrement active dans les activités de vulgarisation à l'externe grâce à sa collaboration à des cas d'entomologie médico-légale. Sherah possède une longue liste de contributions à la communauté académique et aux sociétés d'entomologie.

Sherah a reçu ses diplômes de Baccalauréat en sciences (BSc) et de maîtrise en gestion des ravageurs (MPM) de l'Université Simon Fraser. Ses travaux de maîtrise se sont penchés sur la succession des espèces d'insectes attaquant des cadavres en décomposition enterrés dans deux régions de la Colombie-Britannique. Ce projet a initié Sherah à l'entomologie médico-légale, domaine qui constitue maintenant la majeure partie de son programme actuel. Suite à sa maîtrise, Sherah s'est déplacée vers l'Université de l'Arkansas, où ses études doctorales se sont penchées sur les comportements reproductifs et de recherche alimentaire du dendroctone méridional du pin, *Dendroctonus frontalis*. Grâce à une offre de post-doctorat, Sherah est revenue en Colombie-Britannique pour étudier les interactions entre les communautés végétales et le prédateur omnivore *Dicyphus hesperus*, dans le cadre d'un projet du Réseau Biocontrôle avec Dr David Gillespie. La lutte biologique contre les ravageurs des serres demeure une part importante de son programme de recherche actuel. En 2003, Sherah s'est rendue à l'Université de Windsor en tant que professeure adjointe et pour développer un programme de sciences médico-légales, pour lequel elle est la présidente. Ce projet a résulté en 41 publications, 6 chapitres de livres et 22 rapports de cas d'entomologie médico-légale. Elle a donné un total de 188 présentations orales durant des congrès ou entrevues avec les médias.

En tant que professeure et mentor, Sherah a attiré plusieurs étudiants à travailler dans son laboratoire. Elle supervise présentement six étudiants à la maîtrise, quatre au doctorat, un stagiaire post-doctoral et sept étudiants au baccalauréat. Ces étudiants sont supportés par des bourses de recherche abondantes, qui représentent une somme de 3 millions \$ depuis 2005. Ces fonds supportent un large éventail de projets de recherche incluant : 1) la succession à l'automne des insectes dans les cadavres en décomposition dans le sud-ouest de l'Ontario; 2) la résistance des plantes au puceron du soya; 3) les réponses d'un écosystème à des perturbations à des échelles spatiales multiples; et 4) le système intégré pour la transformation des déchets à l'aide de larves de la mouche soldat noire (*Hermetia illucens*). Sherah enseigne plusieurs cours destinés aux étudiants du baccalauréat et aux étudiants gradués ainsi qu'aux professionnels. Elle enseigne régulièrement des cours au Collège de police de l'Ontario sur la collecte et la récupération des restes humains.

Sherah a été active au sein de plusieurs sociétés professionnelles. Elle a siégé sur le conseil d'administration des Sociétés d'entomologie de la Colombie-Britannique et de l'Ontario et elle a été membre du comité des affaires étudiantes de la Société d'entomologie du Canada. Elle a également été impliquée dans l'organisation de congrès pour la Société canadienne des sciences médico-légales et pour le Réseau Biocontrôle.

Sherah a reçu plusieurs prix de reconnaissance pour son excellence en recherche. Récemment, elle a été nommée pour le prix d'excellence en recherche pour un nouveau chercheur de l'Université de Windsor. D'autres prix de l'Université de l'Arkansas (2) ainsi que de l'Université Simon Fraser (3) ont reconnu son excellence en recherche en tant qu'étudiante graduée impliquée en recherche. Sherah a également été reconnue comme une meneuse dans son domaine et pour ses contributions à la société en général en étant citée dans le palmarès canadien des 40 sous 40 (Caldwell Partners, Globe & Mail, Air Canada) en 2006.

Dr Sherah VanLaerhoven est clairement une jeune meneuse dans le domaine de l'entomologie au Canada et mérite grandement le titre de récipiendaire du prix C. Gordon Hewitt de la Société d'entomologie du Canada.

Previous recipients / Récipiendaires antérieurs

1975	R.P. Bodnaryk	1992	D.L. Johnson
1976	B.S. Heming	1993	S.M. Smith
1977	J.H. Borden	1994	D.T.W. Quiring
1978	S.B. Mciver	1995	D. Langor
1979	J.N. Mcneil	1996	T.J. Lysyk
1980	H.V. Danks	1997	J. Brodeur
1981	G.H. Gerber	1998	No Award
1982	S.S. Tobe	1999	T. Wheeler
1983	No Award	2000	K.D. Floate
1984	No Award	2001	R.S. Bouchier
1985	M.L. Winston	2002	No Award
1986	No Award	2003	H. Proctor
1987	No Award	2004	No Award
1988	G. Boivin	2005	D. Hegedus
1989	S.A. Marshall	2006	C. Buddle
1990	B. Roitberg	2007	M. Evenden
1991	M. Isman	2008	No Award

Norman Criddle Award

The 2009 recipient of the Norman Criddle Award is Dr Robert E. Wrigley. Bob Wrigley receives the award in recognition of his contribution to the Entomological Society of Manitoba and entomologists in the province, as well as to the furthering of entomological knowledge and understanding by the general public.

Bob was trained and has worked as a mammalogist throughout his career. He obtained his B.Sc. and M.Sc. from McGill University in Montreal, and his Ph.D. from the University of Illinois in Urbana-Champaign. During his undergraduate and graduate years, he worked on both large and small mammals. On finishing his training, he became the Curator of Mammals and Birds at the Manitoba Museum of Man and Nature in Winnipeg. Currently he is the Curator at the Winnipeg Zoo, where most of his charges are vertebrates.

Throughout his time in Manitoba, he has also shown a very active interest in insects, and has supported the entomological community in many ways. Most summers, with other enthusiastic amateurs, he embarks on ambitious insect-collecting trips across Canada and the United States, about which he writes fascinating and lively articles, submitting them regularly to the ESM Newsletter. The specimens from these and other trips he makes, he carefully prepares, labels and identifies; ultimately he donates many of them to the J.B. Wallis Museum in the Department of Entomology at the University of Manitoba. To date he has donated specimens valued at over \$50,000, an important contribution to the collection. He has on several occasions hosted "Beetle Night", an event at which he brings together amateur and professional Manitoba coleopterists, some coming from as far away as The Pas for the event. He has done numerous radio and TV spots focusing on insects as well as the other organisms he is so interested in and knowledgeable about. He also contributes often to educating children on the wonders of insects. For example, many of the most beautiful and exotic specimens in the display "Incredible Insects" at the Manitoba Children's Museum were his. Insects have only formed a very small part of Bob's professional responsibilities, but they are clearly a big part of his interests, and with his energy, enthusiasm and abilities, he has made a major contribution to Entomology in Manitoba.



Dr Robert Wrigley

Prix Norman Criddle

Le récipiendaire du prix Norman Criddle de 2009 est Dr Robert E. Wrigley. Bob Wrigley a reçu ce prix en reconnaissance de sa contribution à la Société d'entomologie du Manitoba et aux entomologistes dans la province, ainsi qu'à l'avancement des connaissances et de la compréhension par le grand public.

Bob a été formé et a travaillé en tant que mammalogiste tout au long de sa carrière. Il a obtenu son B.Sc. et son M.Sc. de l'Université McGill à Montréal, et son Ph.D. de l'Université de l'Illinois à Urbana-Champaign. Durant ses études de premier cycle et de cycles supérieurs, il a travaillé sur les grands et les petits mammifères. À la fin de ses études, il est devenu curateur des mammifères et oiseaux au Musée manitobain de l'homme et de la nature à Winnipeg. Il est présentement curateur au Zoo de Winnipeg, où il s'occupe principalement des vertébrés.

Tout au long du temps passé au Manitoba, il a montré un intérêt très actif envers les insectes et a supporté la communauté entomologique de multiples façons. Lors de la plupart des étés, il est parti dans des voyages ambitieux de collectes d'insectes au Canada et aux Etats-Unis en compagnie d'amateurs enthousiastes. Il a d'ailleurs écrit des articles fascinants et vivants suite à ces voyages, les soumettant régulièrement à la *ESM Newsletter*. Les spécimens provenant de ces voyages ont été préparés, étiquetés et

identifiés, et il a fait don de la majorité de ces insectes au J.B. Wallis Museum du département d'entomologie de l'Université du Manitoba. Jusqu'à maintenant, il a fait don de spécimens pour une valeur de plus de 50 000\$, une importante contribution à la collection. Il a hébergé à de multiples occasions la *Beetle Night*, un événement durant lequel il réunissait des coléoptéristes amateurs et professionnels du Manitoba, certains venant d'aussi loin que Le Pas pour l'événement. Il a fait de nombreux passages à la radio et à la télé où il s'est principalement concentré sur les insectes autant que sur d'autres organismes auxquels il s'intéresse et qu'il connaît. Il a également contribué fréquemment à l'éducation des enfants aux merveilles des insectes. Par exemple, la majorité des spécimens magnifiques et exotiques dans la section *Incredible Insects* au Musée des enfants du Manitoba étaient les siens. Les insectes ne forment qu'une petite partie des responsabilités professionnelles de Bob, mais ils forment clairement une grande partie de ses intérêts et il a contribué de façon majeure à l'entomologie au Manitoba avec énergie, enthousiasme et habileté.

Previous recipients / Récipiendaires antérieurs

1977	Terry Galloway	1993	?
1978	?	1994	William B. Preston
1979	?	1995	Jim Troubridge
1980	?	1996	Paul Brunelle
1981	Buck Goodwin	1997	Ruby Larson
1982	?	1998	?
1983	Ron Hooper	1999	Bernie Gollop
1984	?	2000	Stéphane Le Tirant
1985	?	2001	Ross Layberry
1986	Paul Klassen	2002	Robyn Underwood
1987	?	2003	Rex Kenner
1988	?	2004	Henry Hensel
1989	No award	2005	Gary Anweiler
1990	John and Bertha Carr	2006	André Beaudoin
1991	?	2007	Anna L. Leighton
1992	John Kozial	2008	Jay Cossey

Information for participants in scientific sessions

- Please disable all audible pagers and cell phones, and refrain from taking or making telephone calls during sessions
- Photographing or recording of presentations is not permitted
- The Fort Garry Hotel is a non-smoking building. Under a City of Winnipeg by-law smoking is not permitted in any enclosed public space

Chairpersons

The program has been designed to maximize opportunities for participants to move from one session to another by synchronizing the end of presentation slots. Therefore, it is essential to keep your session on time. Please start the session on time, avoid protracted introductions and remarks from the chair, and rigorously enforce the time limit on all speakers. To facilitate rapid transitions between talks, there will be a projectionist whose job it is to make the switch from one PowerPoint file to another, troubleshoot any computer and projector problems, and operate the lights. Please be in the room 5 minutes before the start of the session you are chairing, and (before the session begins) explain to the presenters the procedures you will use to keep time.

Oral Presenters

Regular oral presentations and student competition: talks are 12 minutes long with three additional minutes for questions and transition among speakers. Presenters must adhere to these guidelines as there will be concurrent sessions at the meeting. Symposium talks: scheduling and length of talks will be arranged through consultation with the scientific program chair and symposium organizers.

Please arrive in the room in which you are presenting no less than 5 minutes before the session begins and identify yourself to the projectionist and session chairperson.

The only projection software that will be used for the meeting is Microsoft PowerPoint (2003 version) operating in a Windows-based PC environment. Speakers are asked to submit their talks in the upload room located in Salon C ***on the day prior*** to their scheduled talk. We will accept PowerPoint presentations for use on Windows-based laptops and you may upload your presentation from a CD-ROM or a USB memory stick. We will not be accepting emailed presentations, and presenters will not be allowed to use their own computer. We will not be accepting any Mac presentations.

It is the speaker's responsibility to ensure the talk format will work with Microsoft PowerPoint (2003 version) for PCs. ***Please note that preparing a presentation in PowerPoint 2007 and saving it from the 2007 version as a PowerPoint 2003 file, often produces unpredictable results when the file is run in PowerPoint 2003.*** Thus, if you do prepare your presentation in PowerPoint 2007, you should preview it, and if necessary edit it, in the PowerPoint 2003 environment before making your presentation. It is desirable that this be performed before you come to the meeting. Checks can be performed in the upload room, but long delays may occur if you find it necessary to edit your presentation at that stage.

Audio-visual room: Salon C open for uploading of electronic presentations at the following times:

Sunday	9:00 AM – 1:15 PM	5:30 – 7:00 PM
Monday	7:30 AM – 12:00 noon	1:30 – 5:30 PM
Tuesday	7:30 AM – 12:00 noon	1:30 – 4:30 PM

Poster presenters

Posters (maximum size 1.2 x 1.2 m [4 x 4 feet]) may be attached to poster boards by pins or Velcro in the Provencher room. Pins will be provided in the room. Posters will be arranged in the room alphabetically by first author, corresponding to the order in the program booklet.

Poster Set-up:	Monday 9:00 AM – 1:30 PM
Poster Session:	Monday 4:30 – 6:00 PM
Poster Take-down:	Tuesday 4:30 – 7:00 PM

Poster presenters should be available by their posters throughout the poster session on Monday afternoon, as this is the primary opportunity for poster viewing and discussion. Please note that any posters remaining up after 19:00 on Tuesday may be destroyed. We do not have the room booked the following day so they cannot remain up overnight.

General information about the meeting

Location

Meeting rooms are located on four floors of the hotel (please refer to floor plans):

Crystal Ballroom: the site for the Opening Ceremonies, Plenary Session and Banquet is on the 7th floor.

Concert Hall: the site of the Sunday evening mixer, is on the 7th floor

The Club Room: located on the lower level (wheelchair accessible, ask at the front desk)

Gateway, Taché and La Vérendrye Rooms: located on Mezzanine level

Salon C: Presentation upload room is located on the first floor, one level up from the Mezzanine level

Provencher Room: located on the Main Floor, this is the site for registration, posters, displays and refreshment breaks on Monday and Tuesday

Registration

Sunday the registration desk will be located just outside the Crystal Ballroom

Monday the registration desk will be located in the Provencher Room

Tuesday the registration desk will be located in the Provencher Room

Wednesday registration desk will be outside the Club Room

Refreshments

Refreshment breaks will be as follows:

Sunday 02:30 – 03:00 PM outside Crystal Ballroom

Monday 10:00 – 10:30 AM and 04:30 – 06:00 PM Provencher Room

Tuesday 10:00 – 10:30 AM and 04:00 – 04:30 PM Provencher Room

Wednesday 10:00 – 10:30 AM foyer area outside meeting rooms on Mezzanine

Information aux participants des sessions scientifiques

- Veuillez éteindre les sonneries de vos téléphones cellulaires et téléavertisseurs et abstenez-vous de faire des appels ou de répondre à des appels durant les sessions.
- La photographie et l'enregistrement des présentations sont interdits.
- L'hôtel Fort Garry est un établissement non-fumeur. La ville de Winnipeg interdit quiconque de fumer dans les aires publiques intérieures.

Présidents d'assemblées

Ce programme a été planifié pour que la fin des présentations soit synchronisée et ainsi maximiser la chance des participants de se déplacer d'une session à l'autre. De ce fait, il est important de garder votre session dans les temps. Veuillez débiter votre session à l'heure, éviter les introductions et remarques qui se prolongent et faites respecter la limite de temps allouée aux conférenciers. Pour permettre une transition rapide entre les présentations, il y aura un projectionniste qui aura comme tâche de changer les fichiers PowerPoint d'un à l'autre, de régler les problèmes de projecteurs et d'ordinateurs et de faire fonctionner les lumières. Veuillez vous présenter à votre salle au moins 5 minutes avant le début de la session que vous présidez. Au début de la session, expliquez aux conférenciers la méthode qui sera utilisée pour minuter les présentations et signaler le temps passé.

Conférenciers

Présentations orales régulières et compétition étudiante: les présentations sont d'une durée limitée de 12 minutes avec trois minutes supplémentaires allouées aux questions et à la transition d'une présentation à l'autre. Les conférenciers doivent suivre ces directives puisque d'autres sessions auront lieu au même moment. Présentations de symposiums: l'horaire et la durée des présentations seront décidés suite à une consultation avec le président du Comité du programme scientifique et des organisateurs des symposiums.

Veuillez arriver dans la salle où vous présentez au moins 5 minutes avant le début de la session pour vous identifier au projectionniste et au président de la session.

Le seul programme informatique qui sera utilisé pour les projections sera Microsoft PowerPoint (version 2003) fonctionnant avec Windows dans un environnement PC. Les conférenciers sont priés de télécharger leurs présentations au Salon C ***une journée avant*** de présenter. Nous accepterons les présentations créées avec PowerPoint et fonctionnant sur des ordinateurs portatifs utilisant Windows. Vous pouvez télécharger votre présentation à partir d'un CD-ROM ou d'une clé USB. Nous n'accepterons pas les présentations envoyées par courriel et les conférenciers ne seront pas autorisés à utiliser leur propre ordinateur. Aucune présentation Mac ne sera acceptée.

C'est la responsabilité du conférencier de s'assurer que le format de sa présentation est compatible avec Microsoft PowerPoint (version 2003) dans un environnement PC. ***Veillez noter que préparer une présentation avec PowerPoint 2007 et la sauvegarder en tant que fichier PowerPoint 2003 à partir de la version 2007 produit souvent des résultats imprévisibles lorsque le fichier est ouvert avec une version 2003 de PowerPoint.*** Ainsi, si vous préparez votre présentation avec PowerPoint 2007 vous devriez la visionner au préalable avec une version 2003 et la corriger au besoin. Ceci devrait être fait avant de vous rendre au congrès. Les vérifications de dernière minute peuvent être faites dans la salle de téléchargement, mais prévoyez des délais considérables si vous devez corriger votre présentation à ce stade.

Salle audio-visuel: le Salon C sera ouvert pour le téléchargement des présentations selon cet horaire:

Dimanche	9:00 AM – 1:15 PM	5:30 – 7:00 PM
Lundi	7:30 AM – 12:00 noon	1:30 – 5:30 PM
Mardi	7:30 AM – 12:00 noon	1:30 – 4:30 PM

Présentation des affiches

Les affiches (grandeur maximale 1,2 x 1,2 m [4 x 4 pieds]) peuvent être apposées aux panneaux avec les punaises fournies dans la salle des affiches, soit la salle Provencher. Les affiches seront installées par ordre alphabétique du premier auteur, correspondant à l'ordre retrouvé dans le programme.

Période pour apposer les affiches:	Lundi 9:00 AM – 1:30 PM
Période de présentation des affiches:	Lundi 4:30 – 6:00 PM
Période pour enlever les affiches:	Mardi 4:30 – 7:00 PM

Les personnes présentant les affiches devraient se tenir près de leur affiche durant la période de présentation qui aura lieu lundi en après-midi, comme ceci est l'unique chance de voir les affiches et d'en discuter. Veuillez noter que toutes affiches non enlevées après 19:00 mardi seront peut-être détruites ou perdues. La salle n'a pas été réservée pour le mercredi, ainsi rien ne peut-être laissé durant la nuit.

Information générale sur la réunion

Emplacement

Les salles de conférences sont situées sur quatre étages de l'hôtel (veuillez vous référer aux plans):

Salle de bal Crystal: située au 7^e étage, y ont lieu la cérémonie d'ouverture, l'assemblée plénière et le banquet.

Salle de concert: située au 7^e étage, y a lieu la rencontre du dimanche soir

Salle Club: située au niveau inférieur (cette salle est accessible aux personnes en fauteuil roulant, veuillez vous référer à l'accueil)

Salles Gateway, Taché et La Vérendrye: situées au niveau Mezzanine

Salon C: la salle de téléchargement des présentations est située au premier étage, un niveau au-dessus du niveau Mezzanine

Salle Provencher: située au rez-de-chaussée, veuillez vous y rendre lundi et mardi pour les inscriptions, les affiches scientifiques et les pauses rafraîchissements

Inscription

Dimanche les inscriptions se feront à l'extérieur de la salle de bal Crystal

Lundi les inscriptions se feront dans la salle Provencher

Mardi les inscriptions se feront dans la salle Provencher

Mercredi les inscriptions se feront à l'extérieur de la salle Club

Rafraîchissements

Les pauses rafraîchissements sont réparties comme suit:

Dimanche 2:30 – 3:00 PM à l'extérieur de la salle de bal Crystal

Lundi 10:00 – 10:30 AM et 4:30 – 6:00 PM dans la salle Provencher

Mardi 10:00 – 10:30 AM et 4:00 – 4:30 PM dans la salle Provencher

Mercredi 10:00 – 10:30 AM au foyer à l'extérieur des salles de conférences au niveau Mezzanine

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Abstracts

Abdelghany, A.Y.^{a, b}; Awadalla, S.S.^b; Abdel-Baky, N.F.^b; EL-Syafi, H.A.^b; Fields, P.G.^a

^a Agriculture and Agri-Food Canada, Cereal Research Centre, Winnipeg, MB; ^b Economic Entomology Department, Faculty of Agriculture, Mansoura University, Egypt

POSTER SESSION

PRESIDENT'S PRIZE

The impact of insecticides on penetration into jute and polyethylene bags by two stored-product insects

Diatomaceous earth (DE), pea protein, methoprene, pyrethrin and DEET were applied at label rates on jute and polyethylene bags. We measured the survival of eggs and young larvae of *Stegobium paniceum* and *Lasioderma serricorne* (Coleoptera: Anobiidae). There was no difference between the species or between jute and polyethylene. DE caused the lowest mortality. The other insecticides caused 50% mortality. A second test measured the ability of adults to penetrate the bags. After 24 h, approximately 90% of insects had penetrated through the untreated bag material, whereas fewer insects penetrated through the treated bag material, DEET (12%), pyrethrin (23%), methoprene (35%), pea protein (48%) and DE (53%).

Abdelghany, A.Y.^{a, b}; Awadalla, S.S.^b; Abdel-Baky, N.F.^b; EL-Syafi, H.A.^b; Fields, P.G.^a

^a Agriculture and Agri-Food Canada, Cereal Research Centre, Winnipeg, MB; ^b Economic Entomology Department, Faculty of Agriculture, Mansoura University, Egypt

MON 19 OCT 09:15 AM

PRESIDENT'S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

Efficacy of diatomaceous earth, pea flour, pyrethrin and methoprene for the control of stored-product beetles

Diatomaceous earth (DE), pea protein, methoprene and pyrethrin were compared for their toxicity and reduction of offspring production for the stored-product insects: *Stegobium paniceum* and *Lasioderma serricorne* (Coleoptera: Anobiidae). Over 90% mortality occurred at 1000 ppm DE and at 500 ppm pyrethrin. Pea flour at 1000 ppm caused 80% mortality. Methoprene at 30 ppm caused 50% mortality. Over 80% reduction in offspring production occurred at 1000 ppm DE, 1000 ppm pea flour, 30 ppm methoprene and 50 ppm pyrethrin. Food types: anise, coriander, marjoram, chamomile and wheat did not affect toxicity.

Abram, P.K.^a; Walker, V.K.^b

^a Carleton University, Ottawa, ON; ^b Queen's University, Kingston, ON

MON 19 OCT 11:45 AM

PRESIDENT'S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

Testing the reproductive toxicity of engineered nanoparticles: a *Drosophila* model

Engineered nanoparticles (NPs) have unique physicochemical properties due to their small size, making them useful in a wide range of applications. Due to their increasing prevalence in consumer products, their potential accumulation in ecosystems has raised concerns about toxicity. Few studies have examined the reproductive toxicity of engineered NPs and no published studies have used an insect model. We found that ingestion of engineered NPs by *Drosophila melanogaster* can have negative impacts on longevity, female fecundity and male mating success, setting the stage for further research using *Drosophila* as a nanotoxicological model.

Aikens, K.R.; Buddle, C.M.

Department of Natural Resource Sciences, Macdonald Campus, McGill University, Ste Anne de Bellevue, QC

WED 21 OCT 09:00 AM

CONTRIBUTED PAPERS: BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

Hide and seek in forest canopies: can arthropods find enemy free space?

This study tested the effects of predation pressure on arthropods as a function of vertical stratification in a hardwood forest in SW Quebec. Insectivorous birds were excluded by placing cages over sugar maple foliage in four strata and we measured the resulting arthropod densities; avian predation pressure increased in the upper crown. Using bait trial experiments, we documented that predation pressure by arthropods (notably ants) decreased as a function of distance from the ground. Taken together, we suggest that arthropods find little enemy-free space in our study forest.

Ajlan, A.^a; Alhudaib, K.^a; Faleiro, J.R.^b

^a Department of Arid Land Agriculture, College of Agricultural and Food Sciences, King Faisal University, Al Hasa, Saudi Arabia; ^b Date Palm Center, King Faisal University, Al Hasa, Saudi Arabia

MON 19 OCT 03:45 PM

CONTRIBUTED PAPERS: APPLIED ENTOMOLOGY

Managing the problem of red palm weevil, *Rhynchophorus ferrugineus*

Date palm, *Phoenix dactylifera* L., is cultivated in the Middle East. In the mid eighties of the last century, the crop became threatened by red palm weevil (RPW), *Rhynchophorus ferrugineus* (Olivier), which has been identified by the FAO of the United Nations as a "category-1" insect pest of date palm. The seasonal patterns of activity of RPW were investigated using pheromone traps; peak captures occurred from April to May and from October to November.

Al Dhafer, H.M.

Department of Plant Protection, King Saud University, Riyadh, Saudi Arabia

POSTER SESSION

Tabanidae (Diptera) of Saudi Arabia

Samples were collected from southern, central and eastern regions of Saudi Arabia using Malaise traps and sweep nets. Nine species of Tabanidae were identified, two for the first time from Saudi Arabia, *Hybomitra peculiaris* (Szilády) and *Atylotus pulchellus* (Loew). Therefore, the total number of Tabanidae in Saudi Arabia is 31 species. Commentary on the species recorded in this study is given. A key to the genera of Tabanidae occurring in the Arabian Peninsula is also provided. Available literature for Saudi Arabian Tabanidae is summarized. It is concluded that the tabanid fauna of Saudi Arabia is more similar to that of the Palaearctic Region than that of the Afrotropical Region.

Allen, J. ^a; McDonald, M.R. ^b; Vander Kooi, K. ^b

^a Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph, ON; ^b Department of Plant Agriculture, University of Guelph, Guelph, ON

MON 19 OCT 02:30 PM

CONTRIBUTED PAPERS: APPLIED ENTOMOLOGY

Optimizing spray coverage of onions for control of onion thrips, *Thrips tabaci*

Field trials (2007-2009) were conducted to improve spray coverage and determine if improved coverage could enhance the efficacy of insecticides for the control of onion thrips, *Thrips tabaci* Lindeman. Various water volumes (400, 500 and 600 L ha⁻¹), spray angles (0 or 22 degrees) and surfactants were evaluated and coverage assessed with water-sensitive paper or a fluorescent dye. Spray coverage data from all years will be summarized. Using these spray coverage combinations, registered and reduced risk products were evaluated. The most effective products included Carzol (registered) and Delegate (new product). Results indicate that measures to optimize spray coverage/efficacy may be product specific.

Alsaqabi, S.M.

King Faisal University, Dammam College of Science - Zoology Department, Saudi Arabia

POSTER SESSION

Description of mite (*Uropoda* sp., Muller, 1776) nesting with red palm weevil beetles (*Rhynchophorus ferrugineus*) (Coleoptera : Curculionidae) by scanning electron microscopy

This study presents one of the interesting cases of the red palm weevil, *Rhynchophorus ferrugineus* Oliv. Immature stages of mites (deutonymphs) from the family Uropodidae were observed, and the mites identified using Scanning Electron Microscopy (SEM), the first time this has been done in Saudi Arabia. The uropodid mites were collected from under the wings of red palm weevil specimens, which were collected from infested palm farms in Eastern province of Saudi Arabia. The purpose of using scanning electron microscopy is to clarify some morphological structures, which cannot be effectively observed using light microscopy.

Andersen, G. ^a; Ablard, K.M. ^a; Gries, R. ^a; Khaskin, G. ^a; Schaefer, P.W. ^b; Gries, G. ^a

^a Department of Biological Sciences, Simon Fraser University, Burnaby, BC; ^b United States Department of Agriculture, Agricultural Research Service, Beneficial Insects Introduction Research, Newark, DE, USA.

MON 19 OCT 09:15 AM

PRESIDENT'S PRIZE ORAL: BIOLOGICAL CONTROL

Males of the egg parasitoid, *Ooencyrtus kuvanae* (Hymenoptera: Encyrtidae), use marker pheromone to gather a harem of choosy females

Emerging en masse from host egg masses of gypsy moth, *Lymantria dispar*, male *Ooencyrtus kuvanae* compete for choosy females. By marking females in a pre-copulatory ritual, males secure as many females as possible for subsequent mating and become more successful in courting females that are not yet marked. The mating system of *O. kuvanae* is extraordinary in that males i) attain, and defend in absentia, a harem prior to mating, ii) deploy an individual pheromone to mark females and iii) rely on the marked females' discrimination against unfamiliar and sexually inexperienced males.

Andreassen, L.D. ^a; Kuhlmann, U. ^b; Mason, P.G. ^c; Holliday, N.J. ^a

^a Department of Entomology, University of Manitoba, Winnipeg, MB; ^b CABI Europe - Switzerland Centre, Delemont, Switzerland; ^c Agriculture and Agri-Food Canada, Eastern Cereal and Oilseed Research Centre, Ottawa, ON

MON 19 OCT 09:45 AM

PRESIDENT'S PRIZE ORAL: BIOLOGICAL CONTROL

Ecological consequences of host size selection for the staphylinid (Coleoptera) parasitoid, *Aleochara bipustulata*

Previous host range testing with *Aleochara bipustulata* (L.), a candidate for introduction to manage *Delia radicum* (L.) (Diptera: Anthomyiidae), revealed that several smaller Diptera species are suitable hosts, from which relatively small adult parasitoids emerge. Using three size classes of *D. radicum*, and a smaller species from the family Piophilidae, we investigated reproductive fitness of adults from small hosts to determine how likely the smaller species are to be attacked if the introduction proceeds. Assessment of quality involved comparison of developmental time and success, longevity and lifetime fecundity, egg size and ability of the parasitoid larvae to find hosts.

Antwi-Amoabeng, D.; Hunter, F.F.

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

MON 19 OCT 08:00AM

PRESIDENT'S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

Complementary effects of sugar feeding on *Anopheles stephensi* resistance to *Plasmodium berghei*

Anopheline mosquitoes will typically sugar-feed before seeking blood. Previous studies have shown that honeydew-fed *Anopheles stephensi* Liston show fewer *Plasmodium* oocysts in their midguts compared to those fed nectar. There is an up-regulation in the expression of *A. stephensi* nitric oxide synthase (AsNOS) resulting in increased production of toxic nitric oxide (NO) from L-arginine in the midguts of infected mosquitoes. L-arginine occurs more in honeydew than nectar. It is therefore hypothesized that honeydew will better complement the immune response of mosquitoes to *Plasmodium* infection. In this study we use a murine malaria model to test this hypothesis.

Bahar, M.H.; Stanley, J.N.; Gregg, P.C.; Del-Socorro, A.

Cotton Catchment Communities CRC, University of New England, Armidale, NSW, Australia

WED 21 OCT 11:30 AM

CONTRIBUTED PAPERS: BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

Do green lacewings (*Mallada signata*) add mortality of *Helicoverpa armigera* on transgenic *Bt* cotton?

Experiments were done to study the compatibility of a general predator, a green lacewing, to control *Helicoverpa armigera* eggs and larvae with transgenic *Bt* cotton. *Bt* cotton did not affect green lacewing performance. Green lacewings consumed statistically identical numbers of *Helicoverpa* eggs and larvae on both *Bt* and conventional cotton plants. On *Bt* cotton plants 83% of the *H. armigera* larvae died within 72 hours. Mortality increased to 98% when lacewing larvae were present. This 'mopping-up' of surviving *Helicoverpa* on *Bt* cotton by lacewing larvae has the potential to reduce immediate pest damage but perhaps more importantly remove potentially *Bt*-resistant genotypes.

Bahreini, R.; Currie, R.W.

Department of Entomology, University of Manitoba, Winnipeg, MB

MON 19 OCT 09:00 AM

PRESIDENT'S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

The influence of pollen feeding on tolerance of honey bees against varroa mites

Pollen is the only source of protein in the diet of honey bees and affects the physiological status and health of worker bees. Therefore, pollen feeding might enhance grooming behaviour in honey bees if "healthier" bees are more capable of defending against pests. Our results showed that daily mite mortality rate was greater for pollen-fed bees than for unfed newly emerged bees, but only in bee stock selected for grooming behaviour. When pollen was fed, daily bee mortality rate was similar in susceptible bees and those from stock selected for grooming behaviour.

Baldwin, K.A.

Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre, Sault Ste. Marie, ON

TUE 20 OCT 02:30 PM

SYMPOSIUM: DIVERSITY IN FOREST ECOSYSTEMS

Describing forest diversity in Canada: an introduction to the Canadian National Vegetation Classification (CNVC)

The Canadian National Vegetation Classification is being developed as a nationally standardized classification of Canadian vegetation at various levels of generalization. The CNVC is a hierarchical vegetation-ecological taxonomy. The upper levels of the hierarchy reflect growth-form and physiognomic differences that are driven by broad climatic factors; the middle levels reflect biogeographic and broad ecological variation at the continental and regional scales, and the alliance and association levels reflect floristic and dominance diversity in relation to local site-level ecology. Development of forest associations is nearing completion and design of mid-level units is commencing.

Barnewall, E.C. ^{a,b}; De Clerck-Floate, R.A. ^b

^a University of Lethbridge, Lethbridge, AB; ^b Agriculture and Agri-Food Canada, Lethbridge Research Centre, Lethbridge, AB

MON 19 OCT 08:30 AM

PRESIDENT'S PRIZE ORAL: BIOLOGICAL CONTROL

Pre-release impact assessment of a new biological control agent for *Linaria vulgaris*

Linaria vulgaris is a non-native, invasive plant of agricultural and natural areas in Canada. Multiple introductions of this plant to Canada are suspected, hence, any insects used for biocontrol of *L. vulgaris* will be encountering multiple host genotypes upon release. A pre-release impact assessment of a European weevil, *Rhinusa pilosa*, was conducted in quarantine using Canada-wide *L. vulgaris* populations to help determine the potential efficacy of this candidate biocontrol agent. Impacts of the stem-galling weevil were examined by comparing weevil (i.e., number of adults) and plant (i.e., above and below ground biomass) production among toadflax populations.

Bates, L.M.; Hall, B.D.

Department of Biology, University of Regina, Regina, SK

MON 19 OCT 10:45 AM

PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

Investigating the bioaccumulation of methylmercury in Saskatchewan wetland food webs

Deposition of atmospheric mercury to aquatic habitats is an environmental concern, because here, it can be converted to methylmercury (MeHg), a neurotoxin that bioaccumulates. Aquatic invertebrates are food resources for waterfowl and may be indicative of contamination levels. Invertebrates, collected from ponds from three land use types: agricultural, grassland and organic agricultural, were analyzed for total mercury and MeHg. MeHg concentrations increased with trophic level and were highest in invertebrates from organic agricultural ponds and lowest in those from traditional agricultural ponds. Relationships between the level of contamination and the effects of land use on MeHg bioaccumulation will be discussed.

Beaulieu, F.

Agriculture and Agri-Food Canada, Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, ON

TUE 20 OCT 09:30 AM

CONTRIBUTED PAPERS: SYSTEMATICS, CONSERVATION, BIODIVERSITY

Of Latin, dinosaurs and mites — some hair-tearing and enchanted tales around a taxonomist's job

While reviewing concepts of a genus of predatory mites (*Gaeolaelaps*), I stumbled on the issue of gender agreement between generic and specific names—is *Gaeolaelaps* feminine or masculine? To (try to) answer this question and make specific names agree with the genus' gender, I had to learn basic Latin, investigate stories about name conflicts between a mite and a dinosaur (guess who won that battle?) and also about a mythological dog that was invincible... I'll summarize these issues in my talk and conclude with advice on the use of generic names in the mite family Laelapidae, which includes important biocontrol agents.

Ben-Chanoch, E.; Yarden, G.; Paldi, N.

Beeologics, LLC., Miami, FL, USA

WED 21 OCT 11:15 AM

SYMPOSIUM: APICULTURE: BEE—VIRUS INTERACTIONS

RNAi at work in real life applications: targeting invertebrate pests and beneficial organisms' diseases

Beeologics (www.beeologics.com) has established a simple and relatively inexpensive procedure to produce kilogram quantities of dsRNA homologous to target pest or pathogen sequences. "Remebee" is dsRNA produced *in vitro* and is homologous to honey bee viral sequences. The exogenously supplied Remebee mimics the natural dsRNA intermediate involved in viral replication, within the honey bee. In field trials, the gene silencing mechanism induced by Remebee that was fed to the bees was shown to be highly effective in preventing honey bee mortality from Israel Acute Paralysis Virus (IAPV).

Blake, A.J.^a; Dosdall, L.M.^b; Keddie, B.A.^a

^a Department of Biological Sciences, University of Alberta, Edmonton, AB; ^b Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB

MON 19 OCT 11:30 AM

PRESIDENT'S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

The influence of canola nutrition on the oviposition choice and larval development parameters of the cabbage seedpod weevil

The cabbage seedpod weevil, *Ceutorhynchus obstrictus* (Marsham) (Coleoptera: Curculionidae), is a serious introduced pest of canola, *Brassica napus* L. In an effort to understand the relationship between host plant nutrition and *C. obstrictus* preferences and its larval developmental biology, we exposed gravid females to host plants grown under differing regimes of nitrogen and sulfur. Results from both pod choice arena and no-choice larval development experiments indicate that plants grown with a higher supply of sulfur were preferred as hosts and provided a better environment for larval development but only in plants that were grown in a low nitrogen regime.

Borkent, C.J.; Wheeler, T.A.

Department of Natural Resource Sciences, Macdonald Campus, McGill University, Ste Anne-de-Bellevue, QC

MON 19 OCT 08:15 AM

PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

Monophyly of the Sciophilini (Diptera: Mycetophilidae) and generic relationships within the tribe

The tribe Sciophilini is a cosmopolitan group of fungus gnats currently containing over 540 species in 38 genera. I tested the monophyly of this tribe using morphological characters from multiple exemplars of all genera assigned to the tribe and type-genus exemplars from all other tribes. Multiple characters provide new limits for the monophyly of this tribe and several large clades are present within the tribe, notably the *Neuratelia*-group and *Azana*-group. Several genera do not fit within these new tribal limits (*Impleta*, *Sytemna*), or are paraphyletic within the tribe (some *Azana*-group genera). The classification will be changed to reflect monophyletic relationships.

Bostanian, N.J.^a; Hardman, J.M.^b; Thistlewood, H.A.^c

^a Agriculture and Agri-Food Canada, St. Jean-sur-Richelieu, QC; ^b Agriculture and Agri-Food Canada, Kentville, NS; ^c Agriculture and Agri-Food Canada, Summerland, BC

POSTER SESSION

The effects of five ‘reduced risk insecticides’ on *Neoseiulus fallacis* and *Galendromus occidentalis* (Acari: Phytoseiidae)

This study examines the toxicity of ‘reduced risk insecticides’ on *Neoseiulus fallacis* (Garman) and *Galendromus occidentalis* Nesbitt. Imidacloprid was toxic to adults of both species and affected fecundity. Acetamiprid was very toxic to adults of *G. occidentalis* but of moderate toxicity to *N. fallacis* adults. Its effect on fecundity was more severe and persistent in *G. occidentalis* than on *N. fallacis*. Thiacloprid was harmless to adults of both species. It affected adversely only the fecundity of *N. fallacis*. Spinosad was mildly toxic to adults of *N. fallacis* and harmless to *G. occidentalis*. With the exception of imidacloprid all the insecticides have to be field evaluated.

Bourchier, R.S.^a; Van Hezewijk, B.^a; Shaw, R.^b; Tanner, R.^b

^a Agriculture and Agri-Food Canada, Lethbridge, AB; ^b CABI Europe - UK, Egham, Surrey, UK

WED 21 OCT 09:30 AM

CONTRIBUTED PAPERS: BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

Chasing after the world’s largest female: potential establishment range of the psyllid, *Aphalara itadori*, for biological control of invasive knotweeds in Canada and the United Kingdom

Aphalara itadori has been identified as a promising biocontrol agent for Japanese knotweed initially in the UK and now in Canada. After extensive host-range testing, a strain of *Aphalara itadori* collected from Kyushu, Japan, has been petitioned for release in Britain. To assess the potential range of *A. itadori*, developmental rates and threshold temperatures were determined and used to build a phenology model. The model was overlaid on Canadian and UK climate simulations to predict the establishment range of *A. itadori*. We conclude that temperature conditions will not limit the establishment of *A. itadori* in either the UK or Canada.

Bowden, J.J.; Buddle, C.M.

Department of Natural Resource Sciences, Macdonald Campus, McGill University, Ste Anne de Bellevue, QC

MON 19 OCT 10:30 AM

PRESIDENT’S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

Life history characteristics of three wolf spider species from the Yukon Territory, Canada

The reproductive traits of individuals are important as they help form the basis for adaptation to novel and changing environments. Reproductive traits can vary between species, between populations of a species and between individuals of a population. We collected wolf spiders by hand collecting and live pit-fall trapping during the months of June and July 2008 along a latitudinal transect in the Yukon Territory, Canada. Our objective was to investigate life history traits of three coexisting wolf spider species at a regional scale. This study will seek predictors of spider fitness and assess tradeoffs between reproductive investment and body size.

Burgher-MacLellan, K.^a; Williams, G.^b; **MacKenzie, K.**^a; Shutler, D.^c

^a Agriculture and Agri-Food Canada, Kentville, NS; ^b Dalhousie University, Halifax, NS; ^c Acadia University, Wolfville, NS

POSTER SESSION

Assessment with qualitative and quantitative real-time PCR of *Nosema apis* and *Nosema ceranae* co-infections in western honey bees (*Apis mellifera*)

The microsporidians *Nosema ceranae* and *N. apis* are detected using PCR analyses, but little is known about co-infection dynamics in honey bees (*Apis mellifera* L.). We sought to detect and quantify co-infection intensities in composite colony and individual bee samples with real-time PCR. We used species-specific primers (218MITOC-FOR, 218MITOC-REV, 321APIS-FOR and 321APIS-REV) to examine co-infection intensities in bee samples. *Nosema apis*, *N. ceranae* and co-infection (5.6%, 33.3% and 61.1%, respectively) were detected with real-time PCR and results showed co-infection intensity variation for both *Nosema* spp., indicating the usefulness of these techniques for monitoring infection.

Bush, S.E.^{a,b}; Clayton, D.H.^b

^a University of Kansas, ^b Department of Biology, University of Utah, Salt Lake City, UT, USA

TUE 20 OCT 11:15 AM

SYMPOSIUM: ARTHROPOD HOST-SYMBIONT RELATIONSHIPS

The ecological basis of coevolutionary history: lessons from lice

Adaptive evolution may play a role in host-parasite cospeciation, but this has seldom been tested. We explored the adaptive basis of cospeciation using doves (Columbiformes) and two types of feather-lice (Phthiraptera: Ischnocera), which have cospeciated with their hosts to different degrees. By experimentally simulating host-switches, we found that lice cannot establish on novel hosts that differ in size from their native host. To determine why size matters, we measured three components of louse fitness: attachment, feeding and escape from host defense. Our results suggest that host defense reinforces cospeciation by preventing lice from switching between hosts of different sizes.

Campbell, J.F.

United States Department of Agriculture, Agricultural Research Service, Grain Marketing and Production Research Service, Manhattan, KS, USA

TUE 20 OCT 10:30 AM

SYMPOSIUM: PROTECTING STRUCTURES AND URBAN FORESTS

Pheromone trapping red flour beetle in structures: limitations, implementation and interpretation

Pheromone lures and traps are available for monitoring red flour beetle (*Tribolium castaneum*) in structures where food is processed and stored, but these traps have a number of limitations that need to be considered when implementing and interpreting monitoring programs. Even with these limitations, they are a powerful tool that is typically underutilized in commercial food facilities. In this presentation, I will cover some factors that influence response of beetles to traps and then illustrate how results of a trapping program can be applied to understand pest populations using data from flour mills.

Campbell, K.A.; Giberson, D.J.

Department of Biology, University of Prince Edward Island, Charlottetown, PE

POSTER SESSION

Aquatic Hemiptera of Deroche Pond Natural Protected Area, Prince Edward Island

Deroche Pond Natural Protected Area (NPA) is a 375 ha reserve located on the north shore of Prince Edward Island that is characterized by a variety of wetland habitats. We surveyed aquatic Hemiptera in 2008 in the NPA, and found 20 species in 6 families. This included half the known PEI species, plus 5 species not previously recorded on PEI, a new family record and a new genus record for the maritime provinces. Despite its small size, PEI has been poorly collected for many groups and we expect to see more new provincial or regional records as collecting continues.

Cárcamo, H.A.^a; Dossall, L.M.^b; Olfert, O.^c

^a Agriculture and Agri-Food Canada, Lethbridge, AB; ^b Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB; ^c Agriculture and Agri-Food Canada, Saskatoon Research Centre, SK

MON 19 OCT 02:30 PM

CANADIAN FORUM FOR BIOLOGICAL CONTROL SYMPOSIUM

How to integrate biological control effectively in field crop IPM programs

Some of the key pests of cereal crops in the prairies include wheat stem sawfly, orange wheat blossom midge and more recently, the cereal leaf beetle. Lack of insecticide control options for the wheat stem sawfly, make it an ideal candidate for integration of biocontrol with host plant resistance and cultural practices. For the wheat midge, adhering to economic thresholds and avoiding late insecticide spraying can conserve parasitoid populations. Biological control of the cereal leaf beetle in North America is considered one of the few successful case studies where a field crop pest has been managed primarily by biocontrol.

Carleton, D.^a; Royer, L.^b; Hébert, C.^c; Delisle, D.^c; Bauce, E.^d; Quiring, D.T.^a

^a Department of Biology, University of New Brunswick, Fredericton, NB; ^b Natural Resources Canada, Canadian Forest Service, Corner Brook, NL; ^c Natural Resources Canada, Canadian Forest Service, Sainte-Foy, QC; ^d Faculté de foresterie et géodésie, Université Laval, Sainte-Foy, QC

POSTER SESSION

PRESIDENT'S PRIZE

The *Telenomus* species complex attacking hemlock looper (Lepidoptera: Geometridae) in eastern Quebec and western Newfoundland

Sentinel traps were used to elucidate the seasonal biology of parasitoids of hemlock looper eggs in eastern Canada. *Telenomus flavotibiae*, *Telenomus* sp. nov. and *Trichogramma* spp. were found only in fall sentinel traps. *Telenomus droozi* only parasitized eggs in spring sentinel traps but *T. coloradensis* parasitized eggs in both fall and spring traps. *Telenomus coloradensis* parasitized mostly during spring, and was responsible for the majority of egg parasitism. Only *T. coloradensis* displayed a strong and positive response to host egg density. The results suggest that *T. coloradensis* is the only parasitoid studied that might be able to regulate hemlock looper populations.

Catton, H.A.^a; Lalonde, R.G.^a; De Clerck-Floate, R.A.^b

^a Unit of Biology and Physical Geography, University of British Columbia Okanagan, Kelowna, BC; ^b Agriculture and Agri-Food Canada, Lethbridge Research Centre, Lethbridge, AB

MON 19 OCT 08:00 AM

PRESIDENT'S PRIZE ORAL: BIOLOGICAL CONTROL

Modeling population-level effects of nontarget attack on a native plant by the root weevil, *Mogulones crucifer*, a biocontrol insect for houndstongue (*Cynoglossum officinale*)

The root weevil, *Mogulones crucifer*, released in Canada in 1997, has been a remarkably effective agent for controlling houndstongue (*Cynoglossum officinale*, Boraginaceae) on western Canadian rangelands. However, sporadic nontarget feeding and oviposition on native confamilial plants by the weevil have raised questions about the ecological risks associated with this agent, particularly in the USA. The interaction between *M. crucifer*, houndstongue and the native perennial, *Hackelia micrantha*, provides an excellent study system to model impacts of nontarget attack at the individual plant and population levels. Preliminary findings from ongoing field experiments on weevil host choice and dispersal will be presented.

Cloutier, C.^a; Nguyen, T.T.A.^a; Michaud, D.^b

^a Département de Biologie, ^b Département de Phytologie, Université Laval, Québec, QC

TUE 20 OCT 03:00 PM

SYMPOSIUM: ENTOMOLOGICAL ISSUES IN POTATO PRODUCTION

Studying aphid interactions with plants and potential stress factors using proteomics technology

Two-dimensional electrophoresis and mass spectrometry (MS), in tandem with bioinformatics reveal the entire protein complement (proteome) expressed in cells, tissues, whole organisms and at their interface in inter-organismic interactions. Proteomics must be practised with technical skill, devotion for rigorous experimentation and cautious interpretation of abundant protein identifications from MS data, obtained from widely available internet software. The application of proteomics to study insect development, reproduction, reaction to stress and interactions with plants, pathogens or parasites is presented, including our work on aphids. Protein diversity expressed in insect interactions with hosts, parasites, pathogens, or symbionts is also indicative of divergent ecology and evolution. Our work illustrates that the aphid proteome is morph-specific and responds variously to ecological stress.

Colgan, L.J.; Erbilgin, N.

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

MON 19 OCT 08:30 AM

PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

Investigating induced defence in jack pine (*Pinus banksiana*) seedlings and the indirect interaction between jack pine budworm (*Choristoneura pinus pinus*) and a mountain pine beetle-associated fungal pathogen

The range of the mountain pine beetle (MPB) is expanding eastward into jack pine forests where it will interact with the jack pine budworm (JPB). Jack pine seedlings were either defoliated by JPB and subsequently inoculated with the MPB fungal associate *Grosmannia clavigera*, or inoculated with *G. clavigera* and subsequently defoliated by JPB, to investigate the induction of tree defences by the initial treatment and the resulting tree susceptibility or resistance to the successive treatment. The outcome of this research is important for predicting future susceptibility of jack pine stands to MPB attacks prior to MPB establishment in jack pine forests.

Copps, P.T.

Orkin, Inc., Costa Mesa, CA, USA

TUE 20 OCT 08:30 AM

SYMPOSIUM: PROTECTING STRUCTURES AND URBAN FORESTS

IPM in structural pest management: an evolving concept

The use of IPM in agriculture is well accepted. Within the structural pest management industry, there remains disagreement regarding the definition of IPM. However, basic tenets are recognized — the use of inspection, monitoring processes and best practices. Thresholds are dependent on the nature of the facility and the needs of the client. There is a consensus within the industry that an IPM program designed to include all stakeholders can effectively reduce pest activity and limit pesticide applications. The most advanced programs involve a partnership between the contractor, property management and the client. The roles and responsibilities of all involved must be clearly defined.

Cox-Foster, D.

Department of Entomology, Pennsylvania State University, University Park, PA, USA

WED 21 OCT 10:30 AM

SYMPOSIUM: APICULTURE: BEE - VIRUS INTERACTIONS

Unravelling the pathogens in honey bees undergoing colony collapse disorder

In 2006, honey bee colonies in the United States began to die with unique symptoms and at unprecedented numbers. I will discuss the search for the pathogens and conditions that trigger the dramatic losses of colonies and compare this to “normal losses” of colonies. The experiments described will go from molecular analysis to attempts to duplicate CCD in colonies. I will also present our latest research on how viral pathogens can be transmitted and affect multiple pollinator species, raising concern for not only honey bee health but also the health of other important pollinators.

Craig, P.^a; Cutler, G.C.^a; Nams, V.^a; MacKenzie, K.^b

^a Department of Environmental Sciences, Nova Scotia Agricultural College, Truro, NS; ^b Agriculture and Agri-Food Canada, Kentville, NS

MON 19 OCT 11:15 AM

PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

Influence of landscape and field characteristics on native bees in wild blueberry habitats

This research aims to identify native bee species present in Nova Scotia wild blueberry (*Vaccinium angustifolium* Ait.) fields and to determine some ecological factors associated with their diversity and abundance. Native bees were collected by pan trapping along transects to assess temporal and spatial changes in wild bee populations from field edges into field interiors. Bee population data will be analyzed in relation to non-crop vegetation quantified in fields, plant communities along field edges and macro-scale landscape structure. Additionally, stigma-pollen deposition rates are being used to correlate pollination success with wild bee diversity and/or abundance.

Cutler, G.C.

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

MON 19 OCT 02:00 PM

CONTRIBUTED PAPERS: APPLIED ENTOMOLOGY

Stimulatory effects of insecticides on insects

Toxicologists have traditionally assumed there is a dose-response threshold above which chemical exposures induce biological effects and below which none occurs. However, there is now strong support for hormesis, a response characterized by low-dose stimulation and high-dose inhibition. I examine hormesis in insects exposed to sublethal doses of insecticide, particularly in terms of pest resurgences. While the reduction of natural enemies following insecticide treatment is the most commonly cited explanation of such resurgence, hormetic responses may be an additional or alternative mechanism.

Danci, A.^a; Takács, S.^a; Drake, M.^a; Schaefer, P.W.^b; Gries, G.^a

^a Department of Biological Sciences, Simon Fraser University, Burnaby, BC; ^b United States Department of Agriculture, Agriculture Research Service, Beneficial Insects Introduction Research Laboratory, Newark, DE, USA

MON 19 OCT 09:30 AM

PRESIDENT'S PRIZE ORAL: BIOLOGICAL CONTROL

Perfect timing: how males of the parasitoid wasp, *Pimpla disparis* (Hymenoptera: Ichneumonidae), predict the emergence of prospective mates from gypsy moth, *Lymantria dispar*, host pupae

Males of the parasitoid wasp, *Pimpla disparis*, arrive at parasitized gypsy moth, *Lymantria dispar*, host pupae prior to the emergence of a potential mate. We tested the hypothesis that males track the development of a prospective mate inside a host pupa, allowing them to pinpoint the time of mate emergence. Sound and Laser Doppler Vibrometer recordings of bioacoustic and vibratory signals produced by developing parasitoids in response to physical contact of host pupae by males, or in response to a paintbrush, revealed such significant changes of these signals that they appear suitable to inform males about their mates' emergence time.

De Clerck-Floate, R.A.; Floate, K.D.; Saunders, P.

Agriculture and Agri-Food Canada, Lethbridge, AB

POSTER SESSION

A test of containment efficacy using living insects in a release and recapture study

North American regulatory standards for the containment of arthropods in quarantine stipulate that such facilities be specially designed to prevent arthropod escapes. They are to be equipped with a vestibule light lock containing a UV or regular light trap and inner rooms with negative air pressure. To test the efficacy of various containment methods, a release and recapture study was conducted within an operational quarantine using three insect species: *Aphodius distinctus*, *Musca domestica* and *Urolepis rufipes*. The optimum method for escape prevention depended on species, so a combination UV/incandescent light trap, a pan/water trap and negative air pressure are all recommended.

de Miranda, J.R.

Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden

WED 21 OCT 08:45 AM

SYMPOSIUM: APICULTURE: BEE - VIRUS INTERACTIONS

Current state of honey bee virus research in Europe

This presentation provides an overview of the current status of honey bee virus research in Europe, and a discussion of this with reference to the historical research both in Europe and worldwide. The presentation is organized thematically, covering: virus discovery and characterisation, incidence and surveys, transmission and pathology. The major European institutes involved with different aspects of honey bee virus research are identified, as well as pan-European organizations involved in co-ordinating the research and survey efforts and in disseminating the information to the different stake-holders within the academic, professional, commercial and political sectors.

Desai, S.^a; Eu, Y-J^b; Currie, R.W.^a

^a Department of Entomology, ^b Department of Plant Science, University of Manitoba, Winnipeg, MB

WED 21 OCT 08:15 AM

SYMPOSIUM: APICULTURE: BEE - VIRUS INTERACTIONS

Inhibition of deformed wing virus (DWV) replication in honey bees by RNA interference

RNA Interference (RNAi) has evolved as a simple, rapid and specific method for silencing gene function. RNAi reduces transcripts by causing degradation of the target mRNA. This mechanism has recently been described in a number of species including humans, plants, animals and insects (*Drosophila*) to control viruses. In the current study, we use dsRNA to control Deformed Wing Virus (DWV) in honey bees. An RNA-dependent RNA polymerase (RdRp) region of the DWV gene was selected to construct dsRNA to target DWV replication in honey bees. If proven effective, this mechanism can be used to block DWV replication within an insect host and thus block disease transmission.

deWaard, J.R.^{a, b}; Humble, L.M.^{a, c}

^a Department of Forest Sciences, University of British Columbia, Vancouver, BC; ^b Entomology, Royal British Columbia Museum, Victoria, BC; ^c Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, BC

WED 21 OCT 09:00 AM

BIOLOGICAL SURVEY OF CANADA SYMPOSIUM

Barcode-assisted assessments of lepidopteran diversity in British Columbia

The biodiversity inventory is inherently a formidable task, particularly in hyper-diverse terrestrial arthropod groups. DNA barcoding holds significant promise to assist in the onerous chore, namely by allowing the rough sorting and tentative identifications of collected material by non-specialists. We discuss our ongoing work in British Columbia employing DNA barcoding to facilitate assessments of lepidopteran diversity across several disturbance gradients. We underscore the improvements that this approach provides relative to traditional techniques, such as allowing the appraisal of multiple levels of diversity and the increased sensitivity of detection of taxa at low density.

Dickens, J.C.

USDA, ARS, Henry A. Wallace Beltsville Agricultural Research Center, Plant Sciences Institute, Invasive Insect Biocontrol and Behavior Laboratory, Beltsville, MD, USA

TUE 20 OCT 01:30 PM

SYMPOSIUM: ENTOMOLOGICAL ISSUES IN POTATO PRODUCTION

Chemical signals in the Colorado potato beetle

The nature of chemical signals used by the Colorado potato beetle, *Leptinotarsa decemlineata* (Say) (Coleoptera: Chrysomelidae), had been disputed. While CPB were known to orient to volatiles emanating from potato plants, the chemicals involved had not been identified and the existence of a volatile pheromone was a subject of controversy. I will discuss the discovery of chemical signals for CPB and characterize physiological mechanisms involved in their detection. Results from recent field tests will be presented which portend the usefulness of chemical signals in the management of endemic populations of CPB and for survey or detection of its spread.

Dixon, D.

Former Provincial Apiarist, Manitoba Agriculture, Food and Rural Initiatives, MB

TUE 20 OCT 04:30 PM

HERITAGE LECTURE

The history of beekeeping research in Western Canada

The European honey bee (*Apis mellifera*), not being native to the western hemisphere, has experienced a dramatic history of introduction and widespread commercial management for both honey production and pollination of agricultural crops. Canadian bee research scientists are recognized internationally as having played an integral role in the development of our understanding of this insect as well as the introduction of efficient commercial beekeeping practices.

The first recorded work with honey bees at a Canadian federal experimental farm occurred at the Brandon, Manitoba, Research Station in 1889. During the next 16 years, honey bees were introduced to an additional 15 federal experimental farms across Canada. The first agricultural college in western Canada, later the University of Manitoba, was established in 1877, and an experimental apiary was set up on campus by 1907. With time, the main centres for apiculture research in Canada became the Ottawa Research Farm, the University of Guelph, the University of Manitoba, the Beaverlodge Research Station and more recently, Simon Fraser University.

Although the harsh winter conditions common to much of western Canada made wintering bees a challenge, the long, hot summer days and abundance of nectar-producing plants rewarded beekeepers with large honey crops. This no doubt encouraged the close working relationship between commercial beekeepers and western Canadian bee research scientists that exists to this day.

Du, J.; Holliday, N.J.

Department of Entomology, University of Manitoba, Winnipeg, MB

POSTER SESSION

PRESIDENT'S PRIZE

Responses of *Aleochara bilineata* (Coleoptera: Staphylinidae) to dimethyl disulphide

Aleochara bilineata is a staphylinid parasitoid of the cabbage maggot, *Delia radicum*. Adult beetles are attracted to pitfall traps baited with dimethyl disulphide (DMDS), but the role of DMDS in *A. bilineata* biology has not been elucidated. In an arena with still air, adult *A. bilineata* distribution was not influenced by DMDS; however, *A. bilineata* larvae were arrested in the vicinity of the DMDS release point, a phenomenon that was more evident in full light than under red light. Release of DMDS near *D. radicum* puparia increased the probability that puparia would be attacked by host-seeking *A. bilineata* larvae.

Dupont, J.M.; Westwood, A.R.

Department of Biology, University of Winnipeg, Winnipeg, MB

MON 19 OCT 09:30 AM

PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

Conservation and enhancement of Poweshiek skipperling (*Oarisma poweshiek*) in Manitoba

The Poweshiek skipperling (Lepidoptera: Hesperiiidae) is an endemic tall grass prairie species listed as threatened under Canada's Species At Risk Act. The only Canadian population of the skipperling is found in southeastern Manitoba. There are limited data available on the biology and conservation of the Poweshiek skipperling in Canada. Our research is designed to fill some of these information gaps. To improve future management strategies, two key hypotheses regarding adult Poweshiek skipperling movement

and habitat requirements are being examined. We hypothesize that Poweshiek skipperlings show preferential site selection within tall grass prairie and demonstrate minimal movement between sites.

Durocher-Granger, L.^{a, b}; Boivin, G.^{a, b}

^a Department of Natural Resource Sciences, Macdonald Campus, McGill University, Ste Anne de Bellevue, QC; ^b Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, QC

WED 21 OCT 10:45 AM CONTRIBUTED PAPERS: BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

Does host feeding influence sex allocation in an egg parasitoid?

The allocation of sex by parasitoid females is influenced by the quality of the host (Host Quality Model) and the position of the host in a sequence (Precise Sex Allocation). Host feeding by females of *Trichogramma turkestanica* decreases the quality of the host for the developing immatures and also occurs mostly at the beginning of an oviposition sequence. Females allocated more males in hosts where host feeding occurred but nonetheless also allocated males as predicted by the Precise Sex Allocation model. Interestingly, host feeding influenced sex allocation although it occurs after oviposition.

Erlandson, M.A.

Agriculture and Agri-Food Canada, Saskatoon Research Centre, Saskatoon, SK

WED 21 OCT 11:45 AM SYMPOSIUM: APICULTURE: BEE - VIRUS INTERACTIONS

Viruses as biological control agents for insect pest control

Viruses are associated with insects in a wide range of ecological relationships: as pathogens, plant and animal viruses relying on insect vectors for transmission and as specialized symbionts that allow hymenopteran parasitoids to evade the immune system of their hosts (e.g. polydnviruses). At least 14 virus families have representatives pathogenic in invertebrates and some of these viruses have been investigated for potential as biological control agents of insects. Examples of viruses developed as biocontrol agents and implemented in strategies ranging from classical biological control to inundative approaches similar to conventional application of chemical pesticides will be discussed.

Evenden, M.L.^a; Gries, R.^b

^a Department of Biological Sciences, University of Alberta, Edmonton, AB; ^b Department of Biological Sciences, Simon Fraser University, Burnaby, BC

POSTER SESSION

Comparison of commercially-available sex pheromone lures to monitor diamondback moth in canola

Five different commercially-available sex pheromone lures were compared for their attractiveness to male diamondback moth, *Plutella xylostella* L. (Lepidoptera: Plutellidae), in two season-long field-trapping experiments in canola fields throughout Alberta. Attractiveness of the lures varied and was inversely related to the amount of pheromone released as determined by GC-MS analysis of pheromone components released from the lures. The two most effective commercial lures were attractive to male diamondback moths for up to eight weeks under field conditions but were not as attractive as virgin females.

Fairhurst, S.^a; Ablard, K.M.^a; Schaefer, P.W.^b; Gries, G.^a

^a Department of Biological Sciences, Simon Fraser University, Burnaby, BC; ^b United States Department of Agriculture, Agricultural Research Service, Beneficial Insects Introduction Research, Newark, DE, USA.

MON 19 OCT 08:45 AM PRESIDENT'S PRIZE ORAL: BIOLOGICAL CONTROL

Mechanism and function of the post-copulatory ritual in the egg parasitoid wasp, *Ooencyrtus kuvanae* (Hymenoptera: Encyrtidae)

Male and female *Ooencyrtus kuvanae* emerge from host egg masses of gypsy moth, *Lymantria dispar*. When a single male encounters a single female, he engages her in a pre-copulatory ritual immediately followed by copulation and a post-copulatory ritual. We tested the hypotheses that the pre-copulatory ritual puts the female into a "trance-like" receptive state and that the post-copulatory ritual "re-awakens" her. Our data show that females in trance mate multiple times with different males, whereas females with post-copulatory ritual experience do not re-mate. The post-copulatory ritual appears to "mechanically awaken" the female so that she resists mating with other males.

Fattah-Hosseini, S.; Allahyari, H.

Department of Plant Protection, University of Tehran, Karaj, Iran

POSTER SESSION

Host plant resistance to greenbug, *Schizaphis graminum* (Homoptera: Aphididae), on five wheat varieties

Resistant plants are major factors that cause significant decreases in the population growth rate of greenbug, *Schizaphis graminum* Rond. To evaluate the potential resistance of plants against greenbug, the most important parameter of the life table, the intrinsic rate of increase, r_m , was calculated by the Wyatt and White method on five wheat varieties. The highest and the lowest value of r_m were 0.37 and 0.31, respectively. Antixenosis tests were also done. The result of the antixenosis tests were in agreement with the antibiosis test and showed that the resistant cultivar had both antibiotic and antixenotic effects on greenbug.

Fields, P.G.

Agriculture and Agri-Food Canada, Cereal Research Station, Winnipeg, MB

TUE 20 OCT 09:30 AM

SYMPOSIUM: PROTECTING STRUCTURES AND URBAN FORESTS

Alternatives to methyl bromide fumigation in food processing facilities

Methyl bromide (MB) has been used around the world to control insects in flour mills, pasta manufacturing plants and breakfast food plants. It has been so effective at controlling insects in these facilities, that there were few alternatives to MB when, in 1995, it was determined that MB should be phased-out because it was an ozone-depleting substance. Alternatives that are being used to replace methyl bromide include sulfuryl fluoride (ProFume), heat treatments, sanitation, phosphine combined with heat and carbon dioxide. I will discuss the success of these alternative treatments done in Canadian flour mills and pasta plants.

Fitzsimmons, J.M.*; Burke, R.J.*; Kerr, J.T.

(* Equal contributions)

Department of Biology, University of Ottawa, Ottawa, ON

TUE 20 OCT 10:45 AM

CONTRIBUTED PAPERS: SYSTEMATICS, CONSERVATION, BIODIVERSITY

A mobility index of Canadian butterfly species: tapping in to naturalists' experience

Mobility is an important trait in insect ecology, but its estimation through experimental methods is very difficult. We have utilized the accumulated knowledge of butterfly enthusiasts across Canada to estimate species' mobility rates. Lepidopterists volunteered to complete our survey, rating mobility rates of Canada's butterfly and skipper species. Based on responses we have constructed the first mobility index for Canada's butterfly and skipper species. This index will be useful in testing, among other things, the relationship between mobility and body size, and whether mobility rates limit species' northward range expansion with climate change.

Flaherty, L.^{a,b}; Sweeney, J.^a; Morrison, P.A.^a; Quiring, D.T.^b

^a Natural Resources Canada, Canadian Forest Service, Fredericton, NB; ^b Faculty of Forestry and Environmental Management, University of New Brunswick, Fredericton, NB

MON 19 OCT 08:15 AM

PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

Oviposition and performance of the exotic brown spruce longhorn beetle (*Tetropium fuscum*) on host trees of varying condition

In Europe, the brown spruce longhorn beetle, *Tetropium fuscum* (Fabr.) (Coleoptera: Cerambycidae), is considered a secondary pest, primarily infesting weakened or cut Norway spruce, *Picea abies* (L.) Karst. In Canada, this exotic beetle has been reported to attack several species of apparently healthy spruce (*Picea* spp.). Our research evaluates the effect of tree condition on the oviposition, colonization success and subsequent performance of *T. fuscum* in Canada. Preliminary results indicate that *T. fuscum* can colonize apparently healthy trees in Canada, but that the insects' survival is reduced and their development time extended. Oviposition and colonization data are currently being collected.

Floate, K.D.^a; Tiberg, K.^{a,b}

^a Agriculture and Agri-Food Canada, Lethbridge, AB; ^b The University of Lethbridge, Lethbridge, AB

POSTER SESSION

What happened to the coprophilous insects associated with bison?

The eradication of bison (*Bison bison*) in North America may have reduced populations of coprophilous insects that bred in their manure. Alternatively, these insects may now breed in cattle dung. Breeding success can be affected by dung nutrient content, moisture levels and volatile chemicals that affect colonization. Experiments are underway to compare the attraction of dung insects to manure from bison versus cattle, and to compare numbers of insects developing in these different types of dung. Results to follow.

Floate, K.D.^a; Watson, D.W.^b

^a Agriculture and Agri-Food Canada, Lethbridge, AB; ^b Department of Entomology, North Carolina State University, Raleigh, NC, USA

POSTER SESSION

Introduction of exotic dung beetles into Canada to accelerate degradation of cattle dung

Dung-fouled pastures are poorly used by cattle, which avoid feeding on contaminated grasses. The resulting patchy grazing pattern causes economic losses for the industry such that rapid dung degradation is desired. Efforts now are underway in southern Alberta to establish populations of the coprophagous beetles, *Digitonthophagus gazella* and *Onthophagus taurus* (Coleoptera: Scarabaeidae), which are recognized for efficiently burying dung. Establishment of *O. taurus* is considered likely, given reports of populations within 300 km of the Canada/USA border. Establishment of *D. gazella* is unlikely, but is being studied to test predictions of climatic models under field conditions.

Galka, B.^a; Saguez, J.^b; Vincent, C.^b; Olivier, C.^a

^a Agriculture and Agri-Food Canada, Saskatoon, SK; ^b Agriculture and Agri-Food Canada, Saint-Jean-sur-Richelieu, QC

MON 19 OCT 03:00 PM

CONTRIBUTED PAPERS: APPLIED ENTOMOLOGY

Leafhoppers in Quebec vineyards: implications regarding phytoplasma diseases

Leafhoppers were sampled from five vineyards within Quebec in 2007 and 2008. Individuals were identified and sorted according to species and sex. Nested polymerase chain reaction (PCR) on DNA extracted from individuals revealed that few individuals may be

vectors of phytoplasma which may lead to yellows diseases. Implications are discussed as to which vectors were found and their significance as potential disease vectors.

Galloway, T.D.

Department of Entomology, University of Manitoba, Winnipeg, MB

TUE 20 OCT 10:30 AM

SYMPOSIUM: ARTHROPOD HOST-SYMBIONT RELATIONSHIPS

Patterns in life histories of fleas (Siphonaptera)

Most people are familiar with the cat flea, but are unaware of the wide range of life history patterns in fleas. Fleas vary in their host dependency, from those where adults spend little time on the host, to those which remain permanently attached. Female chigoe fleas undergo neosomy beneath the skin of their host. Larvae mostly reside in the nest, but some species live in the pelage of their host or penetrate beneath the skin. Larvae of some species may not even feed. Fleas may be adapted to seasonal changes, environment, host behaviour and presence of other species of fleas.

Galloway, T.D.

Department of Entomology, University of Manitoba, Winnipeg, MB

WED 21 OCT 08:15 AM

BIOLOGICAL SURVEY OF CANADA SYMPOSIUM

Biodiversity of lice on birds and mammals in Manitoba

When Galloway & Danks (1991) reviewed ectoparasites in Canada, there were published records for 36 species of lice in Manitoba. They recommended entomologists collaborate with ornithologists and mammalogists. Since 1994, I have worked with the Manitoba Wildlife Rehabilitation Organization, Manitoba Conservation, Oak Hammock Marsh and Prairie Wildlife Rehabilitation Centre. Animals are salvaged, frozen and washed to collect ectoparasites. Current estimates from >7,000 hosts are 294 species of lice from birds and 32 species from mammals; >500,000 specimens. Salvaging hosts is an effective means to investigate biodiversity and ecology of lice.

Giberson, D.J.

Department of Biology, University of Prince Edward Island, Charlottetown, PE

TUE 20 OCT 11:15 AM

CONTRIBUTED PAPERS: SYSTEMATICS, CONSERVATION, BIODIVERSITY

Northern collaborative entomology: collecting aquatic insects on the Coppermine River, NU

Nunavut communities have a large stake in monitoring water quality and biodiversity in their region, but are hampered by lack of training opportunities and lack of regional expertise. The community of Kugluktuk (formerly Coppermine) is working with university scientists to train local youth in plant identification, and aquatic insect, fish and water quality monitoring, to help build local infrastructure. I report here on my experience in training local youth in insect collection and identification, and on how this can generate biodiversity data for isolated areas of the country that would not otherwise be available or be too expensive to collect.

Gibson, J.F.^{a, b}; Skevington, J.H.^a

^a Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, ON; ^b Department of Biology, Carleton University, Ottawa, ON

MON 19 OCT 08:00 AM

PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

The key to unlocking the Schizophora: placement of the Conopidae within the Eremoneuran Diptera based on mtDNA and nrDNA

The Conopidae is a fascinating family of parasitoid flies. Past phylogenetic hypotheses have placed the conopids as sister to a number of brachyceran groups including the Syrphidae, the Schizophora (s.s.) and the Tephritoidea. The present study tests these hypotheses using a dataset composed of over 12.8 kbp of DNA sequence from ten different genes and 31 dipteran taxa. Mitochondrial, nuclear, ribosomal and protein-coding genes are all included in the analysis. The Conopidae is recovered as monophyletic with the Diopsidae as the closest sister group. A number of support measures allow a comparison of the informative quality of all genes included.

Gillespie, D.R.^a; Nasreen, A.^a; Moffat, C.E.^a; Clarke, P.^a; Roitberg, B.R.^b

^a Agriculture and Agri-Food Canada Research Centre, Agassiz, BC; ^b Department of Biological Sciences, Simon Fraser University, Burnaby, BC

WED 21 OCT 08:15 AM

CONTRIBUTED PAPERS: BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

Community-level effects of extreme temperature perturbation

The effects of the frequency and severity of high-temperature perturbation were tested in an aphid-based community consisting of pepper plants, green peach aphids and two parasitoids: *Aphelinus abdominalis* and *Aphidius matricariae*. Mesocosm communities were exposed to either daily or twice-weekly perturbations in temperature, with mid-day peaks at either 30 or 40 °C. Population growth in the aphid in both the presence and absence of parasitoids was affected primarily by the frequency of high-temperature perturbation, and was generally slower in the high-frequency treatments. The two parasitoid communities were differentially affected by the frequency of high-temperature perturbation.

Gillespie, D.R.^a; Mason, P.G.^b; Broadbent, B.^c; Jenner, W.^d; Andreassen, L.D.^e; Haye, T.^d; Kuhlmann, U.^d

^a Agriculture and Agri-Food Canada Research Centre, Agassiz, BC; ^b Agriculture and Agri-Food Canada Research Centre, Ottawa, ON; ^c Agriculture and Agri-Food Canada Research Centre, London, ON; ^d CABI Europe - Switzerland Centre, Delemont, Switzerland; ^e Department of Entomology, University of Manitoba, Winnipeg, MB

POSTER SESSION

Defining non-target communities in arthropod biological control programs: approaches and solutions

Recent practice for arthropod biological control programs in Canada recommends that non-target test lists be submitted to the CFIA for comment before non-target testing begins. Although this recommendation is laudable, biological control practitioners may find it difficult to select an appropriate list of arthropods for testing, especially when the taxonomy, systematics and ecology of potential non-target species are incompletely known. Some ideas and approaches are presented for resolving this problem, based on current biological control programs for various arthropod pests in Canada.

Gillespie, S.D.; Adler, L.S.

Department of Plant, Soil and Insect Sciences, University of Massachusetts, Amherst, MA, USA

MON 19 OCT 11:00 AM PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

Factors affecting parasitism in native bumble bees

Bumble bees are important pollinators in North America yet it is unclear what is driving some species' decline. Bumble bees are attacked by many parasites which can impact colony fitness. We used a multi-site survey to document the abundance of *Crithidia bombi*, *Nosema bombi* and parasitoid conopid flies and asked whether factors such as bee species or sex were associated with infection by each parasite. Abundance of all parasites was higher than has been documented in wild bees in North America. Risk of parasitism varied systematically for individual bees, and different factors were important for each parasite type.

Girardo, S.^{a, b}; Kenis, M.^a; Quicke, D.L.J.^c

^a CABI Europe - Switzerland, Delemont, Switzerland; ^b Agriculture and Agri-Food Canada, Research Centre, Ottawa, ON; ^c Division of Biology, Imperial College London, Silwood Park Campus, Ascot, Berkshire, U.K.

WED 21 OCT 08:30 AM CONTRIBUTED PAPERS: BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

Mortality factors affecting the invasive horse-chestnut leaf miner, *Cameraria ohridella* (Lepidoptera, Gracillariidae), in Switzerland

Cameraria ohridella is an invasive species discovered in Macedonia in 1984. It has spread over most of Europe causing severe damage to the horse-chestnut. One particularity of *C. ohridella* is its capacity rapidly to reach and maintain outbreak densities. To help understand this phenomenon, life tables were constructed, to assess the mortality factors affecting the leaf miner. Egg mortality reached 30%. Factors acting during the summer on larvae and pupae included predators, parasitoids and intra- and inter-specific competition. The parasitoids were mostly generalist eulophids, with very low prevalence. Ninety per cent of overwintering pupae died making the overwintering mortality the most important.

Grant, C.R.; Westwood, A.R.

Department of Biology, University of Winnipeg, Winnipeg, MB

MON 19 OCT 09:15 AM PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

Assessment of insect diversity in various urban landscapes

Urban development across Canada is converting naturalized areas into suburban enclaves, resulting in specific habitats of arthropod groups being altered or lost. The objective of this study was to determine the level of insect diversity present in three different land-use areas within the City of Winnipeg and to study the relationship between nocturnal insect diversity and the degree of urban forest development. Preliminary results show that Trichoptera abundance was not linked to urban forest structure for 2005 and 2006, whereas plant-dependent Lepidoptera showed a numerical response for 2005 and is predicted to follow the same trend for 2006.

Gregoire, D.

Population Ecology Group, Faculty of Forestry and Environmental Management, University of New Brunswick, Fredericton, NB

MON 19 OCT 09:30 AM PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

Impact of thinning and previous damage by balsam woolly adelgid on the performance of spruce budworm and balsam fir sawfly

Host-plant-mediated interactions create systems in which herbivorous insects may interact indirectly through their association with a single host plant. I examine the effect that gouting of balsam fir by the balsam woolly adelgid (*Adelges piceae*) has on subsequent populations of two defoliators: balsam fir sawfly (*Neodiprion abietis*) and spruce budworm (*Choristoneura fumiferana*). Manipulative experiments were set up in pre-commercially thinned and adjacent unthinned stands to determine the effect of thinning on this interaction. Both gouting and thinning differentially affected survival and size of the sawfly and budworm.

Hamilton, K.G.A.

Canadian National Collection of Insects, Agriculture and Agri-Food Canada, Ottawa, ON

WED 21 OCT 08:30 AM

BIOLOGICAL SURVEY OF CANADA SYMPOSIUM

Border conflicts - how leafhoppers can help resolve ecoregional viewpoints in Canada and the USA

Ecoregions are defined using different parameters and assumptions in Canada and the USA. The only composite (published in 1999) minimizes the differences but needs to be tested against an impartial data set spanning the borders. Leafhoppers, which are speciose in the northern states and southern Canada, have been extensively collected and analysed for distribution patterns. These patterns tend to follow those of their plant hosts, and therefore reflect ecoregional patterns of lower trophic levels. In general, leafhopper distribution patterns agree with the synthesis but differ in some significant details, especially on the prairies where agriculture has extensively disrupted presettlement ecosystems.

Hansen, L.D.

Biology Department, Spokane Falls Community College, Spokane, WA, USA

TUE 20 OCT 09:00 AM

SYMPOSIUM: PROTECTING STRUCTURES AND URBAN FORESTS

Carpenter ants and their management

Management strategies of carpenter ants include identification of the species infesting a structure plus knowledge of the biology and behaviour of the species. Major carpenter ant species will be discussed and other ant species that may be confused with carpenter ants will be presented, particularly those causing structural damage. Tools in management will be presented and will include manipulation of the microenvironments that support the species. Advances in chemical development and new formulations will be discussed including application techniques and seasonal variations.

Haye, T.^a; Mason, P.G.^b; Gillespie, D.R.^c; Kuhlmann, U.^a

^a CABI Europe-Switzerland, Delémont, Switzerland; ^b Agriculture and Agri-Food Canada, Research Centre, Ottawa, ON; ^c Agriculture and Agri-Food Canada, Research Centre, Agassiz, BC

WED 21 OCT 10:30 AM

CONTRIBUTED PAPERS: BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

Host specificity of *Trichomalus perfectus*: conflicts between insect and weed biological control?

The cabbage seedpod weevil, *Ceutorhynchus obstrictus*, is a serious pest of canola in Canada. In Europe the most important natural enemy attacking the pest is the larval ectoparasitoid, *Trichomalus perfectus* (Hymenoptera: Pteromalidae). This European parasitoid shows the greatest potential for incorporation into an integrated pest management system for *C. obstrictus* in Canada. Ceutorhynchine weevils are important agents for biological control of weeds in North America. These could be negatively affected if agents released against *C. obstrictus* have a broad host preference. Here we present the first results of host range assessments for *T. perfectus* in Europe.

Hervieux, M.^a; Buddle, C.M.^a; Quiring, D.T.^b

^a Department of Natural Resource Sciences, Macdonald Campus, McGill University, Ste Anne de Bellevue, QC; ^b Faculty of Forestry and Environmental Management, University of New Brunswick, Fredericton, NB

MON 19 OCT 09:45 AM

PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

Larval survival of the pale-winged gray moth (*Iridopsis ephyraria*) at different crown levels

Many eastern hemlock (*Tsuga canadensis*) trees in southwest Nova Scotia have recently been severely defoliated by the pale-winged gray moth (*Iridopsis ephyraria*). Interestingly, defoliation is very high in the low and mid crown of mature hemlock trees but seldom occurs in the upper crown. As most eggs are laid in the upper crown, this project is an attempt to understand the possible environmental factors that can explain the downward movement of larvae once they hatch. In summer 2009, we tested two hypotheses that attributed the vertical distribution of the species to within crown variations in microclimate and foliage quality.

Holliday, N.J.

Department of Entomology, University of Manitoba, Winnipeg, MB

SUN 18 OCT 02:00 PM

GOLD MEDAL ADDRESS

Views of entomological evolution

From a personal and several institutional viewpoints, some patterns of past change in entomology will be described. Some current challenges facing entomological institutions will be discussed, with the intent of encouraging debate about possible solutions and future directions.

Humble, L.M. ^{a, b}; Laplante, S. ^c; Terzin, T. ^d

^a Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, BC; ^b Department of Forest Sciences, University of British Columbia, Vancouver, BC; ^c Canadian National Collection of Insects, Agriculture and Agri-Food Canada, Ottawa, ON; ^d Biodiversity Institute of Ontario, University of Guelph, Guelph, ON

WED 21 OCT 09:45 PM

BIOLOGICAL SURVEY OF CANADA SYMPOSIUM

Developing DNA barcode libraries for Cerambycidae

DNA barcoding uses short, standardized DNA sequences from the mitochondrial gene cytochrome oxidase 1 (COI) for species identification, and can be applied to any arthropod life stage. Barcoding requires libraries of COI sequences for all species in the target taxa, and few sequences are available for bark and wood borers. To develop a barcode library for Cerambycidae, samples from >1500 individuals representing 350 species in Canadian Forest Service reference collections were processed, yielding barcodes >500 bp long for 218 species, and partial barcodes (224–491 bp) for another eight species. We discuss the technique's limitations and potential application to regulatory and research surveillance programs for introduced species.

Hunt, S.L.

Department of Environmental Biology, University of Guelph, Guelph, ON

SUN 18 OCT 04:30 PM

PLENARY SYMPOSIUM

Future shock: invasive insects, climate change and Canada's forest ecosystems

Insects are important natural disturbance agents in Canada's forests, but non-native species that invade new, enemy-free territory can have devastating effects on forest ecosystems. As the climate changes, the ability of non-native forest insects to establish and spread in Canada will likely be improved. Canada holds 10% of the world's total forest area and more than 30% of the world's boreal forest. Beyond their commercial importance, these forests provide numerous ecosystem services such as wildlife habitat and carbon sequestration, the latter being currently of immense interest due to potential feedbacks between forests and global climate. Canada's forests play a critical role in the global carbon budget, storing vast amounts of carbon in trees and soils. Forest carbon dynamics, and other ecosystem processes, are strongly influenced by disturbances, including insect outbreaks. Attempts to predict the future state of our forest ecosystems must include consideration of how climate change will affect invasive, non-native insects. I will discuss the results of an assessment of the threats to Canada's forests posed by non-native, invasive insects under climate change, and the potential resulting impacts on forest ecosystem structure and function, with a focus on carbon storage. Climate-envelope models suggest that several non-native pest species identified as posing a potential risk to Canada's forests would be able to expand their ranges to various degrees under different climate change scenarios. I will explore the forest ecosystems of the future under climate change and increased insect outbreak pressure, the impacts of which will be complex and potentially severe.

Hynes, K.I. ^{a, b}; Podemski, C.L. ^b

^a Department of Entomology, University of Manitoba, Winnipeg, MB; ^b Fisheries and Oceans Canada, Freshwater Institute, Winnipeg, MB

MON 19 OCT 10:30 AM

PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

Design of a rapid bioassessment protocol for boreal shield lakes

Boreal lakes and streams are an important Canadian resource increasingly impacted by anthropogenic activities including forestry, mining, residential and recreational development. The use of benthic macroinvertebrate rapid bioassessment (RBA) protocols to screen large geographic areas has been a successful approach in stream biomonitoring; however, RBA protocols have not been widely developed or used in lakes. An RBA protocol is being developed to allow cost effective biomonitoring of lakes across the shield areas of Manitoba. The protocol is being tested on a set of lakes in Nopiming and Whiteshell Provincial Parks with and without shoreline cottage development.

Iranpour, M. ^{a, b}; Lindsay, L.R. ^{a, b}; Peixoto, L. ^b; McFarlane, C. ^b

^a Zoonotic Diseases and Special Pathogens, Public Health Agency of Canada, Winnipeg, MB; ^b Department of Entomology, University of Manitoba, Winnipeg, MB

TUE 20 OCT 09:00 AM

CONTRIBUTED PAPERS: SYSTEMATICS, CONSERVATION, BIODIVERSITY

Molecular characterization of some *Aedes* and *Ochlerotatus* species (Diptera: Culicidae) occurring in Manitoba

Identification of mosquitoes to species level using external anatomy is sometimes challenging due to morphological similarities among some species and/or poor quality of specimens. Nucleotide sequence data and Polymerase Chain Reaction-Restriction Fragment Length Polymorphisms (PCR-RFLP) were used to characterize more than 15 species of *Aedes* and *Ochlerotatus* (Diptera: Culicidae) occurring in Manitoba. DNA was extracted from one to five individuals of each species, and this was followed by amplification of Internal Transcribed Spacer (ITS) as target DNA. Molecular data were used for characterization and accurate identification of examined species.

Jacobs, J.; Latraverse, A.; Work, T.T.

Département des Sciences Biologiques, Université du Québec à Montréal, Montréal, QC

MON 19 OCT 08:00 AM

PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

The role of insects in wood decomposition

Fungi are acknowledged as the main agents of wood decomposition in boreal forests. Although insects have been mentioned in this process, the mechanisms by which they facilitate decomposition are poorly understood. We approached this question with laboratory

and field experiments and a large scale survey of insects and decomposition rates across natural and managed stands. Preliminary results suggest that wood-feeding insects are important for preconditioning wood for saprotrophic fungi and that many deadwood-associated insects have the ability to act as dispersal vectors for fungal propagules. However, changes in beetle communities do not have noticeable effects on wood decomposition rates.

Johns, R.C.^a; Ozaki, K.^a; Tobita, H.^a; Shimazu, S.^b

^a Hokkaido Research Center, Forestry and Forest Products Research Institute, Sapporo, Japan; ^b Forestry and Forest Products Research Institute, Tskuba, Japan

MON 19 OCT 01:30 PM

CONTRIBUTED PAPERS: APPLIED ENTOMOLOGY

Ecological processes driving foliage-age dietary mixing within conifers by a generalist herbivore, the Asian gypsy moth

Some herbivorous insects mix a variety of plant resources to obtain a suitable balance or blend of nutrients, to limit the ingestion of toxins, to accommodate changes in nutritional needs associated with juvenile development and/or to limit susceptibility to natural enemies. We investigated the extent to which these mechanisms drive foliage-age dietary mixing by Asian gypsy moth caterpillars within crowns of various conifer species in northern Japan. We will discuss results from field and laboratory studies examining the effects of foliage-age mixing versus alternative foliage-age feeding strategies on caterpillar fitness and susceptibility to nucleopolyhedrovirus.

Keeling, C.I.^a; **Huber, D.P.W.**^b; Henderson, H.^a; Li, M.^a; Clark, E.L.^b; Ott, D.S.^b; Fraser, J.D.^b; Bohlmann, J.^a; Tria Project Team^{a, b, c, d, e}

^a University of British Columbia; ^b University of Northern British Columbia; ^c University of Alberta; ^d Canadian Forest Service, Natural Resources Canada; ^e Canada's Michael Smith Genome Sciences Centre

MON 19 OCT 03:15 PM

CONTRIBUTED PAPERS: APPLIED ENTOMOLOGY

A large expressed sequence tag (EST) resource for the mountain pine beetle, *Dendroctonus ponderosae* (Coleoptera: Curculionidae: Scolytinae)

We have generated a large expressed sequence tag (EST) resource for the mountain pine beetle, *Dendroctonus ponderosae* Hopkins, as part of a large genomics effort (thetriaproject.ca) focused on the insect, its pathogenic fungi and its pine hosts. Transcripts were sequenced from an array of insect developmental stages (larvae, pupae, adults), tissues (midgut and fatbody, heads, antennae) and physiological states (fed, starved, exposed to terpene vapours, treated with juvenile hormone III, cold hardening). Our database consists of nearly 200,000 ESTs representing over 15,000 tentative unique genes. These data are guiding current research into bark beetle functional genomics.

Kevan, P.G.^a; Packer, L.^b; Schoen, D.J.^c; Ritland, K.M.^d; Elle, E.E.^c; Vamosi, J.C.^f; Kerr, J.T.^g; Weersink, A.J.^a

^a University of Guelph; ^b York University; ^c McGill University; ^d University of British Columbia; ^e Simon Fraser University; ^f University of Calgary; ^g University of Ottawa

TUE 20 OCT 01:30 PM

SYMPOSIUM: POLLINATION BIOLOGY

The Canadian Pollination Initiative: interdisciplinary insights and organization

NSERC-CANPOLIN is a newly funded five-year research network that offers a unique integrative approach to the study of pollinator decline. Research activities fall under four themes: Pollinators (Managed and Wild), Plants (Gene Flow, Abiotic Pollination), Ecosystems (Invasives, Competition, Conservation, Floral Biology) and Prediction & Economics. There are seven Working Groups, comprised of over 44 researchers at 26 institutions across Canada. The Network is designed to create synergy between the range of disciplines involved in pollination research and address critical information gaps in conservation, pollination economics and the expected impacts of climate and land use change.

Kowal, V.A.; Cartar, R.V.

Department of Biological Sciences, University of Calgary, Calgary, AB

WED 21 OCT 09:15 AM

BIOLOGICAL SURVEY OF CANADA SYMPOSIUM

Responses of terrestrial arthropod communities to anthropogenic forest disturbances at local and landscape scales

Anthropogenic impacts are ubiquitous in Canadian forests, which have experienced a mixture of disturbance types with potentially varying effects on biodiversity. The "edge effect" that accompanies direct disturbances has great potential to change or increase the initial disturbance effect. With this project, we use terrestrial arthropod assemblages to compare the edges of three anthropogenic disturbances in a mixed-wood coniferous forest: clearcut logging, forest roads and oil and gas pipelines. We employ multi-scale analysis of environmental factors shaping assemblage structure, from the local to the landscape level, to provide insights into the effects of different forest disturbances.

Kulbaba, M.W.; **Worley, A.C.**

Department of Biological Sciences, University of Manitoba, Winnipeg, MB

TUE 20 OCT 02:30 PM

SYMPOSIUM: POLLINATION BIOLOGY

Selection by hawk moths on floral design in *Polemonium brandegei*

The most appropriate floral design for efficient pollination varies among pollinators, yet evolutionary transitions between pollinators are not well understood. The perennial herb, *Polemonium brandegei*, is pollinated by hawk moths and hummingbirds whereas related species are pollinated by bees and flies. To quantify selection by hawk moths, we exposed experimental populations of *P. brandegei* to captive *Hyles gallii*, a natural pollinator. We analyzed seed set and siring success as functions of sex-organ position, corolla shape, nectar volume and nectar sugar content. These data support predictions that hawk moths should favour recessed sex organs, and will be contrasted with comparable data on hummingbird pollination.

Kwasniewska, A.^a; Buddle, C.M.^a; Vincent, C.^b; Gaul, S.^c; MacKenzie, K.^c

^a Department of Natural Resource Sciences, Macdonald Campus, McGill University, Ste Anne de Bellevue, QC; ^b Agriculture and Agri-Food Canada, St Jean-sur-Richelieu, QC; ^c Agriculture and Agri-food Canada, Kentville, NS

MON 19 OCT 08:15AM

PRESIDENT'S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

Effects of host volatiles on the activity and behaviour of the blueberry maggot fly

The effects of volatiles extracted from host plants on the activity and behaviour of the blueberry maggot fly (*Rhagoletis mendax*) was examined under both field and laboratory conditions. In natural environments, a blend of terpenes and alcohols had a rate of fly captures similar to the standard lure of ammonium acetate, and this blend was more effective for late season monitoring of the fly. Laboratory experiments were done using wind tunnels and these results differed from field experiments in that ammonium acetate and a blend of aldehydes and alcohols elicited the strongest responses. This work supports the hypothesis that host volatiles are attractive to the blueberry maggot fly.

Lachance, S.^a; Nampoothiry, P.^b; Scott-Dupree, C.^b

^a Université de Guelph - Campus d'Alfred, Alfred, ON; ^b Department of Environmental Biology, University of Guelph, Guelph, ON

MON 19 OCT 02:15 PM

CONTRIBUTED PAPERS: APPLIED ENTOMOLOGY

Effects of the vapour phase of essential oils on larvae, pupae and adults of the house fly

Essential oils can be used as repellents, ovicides, larvicides, adulticides and feeding inhibitors for various insects. The purpose of the current study was to assess the toxicity of four doses of the vapour phase of essential oils on larval stages, pupal stages and adults of the house fly, *Musca domestica*. Fifteen essential oils were studied in the laboratory and mortality was significantly higher for most stages when treated with eucalyptus, geranium, thyme, pine, balsam fir, rosemary and lemon. Repellent characteristics of essential oils will also be presented.

Lachowsky, L.; Reid, M.

Department of Biological Sciences, University of Calgary, Calgary, AB

MON 19 OCT 08:45 AM

PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

Over-wintering mortality of mountain pine beetles, *Dendroctonus ponderosae*

Natural selection usually favours equal sex ratios, yet some species have consistently biased populations. The commonly observed bias in mountain pine beetles, *Dendroctonus ponderosae*, (ca. 2:1 females:males) has often been explained by differential mortality. Due to sexual size dimorphism, smaller males are expected to have higher mortality. We brought logs from naturally infested trees into the laboratory prior to winter, and following exposure, above and below snow, to winter conditions. I will discuss how quantity, size and sex ratios of emerging beetles differ among the three treatments and also how they relate to tree characteristics that in turn determine beetle productivity.

Lamb, R.J.; MacKay, P.A.

Department of Entomology, University of Manitoba, Winnipeg, MB

WED 21 OCT 08:00 AM

CONTRIBUTED PAPERS: BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

Is the population stability of an aphid a species trait?

Ecologists have long assumed that population stability is a species trait, and sought explanations for why some species appear to be more stable than others. Uncertainty about how to define and measure stability have left the assumption untested. The stability of natural populations of a native aphid, *Uroleucon rudbeckiae*, is examined at three spatial scales, using three indices of stability. One index of stability is sufficiently uniform among spatial scales, among populations and over time to be considered a species trait. The commonly used index of stability proves inadequate for comparing species, but some species can be shown to exhibit different levels of stability.

Larrivée, M.; Kerr, J.T.

Department of Biology, University of Ottawa, Ottawa, ON

TUE 20 OCT 03:00 PM

SYMPOSIUM: DIVERSITY IN FOREST ECOSYSTEMS

Assessing and predicting global change impacts on Canadian butterfly species distributions through the Canada Global Change Transect

Global changes, particularly land use conversion and climate change have caused widespread and ongoing shifts in the distribution of butterflies in Canada. Accurate predictions of global change impacts are critical to future successful species and habitat conservation. Butterflies respond quickly to shifts in environmental conditions and represent excellent subjects to model and test global change impacts. Broad spatial scale models of butterfly species distributions have not predicted local and regional species occurrences accurately. The Canada Global Change Transect aims to predict global change impacts on local and regional butterfly species distributions through a nationwide network of regional butterfly monitoring transects in Canada.

Lemmen, J.K.; Evenden, M.L.

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

MON 19 OCT 11:00 AM

PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

Mechanisms of pheromone response plasticity in male ash leaf cone roller moths, *Caloptilia fraxinella* (Lepidoptera: Gracillariidae)

Caloptilia fraxinella (Lepidoptera: Gracillariidae) is a pest of ornamental ash trees in Alberta. This long-lived moth undergoes a period of reproductive inactivity during which males exhibit reduced behavioural and antennal response to female sex pheromone. This pheromone response plasticity is mediated partly by juvenile hormone, which enhances pheromone response in reproductively inactive males, but not to the level observed in reproductively active males. We are investigating other mechanisms that might mediate pheromone response, including temperature and photoperiod and the biogenic amine octopamine. The effect of these factors on male pheromone response will be discussed.

Leroux, A.M. ^a; Holliday, N.J. ^b

^a Agroecology Program, ^b Department of Entomology, University of Manitoba, Winnipeg, MB

POSTER SESSION

PRESIDENT'S PRIZE

Post-release assessment of *Aphthona* spp. (Coleoptera: Chrysomelidae) for leafy spurge control in southwestern Manitoba

In Spruce Woods Provincial Park, releases of *Aphthona* spp. for biological control of leafy spurge, *Euphorbia esula*, began in 1983. We performed post-release assessments in leafy spurge patches where releases occurred in 2000 or 2006 and assessed the influence of burning of half of the patches in 2000 or 2006. Weekly sweep net samples of *Aphthona* spp. were taken, and leafy spurge density and biomass were recorded at flowering and at the onset of senescence. Species composition, relative population estimates and seasonal patterns of *Aphthona* spp. were assessed in relation to effectiveness of spurge control, landscape features and the introduction and management history of patches.

Levesque-Beaudin, V.; Wheeler, T.A.

Department of Natural Resource Sciences, Macdonald Campus, McGill University, Ste Anne-de-Bellevue, QC

MON 19 OCT 08:45 AM

PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

Nested patterns of beta-diversity in forest Diptera

The purpose of this study was to describe nested patterns of diversity in temperate forest Diptera, and determine the scale contributing the most to diversity. Fieldwork was carried out in June-July 2008 in three southwestern Quebec forest fragments, using three spatial scales (tree, stand, hill). Additive partitioning showed that fly assemblages were not random at any scale. Patterns in Diptera overall, calyprates, acalyprates and abundant species were influenced most by small scales (tree, stand); patterns in rare species were dictated by site scale. Assemblages at all sites and stands were significantly different. Environmental variables weakly supported the species composition.

Liu, S.Q. ^a; McGarvey, B.D. ^a; Scott, I.M. ^a; Pariente, S. ^b

^a Agriculture and Agri-Food Canada, Southern Crop Protection and Food Research Centre, London, ON; ^b Institute for Chemicals and Fuels from Alternative Resources (ICFAR), Faculty of Engineering, The University of Western Ontario, London, ON

POSTER SESSION

The insecticidal activity of bio-oil from the pyrolysis of canola, *Brassica napus*, and mustard, *B. carinata* and *B. juncea*, straw

Agricultural crop residue is the focus of a bio-mass conversion to bio-fuel or chemicals project. Of special interest are bio-oils with pesticidal activity. In Canada, mustard straw residue from over 200,000 ha is available. Straw samples were pyrolysed and the bio-oil was tested using the Colorado potato beetle insecticidal activity bioassay. All three *Brassica* species were bio-active, and *B. juncea* fractions obtained by liquid-liquid separation were toxic to the larvae. After HPLC fractionation, the activity was associated with the most polar fraction. GCMS analyses indicated these are not phenolic compounds and identification of the compounds is proceeding with NMR.

Locke, M.M.^{a, b}; Skevington, J.H.^a; Marshall, S.A.^c

^a Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, ON; ^b Department of Biology, Carleton University, Ottawa, ON; ^c Department of Environmental Biology, University of Guelph, Guelph, ON

POSTER SESSION

PRESIDENT'S PRIZE

Revision of Nearctic *Dasysyrphus* (Diptera, Syrphidae)

The genus *Dasysyrphus* is taxonomically challenging. There are 43 described species, ten of which are currently recognized as Nearctic. However, the Nearctic species concepts of Thompson (unpublished) and Vockeroth are vastly different. Recent work by Doczkal, supported by Ståhls, on the *venustus* group in Europe has illustrated many new characters. Preliminary sequencing of *cox1* for *Dasysyrphus* suggests that there are many currently unrecognized Nearctic species. ITS2 and morphological data will be added to this analysis to produce an integrative taxonomic revision of this genus. Our work will be linked with ongoing work in the Old World to develop global species concepts for *Dasysyrphus*.

Lusebrink, I.^a; Evenden, M.L.^a; Erbilgin, N.^b

^a Department of Biological Sciences, ^b Department of Renewable Resources, University of Alberta, Edmonton, AB

POSTER SESSION

Monoterpene emission from mature pine trees subjected to different environmental conditions and treatments emulating mountain pine beetle attack

The chemical ecology of three interacting organisms: the mountain pine beetle (*Dendroctonus ponderosae*), its host pine trees and its fungal associates is examined. The objective is to determine the chemical response of pine trees subjected to different environmental conditions and treatments emulating beetle attack. We tested the hypothesis that monoterpene release from pine trees will vary with water regime and biological treatments: control, mechanical wounding and inoculation with a spore solution of *Grosmannia clavigera* and beetle mash. Host chemical response to treatments will ultimately be linked to beetle fitness.

Ma, B.O.

Simon Fraser University, Burnaby, BC

MON 19 OCT 02:00 PM

GRADUATE STUDENT SYMPOSIUM

The role of *Anopheles gambiae* mosquitoes feeding decisions on vector-borne disease transmission

Female anautogenous *Anopheles gambiae* s.s. (Diptera: Culicidae) mosquitoes require host blood for egg production; however, these mosquitoes also use sugar, although to what extent is poorly understood. Although blood is necessary for egg production, it is inherently risky and furthermore, a poor resource for fueling flight and somatic maintenance because of its low conversion efficiency to energy reserves. Sugar, on the other hand, can be readily used to fuel somatic maintenance and flight. Thus, there is a trade-off between reproduction and survival when using these two resources. In light of complex tradeoffs between these two disparate resources, we use a combination of theory and experiments to explore the effects of a female mosquito's feeding behaviour on a mosquito's life history and the implications of these feeding decisions on disease transmission. We develop a dynamic state variable model that explores the best activity decisions for a female mosquito over her lifetime. This model explicitly considers the numerous tradeoffs between sugar and blood feeding behaviour. To validate our model, we use a wind tunnel to determine the role of energetic condition on blood host seeking and acceptance in the absence of choice. We then use a two-port olfactometer to test whether a female mosquito with different energetic condition, given a choice, will choose a sugar host over a blood host. We expand our results to consider the implications of sugar and blood on the ability for these mosquitoes to spread disease using a Ross-Macdonald modeling framework.

MacKenzie, K.

Agriculture and Agri-Food Canada, Kentville, NS

TUE 20 OCT 03:00 PM

SYMPOSIUM: POLLINATION BIOLOGY

Pollination of the North American *Vaccinium* crops, blueberry and cranberry

Pollination is a critical component of production in our native North American *Vaccinium* crops, Blueberry and Cranberry. Biotic agents, in particular bees, are required for pollen transfer among flowers. The diverse indigenous bee fauna found on these crops likely contributes significantly to pollination, and conservation of their populations is warranted. However, managed bees are required to ensure crop success. While honey bees form the mainstay of commercial pollination, both bumble bees and alfalfa leafcutting bees are used. Enhancement of pollination by bee pollinators should be encouraged through the incorporation of "bee-friendly" practices into crop management plans.

MacLeod, A.; Wheeler, T.A.

Department of Natural Resource Sciences, Macdonald Campus, McGill University, Ste Anne-de-Bellevue, QC

POSTER SESSION

PRESIDENT'S PRIZE

Systematic revision of Nearctic *Tritoxa* (Diptera: Ulidiidae)

The Nearctic genus *Tritoxa* is one of the most distinctive genera of picture-winged flies, because of their characteristic wing pattern. *Tritoxa* includes five described species and at least one new western Nearctic species. The biology of *Tritoxa* is poorly known, although *T. flexa* is a minor pest of commercial onions. *Tritoxa incurva* feeds on wild garlic, suggesting all species may breed in *Allium*. This study has documented new species of *Tritoxa* and expanded the range of known species. Species have traditionally been

distinguished by colour and wing patterns, but male genitalia, especially the surstylus, provide valuable distinguishing characters for species.

MacQuarrie, C.J.K.; Cooke, B.J.

Natural Resources Canada, Canadian Forest Service, Northern Forestry Centre, Edmonton, AB

WED 21 OCT 08:45 AM CONTRIBUTED PAPERS: BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

Landscape scale population dynamics of mountain pine beetle

The influx of mountain pine beetle (MPB) into Alberta has precipitated the need for models that can predict the behaviour of the beetle in this novel environment. Fortunately, damage caused by MPB to lodgepole pine forests in BC has been mapped almost every year since the 1950s, providing a data set we can use to model population dynamics. We used clustering methods on these data to identify regions with similar outbreak histories and then modelled the population dynamics of the populations within each region. We found 10 regions in BC all with differing outbreak histories, all of which exhibited non-stationary dynamics.

Malcolm, J.R.; Smith, S.M.

Faculty of Forestry, University of Toronto, Toronto, ON

TUE 20 OCT 03:30 PM

SYMPOSIUM: DIVERSITY IN FOREST ECOSYSTEMS

Taking the wood out (dead or alive): implications for forest insect communities

We provide an overview of research focused on implications of forest management for insect conservation, specifically reductions in forest age and dead wood supplies. The value of old forests, especially those with diverse supplies of downed and standing dead wood, is indicated by recent studies with carabid, syrphid, dipteran and hymenopteran saproxylic groups. Different species, decay classes and locations of dead wood exhibit high beta diversity and provide key habitat for specific taxa. Recently proposed modification to clearcut harvesting, namely, multi-cohort forest management, provides evidence that such oldgrowth features can lifeboat important insect groups.

Marriott, S.M.^a; McCorquodale, D.B.^b; Giberson, D.J.^a

^a Department of Biology, University of Prince Edward Island, Charlottetown, PE; ^b Department of Biology, Cape Breton University, Sydney, NS

MON 19 OCT 09:45 AM PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

Lost and found lady beetles: does the arrival of non-native species coincide with the decline of native species?

Over the past century, five non-native Coccinellinae have become common and widespread in Canada, with earliest records in 1912 (*Coccinella u. undecimpunctata* Linnaeus) and the most recent in 1988 (*Harmonia axyridis* [Pallas]). The introduction of non-native lady beetles as biological control agents has met with some success, but there are now concerns about potential non-target effects on native lady beetle populations. We databased specimens of Coccinellinae from eastern Canadian collections (Newfoundland to Ontario) in order to determine if the arrival of non-native species coincides with the decline of native species using collection records.

Mason, P.G.^a; Bennett, A.M.R.^a; Brodeur, J.^b

^a Agriculture and Agri-Food Canada, Research Centre, Ottawa, ON; ^b Institut de recherche en biologie végétale, Université de Montréal, Montréal, QC

TUE 20 OCT 11:30 AM

CONTRIBUTED PAPERS: SYSTEMATICS, CONSERVATION, BIODIVERSITY

Access and benefits sharing: the implications for entomology and biological control

In 2010, the Access and Benefits Sharing (ABS) clause of the Convention on Biodiversity (CBD) will come into force. As a signatory, Canada and Canadians are obliged to develop policy and comply with policies of other countries to ensure that the biodiversity of each country is fairly and equitably shared amongst all of society. Informed ABS policy will be key to ensure that collection and exchange of biological specimens for scientific study can continue. For biological control, the International Organization for Biological Control (IOBC) has developed recommendations to facilitate a workable framework for policy makers and practitioners.

McDonald, M.R.^a; Vander Kooi, K.^a; Taylor, A.G.^b

^a Department of Plant Agriculture, University of Guelph, Guelph, ON; ^b Department of Horticultural Sciences, New York State Agriculture Experimental Station, Cornell University, Geneva, NY, USA

POSTER SESSION

Insecticide seed treatments for the management of carrot insect pests

Carrot rust fly (*Psila rosea*) and carrot weevil (*Listronotus oregonensis*) are major insect pests of carrots grown on muck soils in eastern Canada. Insecticide seed treatments spinosad, thiamethoxam and clothianidin were evaluated in field trials in the Holland Marsh, Ontario, from 2007-2009. In 2007, spinosad (3.75 and 7.5 mg ai/100g seed) and clothianidin (5.6 and 7.5 mg a.i.) reduced carrot weevil damage. In 2008, thiamethoxam (2.5 and 3.75 mg a.i.), spinosad (7.5 mg a.i.) and clothianidin plus imidacloprid (3:1 at 11.25 mg a.i total) suppressed carrot rust fly damage. Spinosad shows promise for suppression of both pests.

McIntosh, R.; Gooliaff, J.; Moore, R.

Forest Service Branch, Saskatchewan Ministry of Environment, Prince Albert, SK

TUE 20 OCT 11:00 AM

SYMPOSIUM: PROTECTING STRUCTURES AND URBAN FORESTS

A risk-based approach to the banded elm bark beetle: an unwelcome immigrant to Saskatchewan

The banded elm bark beetle, *Scolytus schevyrewi* (Coleoptera: Scolytidae) (BEBB), is an invasive beetle native to northern China, central Asia and Russia. BEBB was first detected in 2003 in Colorado but there is evidence that it was established almost 10 years earlier. BEBB kills trees in the Ulmaceae, Salicaceae and Eleagnaceae. In North America, it is found in elms and is believed to be a vector of Dutch elm disease. There is a lack of knowledge of the bionomics in North America. Saskatchewan's risk-based strategic approach, including risk assessment, risk response and risk communication, is described. This approach will help guide and refine DED management in Saskatchewan.

Mlynarek, J.J.; Wheeler, T.A.

Department of Natural Resource Sciences, Macdonald Campus, McGill University, Ste Anne-de-Bellevue, QC

MON 19 OCT 01:30 PM

GRADUATE STUDENT SYMPOSIUM

Phylogeny of the tribe Elachipterini (Diptera: Chloropidae)

The acalyprate family Chloropidae is a diverse and abundant group of true flies with many morphologically bizarre representatives. The family is divided into three subfamilies: Siphonellopsinae, Chloropinae and Oscinellinae. Two attempts have been made to classify the 3000 described species of the Chloropidae but neither is strongly supported phylogenetically. The Oscinellinae is currently divided into 12 tribes, one of which is the Elachipterini. This tribe has an almost worldwide distribution, although some genera are very limited in their range. There is also a wide range in the number of species per genus. Because of the scarcity of previous phylogenetic analyses and the age of most museum specimens, morphological characters are an appropriate data set for resolving relationships. I conducted a phylogenetic analysis of the tribe Elachipterini using an exemplar approach and morphological characters of adult specimens. Currently, Elachipterini is comprised of ten genera with over 125 described species. Based on the analyses, the monophyly of Elachipterini is supported by multiple characters. However, resolution within the tribe is less clear because of widespread homoplasy. *Elachiptera*, *Cyrtomyia* and *Disciphus* are apparently paraphyletic because of the current recognition of some small autapomorphic genera (*Myrmecosepsis*, *Sepsidoscinis*, *Goniaspis*) and some undescribed species with intermediate combinations of character states. In addition, all species of the large genus, *Melanochaeta*, that have been analysed to date appear to be monophyletic. As a result of this analysis, several changes in generic limits will be required to make the classification of the Elachipterini reflect the evolutionary history of the included species.

Moffat, C.E.^a; Gillespie, D.R.^b

^a Unit of Biology and Physical Geography, University of British Columbia - Okanagan, Kelowna, BC; ^b Agriculture and Agri-Food Canada, Pacific Agri-Food Research Centre, Agassiz, BC

MON 19 OCT 10:45 AM

PRESIDENT'S PRIZE ORAL: BIOLOGICAL CONTROL

Impacts of plant nutrition on host-parasitoid population dynamics

Bottom-up effects of nutrient availability on host-parasitoid population dynamics were investigated, using three rates of nitrogen in fertilizer on a simple community consisting of bell pepper, *Capsicum annuum*, the green peach aphid, *Myzus persicae*, and the parasitoid, *Aphidius matricariae*. Aphids and parasitoids showed increased population growth rates and fitness as nitrogen availability increased. Impacts of habitat fertility on tri-trophic interactions and the potential for applications in parasitoid rearing and biological control are discussed.

Mori, B.^a; Gries, R.^b; Otanni, J.^c; Yoder, C.^d; Evenden, M.L.^a

^a Department of Biological Sciences, University of Alberta, Edmonton, AB; ^b Department of Biological Sciences, Simon Fraser University, Burnaby, BC; ^c Agriculture and Agri-Food Canada, Beaverlodge, AB; ^d Alberta Agriculture, Food and Rural Development, Spirit River, AB

POSTER SESSION

PRESIDENT'S PRIZE

Development of a pheromone-based monitoring tool for the red clover casebearer (*Coleophora deauratella*) in Alberta

The red clover casebearer (RCC), *Coleophora deauratella* (Lepidoptera: Coleophoridae), is an introduced pest in the Peace River Region of Alberta. Infestations of RCC in clover can cause up to 99.5% seed loss. Components of the female sex pheromone were identified as (Z)-7-dodecenyl acetate and (Z)-5-dodecenyl acetate, both of which are necessary to attract male RCC. Here, we further develop this pheromone-based tool to determine the most attractive blend and dose of the two identified pheromone components to male RCC, and the trap type with the greatest efficacy for RCC capture.

Mori, B.; Proctor, H.; Evenden, M.L.

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

MON 19 OCT 11:45 AM

PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

Phoretic mites associated with the mountain pine beetle (*Dendroctonus ponderosae*) in Alberta

Mites associated with the mountain pine beetle (*Dendroctonus ponderosae* Hopkins) collected from northwestern Alberta were identified from beetles emerging from lodgepole pine bolts in the laboratory, and from beetles captured in pheromone-baited traps in the field. Mite load and assemblage structure were tracked over the beetle emergence period, and variation in mite load with respect to

beetle sex, size and condition was analyzed. Members of four mite families were identified: Ascidae, Acaridae, Tarsonemidae and Tydeidae. Beetle sex and condition were significantly correlated with mite load under lab conditions.

Mostafa, A.M.; Lowery, D.T.

Agriculture and Agri-Food Canada, Pacific Agri-Food Research Centre, Summerland, BC

MON 19 OCT 01:45 PM

CONTRIBUTED PAPERS: APPLIED ENTOMOLOGY

Identification and life cycle of climbing cutworms (Lepidoptera: Noctuidae) from grapevines in the Okanagan Valley, BC

Twenty species of climbing cutworm were collected as larvae from vineyards in south central British Columbia, during the spring of 2001 to 2008. *Abagrotis orbis* was the dominant species, and with *A. nefascia* and *A. reedi* accounted for over 85% of the reared moths. Life cycle aspects of *A. orbis* were assessed under three temperatures (11, 15 and 22°C), two light regimes (16L:8D and 12L:12D photoperiod) and on two larval diets. Feeding preferences and suitability of 13 host plants were also investigated for *A. orbis* in the laboratory.

Nagalingam, T.; Holliday, N.J.

Department of Entomology, University of Manitoba, Winnipeg, MB

MON 19 OCT 11:00 AM

PRESIDENT'S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

Tarnished plant bug injury and damage to dry edible beans

In Manitoba, the tarnished plant bug, *Lygus lineolaris*, is a pest of several crops. Its feeding is concentrated on floral buds, flowers and pods and can result in abscission of reproductive structures and deformation of seeds. Observations of *L. lineolaris* on dry edible beans in Manitoba prompted concern about effects on yield quality and quantity. In plant growth rooms, we investigated the effects of feeding by *L. lineolaris* on different growth stages of navy beans by confining male or female adults or 5th instar nymphs to single reproductive structure and characterizing short-term effects of feeding and long-term effects on yield.

Nagel, L.; Robb, T.; **Forbes, M.R.**

Department of Biology, Carleton University, Ottawa, ON

TUE 20 OCT 08:30 AM

SYMPOSIUM: ARTHROPOD HOST-SYMBIONT RELATIONSHIPS

Fluctuating parasite-mediated selection and variable resistance in a specialist mite-damsselfly association

Damsselflies are host to both specialist and generalist parasitic water mites. Our work over the past seven summers, on one specialist association, has revealed that parasitism is highly variable as is apparent parasite-mediated selection on survivorship, which appears confined to females and only in some years. Resistance also varies from not being expressed in a given summer to being expressed by over 10% of individuals. This form of resistance, melanotic encapsulation, is costly in other insects. Resistance expression is not easily explained by abiotic factors but does relate (kind of curiously) to degree of parasitism.

Navaneethan, T.; Ehlers, R.-U.

Faculty of Biology, University of Gent, Gent, Belgium; Institute for Phytopathology, Christian-Albrechts-University, Kiel, Germany

MON 19 OCT 11:15 AM

PRESIDENT'S PRIZE ORAL: BIOLOGICAL CONTROL

Improvement of *Steinernema feltiae* application against diapausing codling moth larvae (*Cydia pomonella*)

Codling moth is a serious pest of apples and pears in most countries where these fruits are grown. Control of diapausing cocooned larvae in cryptic habits with the entomopathogenic nematode, *Steinernema feltiae*, reduces the fruit damage in the following seasons by up to 70%, providing moisture conditions post application are favourable. This study evaluated the LC₅₀ and LT₅₀ in a bark bioassay and the influence of moisture on the performance of the nematodes. The addition of the additive xanthan could significantly improve the control effect.

Navaneethan, T.; Mikunthan, G.

Department of Agricultural Biology, Faculty of Agriculture, University of Jaffna, Jaffna, Sri Lanka

MON 19 OCT 11:30 AM

PRESIDENT'S PRIZE ORAL: BIOLOGICAL CONTROL

Small scale production of entomopathogenic fungi using low cost technology

The entomopathogenic fungi (EPF) are widely used as biological control agents. This paper evaluates a way of producing EPF using low cost technology suitable for farmers' use. Milk extracted coconut scraping (MECS), black gram husk (BGH), rice bran, rice-extract and paddy extract were evaluated. White rice and potato dextrose sago (PDS) were used as a control. Formulations were prepared using termitaria and saw dust. MECS, BGH and rice extract yielded 1x10⁸ spores/ml, almost as high as white rice and PDS (1x10⁹ spores/ml), but at very low cost. When the rice-extract was enriched with yeast and dextrose, spore production was increased. Saw dust and termitaria maintained high spore concentrations for a long period.

Nealis, V.

Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, BC

TUE 20 OCT 11:30 AM

SYMPOSIUM: PROTECTING STRUCTURES AND URBAN FORESTS

Gypsy moth: still invasive after all these years

Much of the past invasion patterns of gypsy moth in eastern Canada and future risk of gypsy moth in western Canada can be understood in terms of pathways and climate suitability. As long as incipient populations are detected and remain isolated, eradication, or at least facilitated extinction, is feasible. The problem of management of gypsy moth in western Canada is illustrated through the history of management in British Columbia.

Noronha, C.

Agriculture and Agri-Food Canada, Crops and Livestock Research Centre, Charlottetown, PE

WED 21 OCT 11:00 AM

CONTRIBUTED PAPERS: BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

Efficiency of *Trichogramma brassicae* as a biocontrol agent of the European corn borer, *Ostrinia nubilalis* (Lepidoptera: Crambidae), in potatoes

The European corn borer (ECB) is primarily controlled with insecticide in potatoes. However, inclement weather often delays insecticide application resulting in poor control. *Trichogramma brassicae*, an egg parasitoid, has been used successfully in corn but its efficiency has not been evaluated in potatoes. Plant architecture plays an important role in the success of *T. brassicae*. I evaluated the efficiency of *T. brassicae* to control ECB in potatoes. There was a 50% reduction in the number of holes per plant. Potato variety had a significant impact on control efficiency. Implications for use in an IPM program will be discussed.

O'Connor, B.M.

Museum of Zoology, University of Michigan, Ann Arbor, MI, USA

TUE 20 OCT 09:15 AM

SYMPOSIUM: ARTHROPOD HOST-SYMBIONT RELATIONSHIPS

Ecological associations of mites and native bees in North America

Associations between mites and native North American bees are reviewed. Mites belonging to numerous families of Acari are generalist or specialist associates of many species belonging to all families of North American bees. Association types include mutualism, commensalism (phoresy), parasitism and cleptoparasitism. Specific species that are of actual or potential importance in the development of native bees as managed pollinators are discussed.

Oghiakhe, S.; Holliday, N.J.

Department of Entomology, University of Manitoba, Winnipeg, MB

MON 19 OCT 09:00 AM

PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

The spatial distribution, tunnelling habits and fat content of overwintering native elm bark beetles, *Hylurgopinus rufipes* (Coleoptera: Scolytidae), in American elm trees

Hylurgopinus rufipes is the major vector of Dutch elm disease in Manitoba, and insecticidal control of overwintering beetles is an important component of the management program. Dissection of the bases of American elm trees, taken in winter from riverbank woodlands, showed that overwintering beetles were most dense in the basal 5 cm. We record, for the first time, that substantial numbers of beetles overwinter below the soil surface. Fat content of overwintering beetles declined as winter progressed. Mark-recapture studies showed that movement of new adult beetles emerging from brood galleries to trees in which they overwinter is somewhat localized.

Oghiakhe, S.; Holliday, N.J.

Department of Entomology, University of Manitoba, Winnipeg, MB

POSTER SESSION

PRESIDENT'S PRIZE

Temperature dependent development of immature stages of the native elm bark beetle, *Hylurgopinus rufipes* (Coleoptera: Scolytidae)

The effect of temperature on the development and survival of the native elm bark beetle, *Hylurgopinus rufipes*, was studied by rearing beetles from eggs to adults in bark presses at five different temperatures in the laboratory. There was no brood development at 12°C; development took 61 days at 16°C and 30 days at 28°C. Data loggers between the inner phloem and xylem of American elm trees showed wide daily temperature fluctuations in sun-exposed and shaded trees; August temperatures in the former exceeded 40°C. This study will enable us to develop a model for the rate of development at different temperatures.

Olivier, C.^a; Galka, B.^a; Floate, K.D.^b

^a Agriculture and Agri-Food Canada, Saskatoon, SK; ^b Agriculture and Agri-Food Canada, Lethbridge, AB

POSTER SESSION

Identification of symbiont organisms in leafhopper vectors of phytoplasma

Is the ability of leafhoppers to vector plant pathogens (e.g., phytoplasmas) affected by coinfections of symbiotic bacteria? We examined this question in a survey of four leafhopper populations (n = 66 species) collected in vineyards and crops in Canada. Genetic markers identified infections of the species '*Candidatus phytoplasma asteris*' in 15 species and infections of *Arsenophonus* and/or

Wolbachia bacteria in 40 species. The correlation between infections of symbionts, phytoplasma and leafhopper population location is discussed.

Otvos, I.S.

Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, BC

MON 19 OCT 02:00 PM

CANADIAN FORUM FOR BIOLOGICAL CONTROL SYMPOSIUM

How to integrate biological control effectively in forestry IPM programs

Forestry is ideally suited to IPM programs. Although biological control is not a panacea for solving all forest insect problems, some or all of its components can be integrated to manage forest insects. Selected examples are given where various biological control agents were used successfully in our forests. These will be illustrated from personal experience, as well as work by others in the Canadian Forest Service. A personal perspective and an example is given on a possible template for IPM of forest insects. Some of the obstacles encountered in the routine use and/or development of IPM in forestry are mentioned.

Owen, R.E.^a; McCorquodale, D.B.^b

^a Department of Chemical and Biological Sciences, Mount Royal College, Calgary, AB; ^b Department of Biology, Cape Breton University, Sydney, NS

TUE 20 OCT 09:45 AM

CONTRIBUTED PAPERS: SYSTEMATICS, CONSERVATION, BIODIVERSITY

Evolution of eusociality in the Hymenoptera via nest sharing between non-relatives: altruism without kin-selection

Eusociality (reproductive division of labour within nests) requires altruism. Parasocial nesting (sharing by members of the same generation) poses a difficulty for kin-selection because nests are often shared by non-relatives. We modeled the evolution of tolerant (i.e. nest sharing) behaviour. Two females share a nest; the first digs and incurs this cost, the second one joins deriving an altruistic benefit. The tolerance allele will spread through the population. A new mutation arising, that causes the second female to be the sole reproductive, will increase yielding a maximum of 50% eusocial nests. Kin selection and relatedness are not necessary for eusociality.

Packer, L.; Sheffield, C.

Department of Biology, York University, Toronto, ON

TUE 20 OCT 02:00 PM

SYMPOSIUM: POLLINATION BIOLOGY

The taxonomic, ecological and behavioural diversity of bees

There are almost 20,000 described bee species, in 480 genera and seven families. Not only are bees the most important pollinators on the planet, they are also excellent indicators of the state of terrestrial ecosystems. In addition to their taxonomic complexity, bees are ecologically and behaviourally diverse. They are found from sea level to 4500 m in altitude, from the equator to the arctic and from the edge of absolute deserts to the wettest of rainforests. While the honey bee has a complex social life, most bees are entirely solitary. We will survey this biological diversity and emphasize aspects relevant to bee conservation.

Parker, D.^a; Phillips, I.^b

^a AquaTax Consulting, Saskatoon; ^b Saskatchewan Watershed Authority, Saskatoon, SK

WED 21 OCT 10:45 AM

BIOLOGICAL SURVEY OF CANADA SYMPOSIUM

Saskatchewan aquatic macroinvertebrate biodiversity surveys and database: past, progress and plans

Saskatchewan aquatic macroinvertebrate research has a rich history spanning more than 70 years. We are assimilating this historical data with our current survey and monitoring results into an online resource for the Saskatchewan fauna. In our presentation we highlight the online database, some of our research successes, obstacles we have encountered and outline some of our future plans.

Parmesan, C.

Section of Integrative Biology, University of Texas, Austin, TX, USA

SUN 18 OCT 03:45 PM

PLENARY SYMPOSIUM

Insects and climate change: what are they telling us and where are we going?

Insects have emerged as one of the most responsive groups to anthropogenic climate change, and some of the more noticeable societal impacts of global warming have been mediated by insects. Insects demonstrate the extremes of responses observed across the natural world. Some species have suffered population extinctions and range contractions, while others have exhibited population booms and range expansions. Responses have sometimes stemmed from a direct effect of climate, but in other cases are almost entirely driven by climatically-driven alterations of interactions among species. With detailed observational records on distributions, abundances, life histories and phenologies going back as far as 250 years, insects are also one of the best documented groups of wild species. Thus insects have also emerged as important indicator species, providing scientists with more general insights into how climate change is impacting the natural world. The next IPCC report will emphasize adaptation – meaning how society might proactively alter its behaviour, policies, growth and development to minimize potential negative impacts of climate change. In the natural world, however, species' adaptation is reactive. While some species show little adaptation to the changing climate, others have demonstrated plasticity in their behaviours and life histories and a few have undergone rapid, population-level evolution. However, to reduce future loss of species, scientists and practitioners in conservation and resource management may benefit by adopting a more proactive, interventionist stance to aid the insect world in adapting to on-going anthropogenic climate change.

Peck, S.B.

Department of Biology, Carleton University, Ottawa, ON

POSTER SESSION

Beetle diversity in the Lesser Antilles islands: how many species are really there?

Recent extensive and intensive field work on the Lesser Antillean island of Montserrat suggests that a mean of 827 beetle species may be expected on that island. This datum makes possible the generation of hypotheses of the probable beetle species diversity on other islands of the Lesser Antilles as a function of the areas of the islands. Figures are given for the presently known, estimated total and estimated number of unknown species for each principal island. This predicts that many hundreds (if not thousands) of beetle species remain to be discovered. This is of importance to land management and conservation interests on these rapidly changing and ecologically fragile islands

Pelletier, Y.

Agriculture and Agri-Food Canada, Potato Research Centre, Fredericton, NB

TUE 20 OCT 03:30 PM

SYMPOSIUM: ENTOMOLOGICAL ISSUES IN POTATO PRODUCTION

Potato resistance to insects

Wild *Solanum* species, bearing tubers, can be used as a source of resistance to insect pests of potato. Information on the behaviour and performance of the insect on the resistant plant species is required to guide the development of new germplasm successfully. Such study of the interactions between the insect and host plants provides new information on the biology of the insect. Examples of such studies on the Colorado potato beetle, the potato tuber moth and potato-infesting aphids will be presented.

Pitt, C.^a; Seybold, S.J.^b; Thommasen, A.T.^a; Huber, D.P.W.^a

^a University of Northern British Columbia, Prince George, BC; ^b United States Department of Agriculture – Forest Service, Pacific Southwest Research Station, Davis, CA, USA

POSTER SESSION

PRESIDENT'S PRIZE

Functional characterization of California five-spined ips, *Ips paraconfusus* (Coleoptera: Curculionidae: Scolytinae), cytochromes P450 exhibiting up-regulation with feeding

Previous expression analyses and comparison of several *Ips paraconfusus* P450s to those in a mountain pine beetle EST library supported a possible role for these proteins in host tissue detoxification or pheromone biosynthesis. We have constructed recombinant baculoviruses for several *I. paraconfusus* P450 genes and have included a reductase for co-transfecting Sf9 insect cells for protein expression. Recombinant proteins were observed for correct folding by their characteristic CO difference spectra. Protein preparations will be exposed to substrate candidates, including various monoterpenes and products will be evaluated by GC-MS for evidence of P450-mediated oxidation of substrates.

Poirier, L.M.

Ecosystem Science and Management Program, University of Northern British Columbia, Prince George, BC

TUE 20 OCT 09:15 AM

CONTRIBUTED PAPERS: SYSTEMATICS, CONSERVATION, BIODIVERSITY

Occurrence and distribution of *Coquillettidia* (= *Mansonia*) *perturbans* mosquitoes in northern British Columbia

Coquillettidia (= *Mansonia*) *perturbans* (Diptera: Culicidae) is generally considered to have a southerly distribution in Canada. CDC miniature light traps were used to survey adult mosquito populations at several sites in northern British Columbia. *Coquillettidia perturbans* were collected at most sites, including as far north as Fort Nelson, BC (58.6°N, 122.7°W). Other species were also found outside their known or expected ranges. These results underscore the need for continuing surveys of insect biodiversity throughout the country. Future research on the effects of climate change, vector management and other aspects of insect biology depend on accurate estimates of geographic distribution.

Pompon, J.^{a,c}; Rahbe, Y.^b; Calevro, F.^b; Quiring, D.T.^c; Goyer, C.^a; Giordanengo, P.^d; Pelletier, Y.^a

^a Agriculture and Agri-Food Canada, Fredericton, NB; ^b INRA, INSA-Lyon, Villeurbanne, France; ^c Department of Biology, University of New Brunswick, Fredericton, NB; ^d Université de Picardie Jules Verne, Amiens, France.

MON 19 OCT 10:45 AM

PRESIDENT'S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

The relationship between xylem consumption, fecundity and the obligate symbiont in *Macrosiphum euphorbiae*

We measured fecundity, water content, time spent consuming phloem and xylem sap of *Macrosiphum euphorbiae* alates and apterae at different ages. Both alates and apterae ingested xylem sap at the end of their life, when aphids were not dehydrated and when fecundity started to decrease. Fecundity was negatively correlated with the proportion of time spent ingesting xylem sap, over the entire reproductive life of aphids. We speculated that xylem consumption may play a regulatory role in aphid fecundity and that *Buchnera* symbionts, that provide essential amino acids required for offspring production, might be involved in this process.

Ramanaidu, K.^a; Gradish, A.^b; Scott-Dupree, C.^b; Cutler, G.C.^a

^a Department of Environmental Sciences, Nova Scotia Agricultural College, Truro, NS; ^b Department of Environmental Biology, University of Guelph, Guelph, ON

MON 19 OCT 08:45 AM

PRESIDENT'S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

Impacts of reduced-risk insecticides on insect pests and pollinators in wild blueberry

We evaluated the efficacy of several new "bio-rational" products against blueberry spanworm, *Itame argillacearia*, a key defoliator of wild blueberry, and assessed their safety to the pollinators, *Bombus impatiens* and *Megachile rotundata*. Field trials demonstrated that flubendiamide-, spinetoram- and spinosad-based products provide excellent spanworm control, and laboratory bioassays indicate that the new alternatives are as potent to the pest as traditional broad-spectrum insecticides. Bee susceptibility in the laboratory depended greatly on the active ingredient to which bees were exposed and the bee species.

Renaud, A.^a; Savage, J.^b; Roughley, R.E.^a

Department of Entomology, University of Manitoba, Winnipeg, MB

MON 19 OCT 02:30 PM

GRADUATE STUDENT SYMPOSIUM

Biodiversity of the Muscidae (Diptera) of Churchill (MB) in the context of environmental changes

Recent studies have shown that some organisms are clearly affected by recent environmental changes occurring in the Arctic, but the responses of insects to these changes have not been well studied in the Nearctic Region. In Churchill (MB), ever-increasing human-related activities combined with the effects of climate warming have disturbed arctic habitats and potentially affected the biodiversity of local insects. Therefore, the study of historical changes in the distribution and abundance of some important northern taxa, such as the fly family Muscidae, may allow us to better understand the impacts of recent environmental changes on the biodiversity of northern insects. The composition of arctic muscids was last reviewed by Hockett in 1965. The pre-1965 Churchill diversity, based on Hockett (1965) and supplemented with North American collection material, was compared to the post-1965 Churchill diversity, obtained from collection specimens and an extensive sampling season in 2007. Preliminary results indicate that the species composition of Muscidae in Churchill has changed. One new generic and 18 new species records have been confirmed for the area and a number of previously abundant species were not collected in the 2007 inventory. More than half of the new distribution records represent northern range expansions, suggesting that the recent warming trend in the arctic may have influenced the important changes to the biodiversity of muscid flies reported in this study.

Renkema, J.M.^{a,b}; Cutler, G.C.^b; Lynch, D.^b; MacKenzie, K.^c; Walde, S.^a

^a Dalhousie University, Halifax, NS; ^b Nova Scotia Agricultural College, Truro, NS; ^c Agriculture and Agri-Food Canada, Kentville, NS

MON 19 OCT 08:30 AM

PRESIDENT'S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

Management of blueberry maggot (Diptera: Tephritidae) using mulches in organic highbush blueberries

Zero tolerance for blueberry maggot (*Rhagoletis mendax* Curran) and few proven alternative controls result in annual insecticide use in highbush blueberries (*Vaccinium corymbosum* L.). Effects of mulches, shown to provide effective weed control and increase fertility, were studied on developing pupae. Emergence was low when 20 cm of pine needles, pulp mill biosolids, or manure/saw dust compost were placed on pupae in laboratory and field. In a laboratory trial, all mulches at 90% water-holding capacity resulted in lower emergence (5-20%) than at 50 or 10% water-holding capacity. Larvae pupated at greatest depths in drier, less dense pine needles. Efforts to further characterize mulch effects on pupae are discussed

Richardson, T.A.^a; Takács, S.^b; Zahradnik, T.^b; Gries, G.^b; Strong, W.B.^c; Lindgren, B.S.^a

^a Ecosystem Science and Management Program, University of Northern British Columbia, Prince George, BC; ^b Department of Biological Sciences, Simon Fraser University, Burnaby, BC; ^c British Columbia Ministry of Forests and Range, Kalamalka Forestry Centre, Vernon, BC

MON 19 OCT 11:45 AM

PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

Cues mediating clonal preference of *Leptoglossus occidentalis* in a lodgepole pine seed orchard

Surveys were conducted in a lodgepole pine seed orchard in British Columbia in 2008 and 2009, confirming that *Leptoglossus occidentalis* (Heidemann) favours certain clones over others. We tested the hypothesis that preference is based on physical and chemical cues from host trees. Terpenes and infrared (IR) radiation emitted from cones of favoured and unfavoured clones were measured. Analysis of variance and *post hoc* means separation tests revealed cones of favoured clones emitted stronger IR cues and different quantities of semiochemicals than cones of unfavoured clones. Contrary to previous studies, we found that *L. occidentalis* favoured the same clones, and often the same tree, in consecutive years.

Riel, W.G.^a; Shore, T.L.^a; Burnett, C.^b; Fall, A.^c

^a Natural Resources Canada, Pacific Forestry Centre, Victoria, BC; ^b Geomemes Research Inc., Victoria, BC; ^c Gowlland Technologies, Ltd., Victoria, BC

MON 19 OCT 03:30 PM

CONTRIBUTED PAPERS: APPLIED ENTOMOLOGY

Spatial risk models for mountain pine beetle in Alberta and Saskatchewan

The mountain pine beetle (*Dendroctonus ponderosae*) has become established east of the Rocky Mountains at several locations in western and central Alberta. To assess the risk of mountain pine beetle to Canada's boreal forest and provide guidance for forest managers in Alberta and Saskatchewan, the attributes of susceptible host stands and their landscape scale configuration and connectivity are explored.

Robson, D.B.

The Manitoba Museum, Winnipeg, MB

TUE 20 OCT 10:30 AM

CONTRIBUTED PAPERS: SYSTEMATICS, CONSERVATION, BIODIVERSITY

Insect visitors to the rare Western Silvery Aster (*Symphyotrichum sericeum*) plant

Western Silvery Aster (*Symphyotrichum sericeum*) is a nationally threatened plant. The purpose of this study was to document visitation frequency and constancy of insect visitors. Of 22 insect visitor taxa, *Bombus bifarius* Cresson was the most frequent. The overall insect visitation rate was not significantly different between *S. sericeum* and its most common co-flowering plant, *Solidago nemoralis*, but the constancy of its insect visitors was lower. The insect visitor composition changed over time with *B. bifarius* ignoring *S. sericeum* plants initially, then visiting them more frequently as the number of receptive *S. nemoralis* flowers declined.

Rosati, J.Y.; VanLaerhoven, S.L.

Department of Biology, University of Windsor, Windsor, ON

MON 19 OCT 09:00 AM

PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

The effect of global climate change on range expansion of the invasive blow fly, *Chrysomya rufifacies* (Diptera: Calliphoridae): behavioural and ecological impacts within the carrion insect community

The effects of global climate change vary widely depending on the species and geographical location as well as the ecological system involved. *Chrysomya rufifacies* (Macquart) is an invasive species originating from the Australia and the Orient, which was introduced into North America in the early 1900s, where it has continued to spread throughout the continental United States, entering into southern Ontario, Canada during the fall season. Since its introduction into the U.S., it has become a dominant fly species recovered from carrion and due to its predatory nature, it has the potential for direct negative and competitive interactions with other members within the carrion insect community.

Roughley, R.E.

Department of Entomology, University of Manitoba, Winnipeg, MB

WED 21 OCT 08:45 AM

BIOLOGICAL SURVEY OF CANADA SYMPOSIUM

Beetles of Churchill, Manitoba

Various aspects of the beetle fauna of Churchill, Manitoba are examined. Three main distribution patterns are present: 1. Northern from Alaska east to Manitoba, 2. Transcontinental northern often to Greenland, 3. Churchill plus adjacent Nunavut. The most diverse families of the 500+ spp. are Carabidae (82 species) and Dytiscidae (84 species). The most common life history pattern involves 1+ aquatic life stages. The most common feeding pattern is predation. The majority of new records for the Churchill are found along the Churchill River, suggesting that habitat change rather than climate change is more important for beetles.

Roy, M.^a; Broadbent, B.^b; Chouffot, T.^c

^a MAPAQ, Quebec, QC; ^b Agriculture and Agri-Food Canada, London, ON; ^c Koppert Canada, Trois-Rivières, QC

MON 19 OCT 01:35 PM

CANADIAN FORUM FOR BIOLOGICAL CONTROL SYMPOSIUM

How to integrate biological control effectively in small berry IPM programs

With concerns of consumers for the environment and human health, Canadian producers face the challenge of incorporating ecological approaches to manage pests using IPM. Growers of small fruit are no different. Some options appear promising when all the tools of IPM are applied in a complementary manner. For tarnished plant bug, inoculative introductions of the braconid endoparasitoid, *Peristenus digoneutis*, have shown increased parasitism levels in strawberries and adjacent refuge areas when cultural practices are integrated. In the case of spider mites, biological control strategies based on release of predatory mites offer good results when special care is given to pesticide compatibility and weed management practices.

Royauté, R.^a; Buddle, C.M.^a; Vincent, C.^b

^a Department of Natural Resource Sciences, Macdonald Campus, McGill University, Ste Anne de Bellevue, QC; ^b Agriculture and Agri-Food Canada, St Jean-sur-Richelieu, QC

MON 19 OCT 11:00 AM

PRESIDENT'S PRIZE ORAL: BIOLOGICAL CONTROL

Steps in assessing behavioural syndromes in *Eris militaris*, an agricultural salticid spider

Recent developments in behavioural ecology suggest that suites of behaviors can be correlated across a range of situations (e.g., predation pressure). These "behavioural syndromes" can be of particular interest for agroecosystems since they could indicate whether certain spider populations may be better at regulating pests than others. Correlation between behavioural traits relevant to dispersal and response to changing environments is discussed in order to assess how different levels of human disturbance affect spiders' performance as pest regulators in agroecosystems. We will discuss how we developed methodologies to determine behavioural syndromes in *Eris militaris*, a salticid spider common in agricultural systems.

Sabbahi, R.; Royer, L.

Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre, Corner Brook, NL

POSTER SESSION

Parasitism of eastern hemlock looper in forests of Newfoundland and Labrador

The hemlock looper, *Lambdina fiscellaria* (Guenée) (Lepidoptera: Geometridae), is widely distributed and is one of the most destructive defoliators of balsam fir forests in North America. Lower mid-crown branches were sampled from various locations in Newfoundland and Labrador at weekly intervals from early June to mid-August. Individual eggs, larvae and pupae were tallied from each branch and reared in the laboratory under summer conditions. Progress in the developmental stages of each individual was monitored through time. Stage-specific densities and species-specific temporal occurrence of parasitoids and parasitism incidences were determined and estimated.

Salomon, M.; Whitaker, K.; Avilés, L.

Department of Zoology, University of British Columbia, Vancouver, BC

WED 21 OCT 09:15 AM CONTRIBUTED PAPERS: BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

Cooperative foraging dynamics across social and subsocial spiders

Despite a large body of research on the evolution of sociality in spiders, there is a general lack of knowledge about the cooperative behaviours associated with different social systems. We tested the hypothesis that the extent of cooperation in the context of foraging varies with spiders' level of social organization and relative prey size. We experimentally examined the foraging behaviours of several species of social and subsocial *Anelosimus* spiders in Ecuador, and show that inter- and intraspecific variation in cooperation reflects differences in social structure, colony size and relative prey size.

Scott, I.M.^a; Tolman, J.H.^a; MacArthur, D.C.^a; Pelletier, Y.^b

^a Agriculture and Agri-Food Canada, Southern Crop Protection and Food Research Centre, London, ON; ^b Agriculture and Agri-Food Canada, Potato Research Centre, Fredericton, NB

TUE 20 OCT 02:00 PM

SYMPOSIUM: ENTOMOLOGICAL ISSUES IN POTATO PRODUCTION

Monitoring insecticide-resistance in Colorado potato beetle populations in Canada: past, present and potential approaches

Insecticide resistance is a recurring and growing concern for Canadian potato growers. Recent surveillance has confirmed reduced susceptibility in increasing numbers of CPB populations managed with imidacloprid (Admire 240F). Further bioassay screening has documented cross-resistance with other neonicotinoid insecticides in a subset of these populations. As current bioassay methods are labour intensive and do not identify the resistance mechanism, other monitoring techniques are required. Research at AAFC is investigating other potential tools that will expedite the detection of resistance and suggest solutions for effective, sustainable CPB management.

Sela, I.

Virus Laboratory, Hebrew University of Jerusalem, Rehovot, Israel

WED 21 OCT 09:30 AM

SYMPOSIUM: APICULTURE: BEE - VIRUS INTERACTIONS

Association of colony collapse disorder with Israeli acute paralysis virus (IAPV): an RNAi approach to control IAPV and a possible role for viral integration

IAPV was indicated to be associated with Colony Collapse Disorder (CCD). CCD was also correlated with other stress factors of bees, such as *Varroa*, *Nosema*, chemicals, climate, etc. We will discuss the possibility that integrated IAPV sequences (not current infections) may cause CCD and the possible IAPV-derived mechanisms leading to CCD. In collaboration with Beeologics, Inc., we have devised an RNAi approach controlling IAPV in the laboratory and in the field. Large-scale clinical assays are being conducted. Prevention of mortality from IAPV and improvements of bee colonies have already been demonstrated and results will be presented.

Sheffield, C.; Packer, L.; Gibbs, J.; Dumesh, S.; Best, L.; de Silva, N.

Department of Biology, York University, Toronto, ON

WED 21 OCT 08:00 AM

BIOLOGICAL SURVEY OF CANADA SYMPOSIUM

An overview of the bees of Canada: diversity, distribution and status

Bees are one of the most important groups of organisms in terrestrial ecosystems due to their role as pollinators. By providing pollination services to agriculture in Canada, bees contribute millions of dollars to our economy; even greater benefits, albeit of incalculable monetary value, occur in natural communities. Despite these facts, very little is known about bee faunistics in Canada. The purpose of this presentation is to provide a summary of the diversity, distribution and taxonomic status of bees in Canada and to summarize some of the bee-related goals of the Canadian Pollination Initiative, CANPOLIN.

Shorthouse, J. D.

Factors influencing the distribution of gall-inducing cynipids on wild roses across Canada

Thirteen species of cynipid wasps of the genus *Diplolepis* induce galls on the wild roses of Canada. Galls of each species are inhabited by parasitoids and inquilines that form gall-specific component communities. Rose galls provide a unique opportunity to study the zoogeography of microhymenoptera because presence of the insects can be determined at various sites throughout the season without observing the adults. Galls sampled across Canada reveal patterns that illustrate the northeastern movement of roses and cynipids following deglaciation and the impact of factors such as northward flowing rivers of the Hudson Bay Lowlands, the Rocky Mountains, freezing winter conditions and wind.

Simonsen, T.J. ^a; Zakharov, E.V. ^b; Djernaes, M. ^a; Cotton, A.M. ^c; Vane-Wright, R.I. ^{d, e}; **Sperling, F.A.H.** ^a

^a Department of Biological Sciences, University of Alberta, Edmonton, AB; ^b Department of Integrative Biology, University of Guelph, Guelph, ON; ^c Chiang Mai, Thailand; ^d Durrell Institute of Conservation and Ecology, University of Kent, Canterbury, Kent, UK; ^e Entomology Department, Natural History Museum, London, UK

TUE 20 OCT 08:00 AM

CONTRIBUTED PAPERS: SYSTEMATICS, CONSERVATION, BIODIVERSITY

Phylogeny, host plant associations and divergence time of Papilioninae (Lepidoptera: Papilionidae) inferred from morphology and seven genes

We reconstructed phylogenetic relationships of 25 species from 18 genera of the swallowtail subfamily Papilioninae, plus outgroups, based on 94 morphological characters and 5616 bp DNA from seven genes (16S, COI, COII, ND1, ND5, EF1-alpha and Wingless). The most notable results are: 1) the two enigmatic genera *Meandrusa* and *Teinopalpus* are sister taxa, together comprising the tribe Teinopalpini; 2) based on dispersal-vicariance analyses, past dispersal events are far more important than vicariance events for explaining current distributions and 3) fossil-calibrated molecular clock analysis gives age estimates that are generally at least 25% younger than previous vicariance-calibrated molecular clock analyses.

Sinclair, B.J. ^a; Shamshev, I. ^b

^a Canadian Food Inspection Agency, Ottawa, ON; ^b All-Russian Institute of Plant Protection, St. Petersburg, Russia

TUE 20 OCT 08:45 AM

CONTRIBUTED PAPERS: SYSTEMATICS, CONSERVATION, BIODIVERSITY

Early spring pollinators: revision of the dance-fly genus *Iteaphila* (Diptera: Empididae)

At higher northern latitudes and montane regions, the genus *Iteaphila* Zetterstedt is one of the first pollinators active in early spring, primarily visiting flowers of *Prunus* and *Salix* and other spring flowers. Apart from these collection records, little is known about the biology of *Iteaphila*. Two species groups are recognized: the *Iteaphila setosa* group is confined to the Mediterranean Province, distributed from southern England, through southern Europe and northern Africa, to the Caucasus and Middle Asia (Uzbekistan). The *Iteaphila macquarti* group is a Holarctic group, with widespread species across Europe, Asia (including Japan) and North America.

Skevington, J.H. ^a; Sommaggio, D. ^b

^a Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, ON; ^b Facoltà di Agraria, Università di Bologna, Bologna, Italy

TUE 20 OCT 08:30 AM

CONTRIBUTED PAPERS: SYSTEMATICS, CONSERVATION, BIODIVERSITY

“If the flies can tell who’s who, why can’t we?” Attempting to revise the taxonomy of Nearctic *Chrysotoxum* (Diptera, Syrphidae)

Species concepts of Nearctic *Chrysotoxum* have been hotly debated for years. We are re-examining morphological characters and integrating the outcome with analysis of *cox1* mtDNA. To do this, we ‘barcoded’ a selection of identified material, then examined morphological character distribution among the resulting genetic lineages. A draft key was written and specimens identified on that basis were sequenced. The key was revised three times in this way. We are now confident that we have the first reliable key to *Chrysotoxum* species. The problem is that we are still unsure whether we are circumscribing species or populations. Ecological data may be the key needed to unravel the taxonomy of this difficult group.

Sperling, J. ^a; Shpeley, D. ^a; Leo, S. ^{a, b}; Jenkins, M. ^b; Sperling, F.A.H. ^a

^a Department of Biological Sciences, University of Alberta, Edmonton, AB; ^b City of Edmonton Environmental Services, Edmonton, AB

TUE 20 OCT 11:00 AM

CONTRIBUTED PAPERS: SYSTEMATICS, CONSERVATION, BIODIVERSITY

***Ixodes scapularis* and *I. pacificus* ticks in Alberta**

Recent reports have documented the distribution of *Ixodes scapularis* and *I. pacificus* throughout southern Canada - except for Alberta. As these two tick species are recognized as the primary vectors for Lyme disease, this gap implies a low risk of Lyme disease for Alberta. However, over the last decades in the Edmonton area we have received for identification a number of ticks of these two species. Although the recent travel history of the human and other hosts of these ticks is incompletely documented, it is important to note that the putative vectors of Lyme disease have been consistently present in central Alberta.

Stephens, A.E.A.; Myers, J.H.

Department of Zoology, University of British Columbia, Vancouver, BC

MON 19 OCT 10:30 AM

PRESIDENT'S PRIZE ORAL: BIOLOGICAL CONTROL

Patterns of herbivore abundance on an invasive weed: a test of the resource concentration hypothesis

The resource concentration hypothesis (RCH) predicts that plants in more dense stands will attract disproportionately more herbivores than plants in sparser stands. However, support for this hypothesis is mixed. Understanding how biological control agents respond to host density can be important in predicting how they will affect host dynamics. We tested the RCH for two seed-head herbivores on an invasive weed, diffuse knapweed. An appreciation of interspecific competition, herbivore densities and environmental variation is needed to explain fully the relationship between insect and plant density.

Subramaniam, R.^a; Dossdall, L.M.^a; O'Donovan, J.T.^b; Harker, K.N.^b

^a Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB; ^b Agriculture and Agri-Food Canada, Lacombe Research Centre, Lacombe, AB

WED 21 OCT 11:15 AM

CONTRIBUTED PAPERS: BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

Identifying agronomic practices that conserve and enhance natural enemies of root maggots (*Delia* spp.) (Diptera: Anthomyiidae) in canola

Yield losses from infestations of root maggots (Diptera: Anthomyiidae) can be severe in canola crops in central Alberta. Studies were undertaken in central Alberta to identify agronomic practices that can affect the survival and abundance of *Aleochara bilineata* (Coleoptera: Staphylinidae), which is an important natural enemy of root maggots. We manipulated tillage regime (conventional versus zero tillage), row spacing and seeding rate to assess effects on *A. bilineata* populations. Tillage and plant density had significant effects on root maggot infestations and *A. bilineata* activity density, but effects on parasitism of root maggot puparia were variable in different sites and years.

Suthisut, D.^a; Fields, P.G.^b; Chandrapatya, A.^a

^a Department of Entomology, Kasetsart University, Bangkok, Thailand; ^b Agriculture and Agri-Food Canada, Cereal Research Centre, Winnipeg, MB

MON 19 OCT 09:45 AM

PRESIDENT'S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

Biological activity of essential oil of *Alpinia conchigera* rhizome against *Sitophilus zeamais* and *Tribolium castaneum*

The toxicity and repellency of the essential oil of *Alpinia conchigera* rhizome was evaluated against the stored-product insect pests, *Sitophilus zeamais* and *Tribolium castaneum* adults at $29 \pm 2^\circ\text{C}$ and $65 \pm 5\%$ R.H. In fumigation trials, *S. zeamais* (LC₅₀, fiducial limits: 121, 114 – 129 $\mu\text{L/L}$) was more susceptible to essential oil of *A. conchigera* than *T. castaneum* (295, 203 – 369 $\mu\text{L/L}$). In contact toxicity trials, *S. zeamais* (27, 18 – 40 $\mu\text{g/mg}$) had similar mortality to *T. castaneum* (34, 28 – 47 $\mu\text{g/mg}$). When placed on filter paper, the essential oil of *A. conchigera* repelled *T. castaneum* better than *S. zeamais*.

Tansey, J.A.^a; Dossdall, L.M.^a; Keddie, B.A.^b

^a Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB; ^b Department of Biological Sciences, University of Alberta, Edmonton, AB

MON 19 OCT 11:15 AM

PRESIDENT'S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

Incorporation of novel *Ceutorhynchus obstrictus* (Coleoptera: Curculionidae)-resistant canola genotypes into mixed cropping strategies and its effects on weevil spatial dynamics

Genotypes resistant to the cabbage seedpod weevil, *Ceutorhynchus obstrictus* (Marsham) have been developed through the introgression of *Sinapis alba* L. x *Brassica napus* L. Several of these genotypes express antixenosis and antibiosis resistance and are less attractive in visual and olfactory behavioural bioassays. A small plot study was used to assess incorporation of susceptible refugia into deployment strategies for resistant genotypes. Mixes reduced weevil numbers and oviposition in pods of susceptible genotypes relative to susceptible monocultures. Weevil dispersal was affected by proportions of resistant and susceptible germplasm. Results are consistent with associational resistance.

Taylor, G.

University of Victoria, Victoria, BC

MON 19 OCT 03:30 PM

GRADUATE STUDENT SYMPOSIUM

Host range of a male-killing bacterium infecting filth fly parasitoids

The son-killer bacterium (*Arsenophonus nasoniae*) infects the blow fly parasitoid, *Nasonia vitripennis* (Hymenoptera: Pteromalidae), causing virtually all male offspring to die as eggs. Interestingly, this bacterial symbiont can be transmitted both vertically (from mother to offspring) and horizontally (to unrelated *Nasonia* parasitizing the same host). This capability for horizontal transmission suggests that this symbiont may have the potential to move through a biological community and utilize diverse host species. Here I used two complementary methods to examine whether son-killer has a wider host range than was previously anticipated. First, I used *Arsenophonus*-specific primers to screen a large sample of filth flies and their associated parasitoids for infection. I found that a wide range of pteromalid wasps were infected with *Arsenophonus* spp., indicating a transfer could have occurred when these species interact with *N. vitripennis*. Second, I inoculated four species of pteromalid wasps with a strain of *A. nasoniae* that I collected and isolated from field-caught *N. vitripennis*, and measured maternal transmission efficiency and male-killing activity. This bacterium was successfully transmitted to all four species, although maternal transmission efficiency was low, and this strain did not exhibit

detectable male-killing in any of the species used. I have also found that son-killer harbours a lysogenic bacteriophage that is widespread in *Arsenophonus* spp. infecting the filth fly community. The son-killer bacterium and its phage may play an important role in shaping its ecological community, and understanding their effects is crucial for establishing successful biocontrol programs for fly populations.

Teller, J.T.

Department of Geological Sciences, University of Manitoba, Winnipeg, MB

SUN 18 OCT 03:00 PM

PLENARY SYMPOSIUM

History of glacial Lake Agassiz and climate since the last ice age, as reflected in lake sediments

Today's landscape is largely the result of Pleistocene glaciation. The late-glacial and Holocene record of the past 10,000 years is recorded in the sediments of lakes, and indicates that there have been significant climatic and hydrological changes during this period. Until the ice sheet had melted from Canada, northward-draining rivers remained dammed, and an extensive but changing fringe of lakes lay along the ice margin from the Mackenzie River basin across the Prairies to the Great Lakes and into the St. Lawrence Valley. Glacial Lake Agassiz was the largest of these lakes (and the largest lake in the world), covering a total of >1.5 million km². Lake Agassiz influenced the climate, vegetation, and people of this vast region, and its overflow played a role in the evolution of the Great Lakes and the St. Lawrence, Athabasca and Mississippi River Valley systems. Overflow from Lake Agassiz entered three different oceans during its 5000-year history, and periodic catastrophic outbursts eroded deep valleys; these waters altered global ocean thermohaline circulation and brought about several episodes of global cooling during a period when the earth was warming. One of these bursts released 163,000 km³ of freshwater in less than a year (seven times the volume of the modern Great Lakes), causing oceans to encroach rapidly onto continental margins. In the Persian Gulf, which had been dry during glacial times, this Agassiz outburst caused the ocean to flood inland >12 km in only a few months, displacing people living along the Tigris and Euphrates Rivers and, perhaps, leading to stories about a Great Flood.

Tesfaendrias, M.T.; Vander Kooi, K.; McDonald, M.R.

Department of Plant Agriculture, University of Guelph, Guelph, ON

POSTER SESSION

Integrated pest management in the Holland Marsh

Integrated pest management in the Holland Marsh, Ontario, has been provided by the University of Guelph, Muck Crops Research Station since 2004. Insect traps and degree day models are used to predict the different life stages of carrot weevils (*Listronotus oregonensis*), carrot rust flies (*Psila rosae*), aster leafhoppers (*Macrostelus quadrilineatus*), onion flies (*Delia antiqua*) and tarnished plant bugs (*Lygus lineolaris*). In 2008, predicted compared to actual emergence of carrot rust flies was 26 and 29 May. Similarly, for onion flies, predicted vs. actual emergence was 12 and 15 May. Results are disseminated through phone, fax or e-mail.

Thielman, A.C.; Hunter, F.F.

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

MON 19 OCT 08:30 AM

PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

Morphological and molecular analyses of *Anopheles* (Diptera: Culicidae) mosquitoes for evidence of cryptic species in Canada

Preliminary morphological examination of *Anopheles* mosquitoes collected from across Canada revealed the possible occurrence of cryptic species. Many anopheline species are known to be complexes of isomorphic species, the members of which often differ in their ability to transmit pathogens. They are often distinguished using cytological, molecular, biochemical, ecological, or minor morphological traits. The results of two types of analyses used to look for evidence of cryptic species in *Anopheles* mosquitoes in Canada will be presented, namely molecular analyses using ribosomal (ITS1 and ITS2) and mitochondrial (COI) sequences, as well as SEM analyses of egg morphology.

Timms, L.

Faculty of Forestry, University of Toronto, Toronto, ON

MON 19 OCT 04:00 PM

GRADUATE STUDENT SYMPOSIUM

What happens after establishment? Using gypsy moth to explore indirect impacts of invasive species on native communities

Invasive species are considered one of the most serious threats affecting natural environments today; however, surprisingly little research has addressed the impacts of invasive species establishment on native foodwebs. My research addresses the questions: what are the ecological impacts of an exotic species upon its establishment in a new community? Does the community shift after the invasive establishes, and if so, what are the main drivers in this realignment? With a wide host range and a large assemblage of natural enemies, the gypsy moth has broad potential to affect native North American forest insects. I assessed the structure and diversity of caterpillar communities and their parasitoids in forests with and without histories of gypsy moth outbreak. Despite predictions to the contrary, neither gypsy moth history nor current abundance were strong predictors of caterpillar community structure or parasitism. However, correlations were observed between gypsy moth and several native defoliating species. One of these relationships was a strong positive association between the gypsy moth and the forest tent caterpillar. Currently, I am investigating the presence of indirect interactions between these two species using manipulative greenhouse experiments. Previous work suggests that forest tent defoliation may induce changes in host plant chemistry that reduce the gypsy moth's susceptibility to its virus, thereby creating a

positive feedback loop between the two species. If supported, my work will help explain the positive correlation between these two, and will be one of the first studies to demonstrate the complexity of interactions between exotic and native species following invasion.

Van Hezewijk, B.; Bouchier, R.S.

Agriculture and Agri-Food Canada, Lethbridge, AB

WED 21 OCT 09:45 AM

CONTRIBUTED PAPERS: BIOLOGICAL CONTROL, ECOLOGY AND BEHAVIOUR

Are two heads better than one? The interaction between a root galler and seed-head feeder in the biological control of diffuse knapweed

In a manipulative field experiment we tested the impact of the root galler, *Cyphocleonus achates*, on plant density, size, architecture, as well as seed-head number and size of diffuse knapweed. Subsequently, we tested the hypothesis that the seed-head weevil, *Larinus minutus*, was indirectly affected by the impacts of the root galler on the plant. The main effect of *C. achates* was to reduce plant height, increase lateral branching and decrease the number and size of seed-heads. In combination these effects had a negative impact on attack rate by *L. minutus*.

Vankosky, M.A.^{a, b}; Dosdall, L.M.^a; Cárcamo, H.A.^b

^a Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB; ^b Agriculture and Agri-Food Canada, Lethbridge, AB

MON 19 OCT 09:00 AM

PRESIDENT'S PRIZE ORAL: BIOLOGICAL CONTROL

Exploiting the weakest link: identifying endemic predators and parasitoids of *Sitona lineatus* eggs in southern Alberta

Endemic natural enemies may reduce populations of the pea leaf weevil (*Sitona lineatus* L.), an emerging pest of field peas in southern Alberta. In laboratory trials, predation of pea leaf weevil eggs over 48 hours ranged from 75 to 100% by small carabid beetles such as *Bembidion quadrimaculatum*. Egg predation by larger species such as *Pterostichus melanarius* was negligible over the same exposure period. No evidence of a parasitoid of pea leaf weevil eggs has been observed. Our study aims to integrate conservation biological control into an integrated pest management strategy for the pea leaf weevil in the southern prairies.

Veilleux, J.^a; Leferink, J.^b; Holliday, N.J.^a

^a Department of Entomology, University of Manitoba, Winnipeg, MB; ^b Forestry Branch, Manitoba Conservation, Winnipeg, MB

MON 19 OCT 09:15 AM

PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

Assessment of the benefits of rapid removal of elm trees infected with Dutch elm disease

A recent study showed that Manitoba's main Dutch elm disease vector, *Hylurgopinus rufipes*, can complete development in newly-infected American elm trees and emerge in late summer. Therefore, conventional winter removal of newly-symptomatic trees occurs after spore-bearing beetles have left. We assessed whether rapid (summer) removal would reduce infection rates by comparing infection rates in 14 Manitoba communities, seven having switched from winter removal to rapid removal in 2004. Rates of new Dutch elm disease infections in rapid removal communities were consistently lower, suggesting that rapid removal should be incorporated into Manitoba's integrated disease management program.

Veilleux, J.; Holliday, N.J.

Department of Entomology, University of Manitoba, Winnipeg, MB

POSTER SESSION

PRESIDENT'S PRIZE

The banded elm bark beetle, *Scolytus schevyrewi*, in Canada

The discovery of banded elm bark beetles, *Scolytus schevyrewi*, in Colorado in 2003 and Canada in 2006 poses a challenge to established Dutch elm disease management techniques. It is not known whether or not the beetle can transmit the pathogen and if the beetle's life cycle is similar in its native habitat, Asia, and in its new habitat. This project investigates the bionomics of *S. schevyrewi* in the prairies: number of generations, overwintering stages, host trees and interactions with *Ophiostoma novo-ulmi* and with the native elm bark beetle, *Hylurgopinus rufipes*. With this information, appropriate modifications can be made to the management strategies in place.

Vernon, R.S.^a; Herk, W. van^a; Clodius, M.^a; Tolman, J.H.^b; Noronha, C.^c

^a Agriculture and Agri-Food Canada, Pacific Agri-Food Research Centre, Agassiz, BC; ^b Southern Crop Protection and Food Research Centre, London, ON; ^c Charlottetown Research Station, Charlottetown, PE

TUE 20 OCT 02:30 PM

SYMPOSIUM: ENTOMOLOGICAL ISSUES IN POTATO PRODUCTION

Wireworms: we can control their damage, but can we kill them?

Wireworms are an increasing threat to many crops in Canada, and most of the previously-used insecticides have now been de-registered. In potatoes, only phorate (Thimet 15G) remains, and will be de-registered in 2012. Some of the leading candidate wireworm insecticides, including certain neonicotinoids (e.g., clothianidin) and pyrethroids (e.g. tefluthrin), although providing effective damage protection in some crops, are not actually as effective at reducing wireworm populations as the formerly used organophosphates, carbamates and organochlorines. We discuss laboratory and field efficacy studies that support this claim, and describe the future of wireworm control in Canada.

Waller, J.L.

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

MON 19 OCT 11:30 AM

PRESIDENT'S PRIZE ORAL: BIODIVERSITY, CONSERVATION, SYSTEMATICS

Parasitoid community shifts across the 'front' of an advancing forest tent caterpillar (*Malacosoma disstria*) outbreak in northern Alberta's boreal forest

I am investigating how the forest tent caterpillar (FTC) parasitoid community changes as FTC density shifts from endemic to epidemic to post outbreak levels. My research area covers 130 km² in northern Alberta's boreal forest cutting through the 'front' of a FTC outbreak, which is moving south. Over 10,000 FTC larvae and pupae were collected from which approximately 3500 parasitoids were reared. Eighteen per cent of larvae and 74% of pupae collected contained parasitoids. The majority of parasitoids were tachinid and sarcophagid flies. I will present the preliminary results of my first field season (2008) which will later be compared to data collected in 2009.

Waller, J.L.

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

POSTER SESSION

PRESIDENT'S PRIZE

Parasitoid competition or, "Can parasitoids distinguish previously parasitized hosts?"

I am investigating the forest tent caterpillar (FTC) parasitoid community in northern Alberta. Over 10,000 FTC larvae and pupae were collected in 2008, from which approximately 3500 parasitoids were reared. The majority of parasitoids were flies, with the two most common being *Arachnidomyia aldrichi* (Parker) and *Carcelia malacosomae* (Sellers). Interspecific competition was observed and investigated between these two parasitoids. I will present the surprising preliminary results of my first field season (2008) and the results of further field tests in 2009.

Walter, D.E.

Royal Alberta Museum and University of Alberta, Edmonton, AB

WED 21 OCT 10.30 AM

BIOLOGICAL SURVEY OF CANADA SYMPOSIUM

Unexpected diversity in boreal forest and aspen parkland mites (Acari: Oribatida): results from the Alberta Biodiversity Monitoring Institute

When the Alberta Biodiversity Monitoring Institute surveys began in 2007, 132 species of oribatid mites had been reported from Alberta, mostly from the Rocky Mountains. Currently, I have records for ~300 species, including three new to North America, 16 new to Canada and 95 previously unknown in Alberta; 24–35 of these represent new species. To date, most ABMI samples and new records are from boreal forest and aspen parkland, indicating an unexpected richness in these previously poorly sampled biotic regions. Limited samples from the grasslands also indicate numerous new species.

Wheeler, T.A.

Department of Natural Resource Sciences, Macdonald Campus, McGill University, Ste Anne-de-Bellevue, QC

TUE 20 OCT 08:15 AM

CONTRIBUTED PAPERS: SYSTEMATICS, CONSERVATION, BIODIVERSITY

Taxonomic impediments: unravelling the taxonomic, phylogenetic and ecological diversity of chloropid flies

Grass flies (Chloropidae) are one of the more species-rich families of higher flies and among the two or three most ecologically varied families of Diptera worldwide. This daunting taxonomic and ecological variety may be partly to blame for the historical lack of progress in documenting the diversity of these ubiquitous flies. Using examples from our recent and ongoing taxonomic, phylogenetic and ecological studies, I will discuss the evolutionary, logistic and anthropogenic challenges involved in trying to unravel the diversity of this poorly known group of very common insects. I will also attempt to justify why we bother.

Whitehouse, C.M.^a; Strong, W.B.^b; Evenden, M.L.^a

^a Department of Biological Sciences, University of Alberta, Edmonton, AB; ^b British Columbia Ministry of Forests and Range, Kalamalka Forestry Centre, Vernon, BC

MON 19 OCT 10:45 AM

PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

Multiple mating of female *Dioryctria* in British Columbia conifer seed orchards

Several seed and foliage-feeding species of *Dioryctria* Zeller (Lepidoptera: Pyralidae) are serious, economically important pests in conifer seed orchards. *Dioryctria* were sampled using black-light traps in *Pinus contorta*, *Picea glauca* and *Pseudotsuga menziesii* orchards in the north Okanagan Valley, British Columbia in 2008 and 2009. Specimens from within *abietella*, *auranticella*, *ponderosae*, *schuetzeella* and *zimmermani* species groups were dissected to determine mating status. Multiple mating occurred in females of all species groups collected, while remating frequency varied among the groups. Results will be discussed with reference to life history traits and the phylogenetic relationships within and among species groups.

Wijayaratne, L.K.W.^{a, b}; Fields, P.G.^b

^a Department of Entomology, University of Manitoba, Winnipeg, MB; ^b Agriculture and Agri-Food Canada, Cereal Research Centre, Winnipeg, MB

MON 19 OCT 09:30 AM

PRESIDENT'S PRIZE ORAL: APPLIED AND BASIC ECOLOGY

Diapause induction in the larvae of different populations of Indianmeal moth, *Plodia interpunctella* (Lepidoptera: Pyralidae)

Larvae of Indianmeal moth populations from Vancouver, California, and two places in Winnipeg were tested for their diapause induction. Larvae were reared at 25°C, 16 h light for 9 days, then placed at 20°C, 8 h light for the rest of their development. Indianmeal moths diapause as late instar larvae. The percentage induced to diapause at 20°C, 8 h light was 0±0%, 7±2%, 20±10%, and 23±5% for California, Vancouver, Winnipeg 1 and Winnipeg 2 populations, respectively. For the Vancouver population, selecting for diapause for another generation increased the percentage diapausing at 20°C, 8 h light to 14%.

Williams, N.M.^a; Winfree, R.^b; Kremen, C.^c

^a Department of Entomology, University of California-Davis, CA, USA; ^b Rutgers University, NJ, USA; ^c University of California-Berkeley, CA, USA

TUE 20 OCT 03:30 PM

SYMPOSIUM: POLLINATION BIOLOGY

Response of wild bees to landscape change and its implications for pollination services

We surveyed wild and managed bees visiting watermelon fields in two distinct regions of North America, the Mid-Atlantic and California's Central Valley. In each region we measured the species richness and abundance of flower visitors in melon fields along a landscape gradient from areas with high proportions of natural habitat to those in intensive agriculture. We also measured pollination by the different visitor taxa. Responses of pollinators and pollination service to landscape change differed strikingly between East and West. Although land use gradients were similar between regions, differences in landscape structure and farm site configuration contributed to differential responses.

Winchester, N.N.

Department of Geography, University of Victoria, Victoria, BC

TUE 20 OCT 01:30 PM

SYMPOSIUM: DIVERSITY IN FOREST ECOSYSTEMS

Diversity of arthropods in ancient forests: counting the uncounted

Threats to biodiversity are urgent matters and understanding the assembly, dynamics and structure of ecological communities, especially those containing rare taxa, are critical issues in ecological entomology. Several processes act to shape arthropod communities but it is clear that challenges to document species richness and evenness accurately in these forest communities still remain. Using analogous sampling of arboreal and terrestrial communities across different spatial scales in a temperate rainforest, I quantify the variation in species assemblages of Araneae, Oribatida, Staphylinidae and Braconidae.

Wise, I.L.^a; Woodbeck, N.^b; Fox, S.L.^a

^a Agriculture and Agri-Food Canada, Cereal Research Centre, Winnipeg, MB; ^b Canadian Grain Commission, Winnipeg, MB

MON 19 OCT 02:45 PM

CONTRIBUTED PAPERS: APPLIED ENTOMOLOGY

An estimate of economic losses to spring wheat caused by *Sitodiplosis mosellana* in western Canada, 2003–2008

Damage to wheat seed by the orange wheat blossom midge, *Sitodiplosis mosellana* (Gehin), reduces yield and seed grade. An estimate of yield losses in western Canada was calculated from the proportion of wheat degraded by the wheat midge in samples from western Canada that were sent to the Grains Research Laboratory in 2003 to 2008. The proportion of wheat degraded by midge in each seed grade was converted to yield losses by assessing the percentage of damaged wheat that is retained during harvest and then detected during grading, and from weight differences between damaged and undamaged seed in the harvested grain.

Wist, T.J.^a; Gries, R.^b; Lusebrink, I.^a; Evenden, M.L.^a

^a Department of Biological Sciences, University of Alberta, Edmonton, AB; ^b Department of Biological Sciences, Simon Fraser University, Burnaby, BC

MON 19 OCT 11:15 AM

PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

Volatile cues for the location of *Fraxinus* hosts by female *Caloptilia fraxinella* (Lepidoptera: Gracillariidae)

The ash leaf-cone roller, *Caloptilia fraxinella* (Lepidoptera: Gracillariidae), infests horticultural ash, *Fraxinus* spp. (Oleaceae), in Prairie urban forests. Discovery of volatile cues from ash hosts that attract gravid female moths is the first step in the development of a semiochemical-based attracticide. Six antennally-active compounds from black ash, *F. nigra*, were identified by GC-EAD. Gravid female moths oriented at a distance to black and green ash, *F. pennsylvanica*, in field and wind tunnel assays, respectively.

Wogin, M.J.^a; Roitberg, B.R.^a; Haye, T.^b; Gillespie, D.R.^c

^a Simon Fraser University, Department of Biological Sciences, Burnaby, BC ; ^b CABI-Europe Switzerland, Delémont, Switzerland ^c; Agriculture and Agri-Food Canada, Agassiz, BC

MON 19 OCT 08:15 AM

PRESIDENT'S PRIZE ORAL: BIOLOGICAL CONTROL

Intra-guild interactions between two parasitoids of the cabbage seedpod weevil and their effects on population dynamics and biological control

Studies examining effectiveness of single versus multiple species introductions in classical biological control have produced conflicting results due to the complex interactions that can occur. The cabbage seedpod weevil, an invasive pest in North America, has two European parasitoids under consideration as potential biological control agents. In order to determine the ideal parasitoid community as well as predict possible conflicts with established parasitoids in Canada, we conducted field and laboratory experiments examining the outcomes of inter-specific competitive interactions and their effects on parasitoid populations. Results and ecological implications are discussed.

Wohlfahrt, B.

University of Calgary, Calgary, AB

MON 19 OCT 03:00 PM

GRADUATE STUDENT SYMPOSIUM

Antagonistic selection on an antipredator defence: one predator type and the combined effects of prey phenotype and environment

Adaptations to heterogeneous environments may lead to phenotypic differentiation in closely related prey species. Predation is a strong selective factor that is known to facilitate phenotypic differentiation. In correspondence, prey species may possess a variety of different antipredator defences. However, the effectiveness of antipredator defences is not universal, and ineffective antipredator defences can lead to decreased survival. In this study, we examined the effectiveness of two morphological antipredator defences (body size and elytral maculation pattern) in four species of dytiscid diving beetles (Coleoptera: Dytiscidae) under heterogeneous environmental conditions (plant density and water colour). Dytiscid beetles represent a species rich and phenotypically diverse component of aquatic communities. Previous results have shown that the community composition of dytiscid beetles may be significantly influenced by environmental factors, such as predator presence, vegetation structure and water clarity. In correspondence with that, our results revealed that prey mortality risk generally decreased with larger body size, whereas the effectiveness of elytral maculation patterns depended on water colour and prey body size. In clear water, small maculated dytiscids had survival rates equal to larger plain beetles. However, under dark water conditions, the effectiveness of elytral maculation in larger beetles decreased to the point that it became detrimental to survival, revealing an adaptive trade-off. Our results suggest that interactions among biotic and abiotic factors in heterogeneous environments dominated by the same predator-type can lead to antagonistic selection on prey species' antipredator defences.

Work, T.T.^{a, b}; Renault, F.^{a, b}; Jacobs, J.^{a, b}; Brais, S.^{a, c}

^a NSERC/UQAT/UQAM Industrial Chair in Sustainable Forest Management; ^b Sciences Biologiques, Université du Québec à Montréal, Montréal, QC; ^c Université du Québec à Abitibi-Témiscamingue, Rouyn-Noranda, QC

TUE 20 OCT 02:00 PM

SYMPOSIUM: DIVERSITY IN FOREST ECOSYSTEMS

Managing deadwood and arthropod diversity in boreal forests under increasing demands for woody biomass feedstocks

With renewed interest in woody biomass feedstocks, additional mitigative measures aimed at replenishing stocks of dead wood may be needed to maintain biodiversity in managed boreal forests. Here we evaluate whether beetle communities respond differently to rapid deposition of coarse woody material (CWM) by late commercial thinning [dead wood pulse] than to CWM deposited from gradual loss of standing retention in conifer dominated stands in western Québec. We also provide an initial assessment of beetle response to the first commercial biomass harvesting conducted in this region and compare these responses to overall patterns in beetle diversity observed in related partial cutting trials.

Wytrykush, D.; Ritland, K.M.; Ritland, C.; Yeuh, H.

Department of Forest Science, University of British Columbia, Vancouver, BC

MON 19 OCT 10:30 AM

PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

Sibship structure of *Pissodes strobi* (Coleoptera: Curculionidae) in spruce stands

Pissodes strobi (Peck) is a major pest of spruce in British Columbia. Knowledge of the weevil on a small-scale stand level is extremely important to develop strategies that decrease possible resistance in *P. strobi* populations. To understand the population dynamics of *P. strobi*: three stand age classes of Sitka and Interior Spruce were sampled and 12 microsatellite loci were chosen for amplification in 429 weevil larvae. Understanding reproductive dynamics of *P. strobi* will help develop strategies for planting resistant trees to decrease the development of insect tolerance and further our knowledge of the possible coevolutionary dynamics of this system.

Zahradnik, T.^a; Takács, S.^a; Tsang, M.^a; Strong, W.B.^b; Bennett, R.G.^c; Gries, G.^a

^a Department of Biological Sciences, Simon Fraser University, Burnaby, BC; ^b British Columbia Ministry of Forests and Range, Kalamalka Forestry Centre, Vernon, BC; ^c British Columbia Ministry of Forests and Range, Saanichton, BC

MON 19 OCT 11:30 AM

PRESIDENT'S PRIZE ORAL: FOREST ENTOMOLOGY

Use of electromagnetic foraging cues by conophytic insects

The western conifer seed bug, *Leptoglossus occidentalis*, and Douglas-fir cone gall midge, *Contarinia oregonensis*, seek conifer cones for feeding or oviposition, often causing significant seed losses in seed orchards. Here we present evidence from laboratory and field experiments that (i) *C. oregonensis* appears to respond to infrared (IR) radiation from Douglas-fir cones as a foraging cue and (ii) that *L. occidentalis* utilizes wavelengths of visible and UV light, in addition to IR radiation, to locate cones of white pines. Our results may help design effective traps for monitoring and/or control of both insect species in seed orchards.