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Scientific Note
**The Occurrence of the Bat Bug,
Cimex pilosellus (Horváth)
(Hemiptera: Cimicidae), in Manitoba,
Canada**

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Although bats are an ecologically important component of the mammalian fauna in much of Canada, their ectoparasites are seldom collected and poorly known. Many cimicids are blood-feeding ectoparasites of bats, and are found most frequently in the cracks and crevices in roosting areas of their hosts, rather than on the hosts themselves. Usinger's 1966 monograph of the cimicids is still, taxonomically and biogeographically, the most comprehensive treatment of the group. Apart from this monograph, most of the work on bat bugs is anecdotal and much of the information is widely scattered in the literature.

Four of the seven species of cimicids recorded in Canada by Maw *et al.* (2000) are ectoparasites of bats. *Cimex latipennis* Usinger and Ueshima is western and recorded only from British Columbia (Maw *et al.* 2000). *Cimex brevis* Usinger and Ueshima is found in midwestern and northeastern North America, and has been reported from Quebec (Usinger 1966) and Ontario (Bower and Woo 1981a, b) in Canada. *Cimex adjunctus* Barber is mainly an eastern and midwestern species, and in Canada has been recorded from Newfoundland, Quebec, Ontario, and Manitoba (Maw *et al.* 2000). *Cimex pilosellus* (Horváth) is found in western North America, primarily on bats in the genera *Antrozous*, *Eptesicus*, *Lasionycteris*, *Myotis*, and *Pipistrellus* (Usinger 1966; Chilton *et al.* 2000), and has been recorded from British Columbia (Horváth 1910; Spencer 1934; Anonymous 1964b, 1965; Usinger 1966; Chilton *et al.* 2000), Alberta (Banfield 1948) and Saskatchewan (Anonymous 1964c). There are several records for *C. pilosellus* from Ontario and Quebec

(e.g. Stirrett 1936; Dymond 1938; Judd 1950; MacNay 1953; Anonymous 1964a), but these are almost certainly in error and are probably records for *C. brevis* and/or *C. adjunctus*. In more recent checklists (e.g. Usinger 1966; Froeschner 1988; Maw *et al.* 2000), there is no reference to these records as being *C. pilosellus*. Dood and Kurta (1982) considered specimens previously identified as *C. pilosellus*, from the Upper Peninsula of Michigan (see Lawrence *et al.* 1965) were probably *C. brevis* or *C. adjunctus*, though based on the known distributions at the time.

As a result of requests for fleas from bats, several specimens of cimicids were collected incidentally by several contributors from the field. Seven specimens were collected at four localities in Manitoba, from three different species of bats. All cimicids were *C. pilosellus* and they represent a substantial eastern extension in the known range of the species. Specimens are deposited in the J.B. Wallis Museum of Entomology (Department of Entomology, University of Manitoba) and the N. Wilson collection (Department of Biology, University of Northern Iowa).

NEW RECORDS: Manitoba: University of Manitoba Field Station, Delta, 28.viii.1981, from silver-haired bat, *Lasionycteris noctivagans*, 1♂ (coll. R. Barclay); same data, except 1.viii.1982, 1♂. Red Rock Lake, near Rennie, 1.vii.1988, from hoary bat, *Lasiurus cinereus*, 2♀ (coll. J.E. Christie). Mulvihill, 26.v.1990, from little brown bat, *Myotis lucifugus*, 1♀ (coll. J. Dubois). Taiga Biological Station, Wallace Lake, east of Bissett, 28.vi.1990, from *M. lucifugus*, 1♂, 1♀ (coll. D.D. Keam).

Cimicids typically spend most of their time hiding in and around the roosting areas of their hosts, making repeated visits to the host for a blood-meal. Consequently, they are usually most abundant in situations where there is a frequently available and reliable food source. Colonially roosting bats provide such a source, and may be present in large numbers of individuals as well. Therefore, it was not surprising that *C. pilosellus* was found in association with the colonial little brown bat. The hoary and silver-haired bats are solitary, tree-roosting species, shifting their roosting sites frequently. This behaviour pattern is not generally considered conducive to successful parasitism by cimicids, though *C. pilosellus* has been collected previously on *L. noctivagans* in British Columbia by Spencer (1934) and by Chilton *et al.* (2000).

Cimex brevis and *C. adjunctus* are the two bat cimicids reported from midwestern and northeastern North America (Froeschner 1988; Dood and Kurta 1982; Maw *et al.* 2000). Therefore, it is interesting to find *C. pilosellus* in eastern Manitoba, rather than *C. brevis* or *C. adjunctus*. The record of *C. pilosellus* nearest to Manitoba is in Saskatchewan. It is reasonable to expect that *C. brevis* will eventually be discovered in Manitoba, and that *C. brevis*, *C. adjunctus* and *C. pilosellus* may be broadly sympatric over parts of their ranges.

The occurrence of *C. pilosellus* in Manitoba raises some interesting questions regarding biogeography and overlap with other species of cimicids associated with bats. Clearly, there is a need for fundamental investigations on this group of ectoparasites.

ACKNOWLEDGEMENTS

We thank Robert Barclay, John Christie, Jack Dubois and Bill Pruitt for providing the specimens for this study, and Geoff Scudder for information about records of

cimicids in Ontario and Manitoba. We would also like to thank R.E. Roughley for undertaking the editorial services for this manuscript.

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Scientific Note

New Records of Dytiscidae (Insecta: Coleoptera) in Manitoba

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Manitoba is situated in the central part of Canada. It includes the border of some geomorphologically different regions (Precambrian Shield and Paleozoic to Cenozoic formations). It has a temperate-continental climate. Geology and climate combine to create different ecozones (Boreal Shield and Boreal Plain) within the province. Due to these various geophysical features, many species of Dytiscidae have the eastern or western limits of their distributions in Manitoba. As well, some widely distributed species (e.g. *Laccophilus maculosus* Say, *Coptotomus longulus* LeConte) have a transition zone between their eastern and western forms here. All this makes Manitoba an interesting and important region for collecting water beetles.

The most intensive study of Dytiscidae of Manitoba was conducted by J.B. Wallis. He reported 141 species of dytiscids from Manitoba (1973) and described three new species from this province (1924, 1933, and 1939). Larson *et al.* (2000) documented 148 species of Dytiscidae in Manitoba. Several recent collecting trips were carried out by us in the province. New faunistic data on three dytiscid species are presented herein. Specimens are deposited in the J.B. Wallis Museum, Department of Entomology, University of Manitoba.

Hydroporus melsheimeri Fall

1♂ : Canada, MANITOBA, (2002-04a); Whiteshell Provincial Park, backwater of Lyon's Lake, 49°44'06" N, 95°10'51" W; 14.vii.2002 (coll. Roughley and Shaverdo).

This species was recorded from southeastern Canada and northeastern USA. The most western points of its distribution were in western Ontario and Minnesota (Larson *et al.* 2000). The present record is an extension of its known distribution to the northwest. However, the species is not recorded for a new ecozone. It is so far known only from the Boreal Shield and Mixedwood Plains within Canada.

Oreodytes quadrimaculatus (Horn)

1♂ : Canada, Manitoba, Cowan Creek, 51°59'04" N; 100°40'49" W; 18.viii.2001 (coll. T. Mousseau).

This species has a western distribution in North America: central Alberta, southern British Columbia, Washington, Oregon, Nevada, and California. It is known from Montane Cordillera and Boreal Plain in Canada (Larson *et al.* 2000). It is apparent from the present record that *O. quadrimaculatus* is more widely distributed, and Cowan Creek is the most eastern point of its range, though this does not change the known distribution of the species among ecozones.

Acilius mediatius (Say)

1♂ : Canada, Manitoba, (77), NE, Richer, Hwy #506, ditch, 49°40'09" N; 96°05'30.6" W; 12.ix.2002 (coll. Shaverdo and Roughley).

This species has a distribution similar to, but much wider than *H. melsheimeri*. It occurs from Nova Scotia to southern Ontario and south to Florida and, in Canada, it is known from Boreal Shield, Mixedwood Plains, and Atlantic Maritime (Larson *et al.* 2000). Our new record extends its known distribution to the northwest. However, within Manitoba, *A. mediatius* is reported from the same ecozone (Boreal Shield) as previously.

Thus, at present, 151 species of Dytiscidae are known from Manitoba.

ACKNOWLEDGEMENTS

The study was conducted under support of Natural Sciences and Engineering Research Council of Canada through a 2001 NATO Science Fellowship to H.V. Shaverdo and research grant #A0428, to R.E. Roughley. We are grateful to M. Alperyn for his help and companionship during various collecting trips throughout the province.

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Scientific Note

Additional Records of Native Insects Associated with Purple Loosestrife, *Lythrum salicaria* L., in Southern Manitoba

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Lythrum salicaria has been implicated by several authors (e.g. Thompson *et al.* 1977, Malecki and Rawinski 1979) as putatively causing widespread ecological disruption of wetlands. Diehl *et al.* (1997) conducted an extensive survey of native insects associated with purple loosestrife, *Lythrum salicaria* L. (Lythraceae), in southern Manitoba. Several species of insects not reported in the aforementioned paper have since been collected from this plant. At two sites in southern Manitoba (Winnipeg (49° 53' N, 97° 09' W) and Netley-Libau Marsh (50° 12' N, 96° 43' W)), adult insects that were observed feeding directly on *L. salicaria* were collected. Immatures that were observed feeding directly on *L. salicaria* were also collected and reared to maturity in the laboratory on *L. salicaria* foliage. At Netley-Libau Marsh, where *L. salicaria* is well established, ten *L. salicaria* rootstocks were carefully excavated, bagged, and returned to the laboratory where they were dissected and examined for evidence of external and internal insect feeding damage.

Several species of Lepidoptera were reared from *L. salicaria* foliage in 1997. All belonged to the family Tortricidae and all are previously unrecorded host associations with *L. salicaria*:

Archips purpurana (Clemens). A small number of *L. salicaria* plants had the terminal leaves tied together, each containing one larva. At Winnipeg, several larvae were collected from *L. salicaria* on 13 June, 1997. According to Freeman (1958), *A. purpurana* is recorded from such diverse host plant genera as *Sassafras*, *Rhus*, *Ribes*, *Vaccinium*, *Rubus*, *Salix*, *Prunus*, *Solidago*, *Viola*, *Geranium* and *Fragaria*.

Archips argyrospila (Walker). At Netley-Libau Marsh, a single larva was collected from *L. salicaria* in June, 1997. *Archips argyrospila* is polyphagous, especially on trees but also on forbs (Powell 1964).

Olethreutes bipartitana (Clemens). A single larva was collected from *L. salicaria* at Winnipeg on 13 June, 1997. Miller (1987) cited *Spermolepis* as a host of *O. bipartitana*.

There are few published records of Tortricidae feeding on *L. salicaria*. Blossey (1995) collected a single larva of *Acleris lorquiniana* (Duponchel) from *L. salicaria* at one site in central Germany. Larvae of the first generation feed in *L. salicaria* shoot tips, while those of the second generation feed in the inflorescence. This species was not common and neither were the species collected in southern Manitoba. Specimens have been deposited in the Mississippi Entomological Museum, Mississippi State University.

A single specimen of the pale-striped flea beetle, *Systema blanda* Melshiemer (Coleoptera: Chrysomelidae), was found feeding on *L. salicaria* at Netley-Libau Marsh in June, 1997. Feeding on *L. salicaria* continued for several weeks in the laboratory. This species feeds on a wide variety of cultivated plants, including sugarbeets, alfalfa, potatoes, tomatoes, and beans (Capinera 1978). *Lythrum salicaria* is not recorded as a host plant for this species. This specimen has been deposited in the J.B. Wallis Museum of Entomology, University of Manitoba.

High densities (>1,000/plant) of *Myzus lythri* (Schränk) (Homoptera: Aphididae) were observed on *L. salicaria* plants at Netley-Libau Marsh during August, 1998. Diehl *et al.* (1997) collected *M. lythri* in small numbers from *L. salicaria* in southern Manitoba. Halbert and Voegtlin (1994) reported that by midsummer, *L. salicaria* became heavily infested with *M. lythri*. We observed no obvious negative effect of large aphid populations on *L. salicaria* plants at Netley-Libau Marsh in 1998. None of the above species were expected to have any long-term negative effects on *L. salicaria*.

Examination of *L. salicaria* rootstocks did not yield any evidence of external or internal feeding damage. Hight (1990) also excavated mature *L. salicaria* rootstocks, dissected, and examined them for damage from native North American insects and found no evidence of natural enemies feeding on or damaging *L. salicaria* rootstocks. Batra *et al.* (1986) listed several species of insects associated with *L. salicaria* rootstocks in Europe, including *Hylobius transversovittatus* (Coleoptera: Curculionidae), which has been introduced to North America for biological control of *L. salicaria*.

ACKNOWLEDGEMENTS

The authors thank Jason K. Diehl for determination of *Myzus lythri*, Darren A. Pollock (Eastern New Mexico State University) for identifying the specimen of *Systema blanda* and Richard L. Brown (Mississippi Entomological Museum, Mississippi State University) for identification of tortricids and providing additional tortricid references. This project was supported by the Institute for Wetland and Waterfowl Research,

Ducks Unlimited, Canada, the Canada-Manitoba Agreement on Agricultural Sustainability, and Natural Sciences and Engineering Research Council of Canada grant #A0428 to R.E. Roughley.

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Scientific Programme for the Joint Meeting of the Entomological Society of Manitoba and the Entomological Society of Canada

Winnipeg, Manitoba

5-9 October, 2002

Insects and Humans: Confrontation and Coexistence

Saturday, October 5

09:00-17:00 ESC Governing Board Meeting

Sunday, October 6, Session 1

09:30-13:00 Registration

13:30 Opening Ceremonies and Welcome

14:00 ESC Awards, Gold Medal Address

14:30 - 15:00 Refreshments

Art Show (On display until Wednesday)

Plenary Session

15:00 Dave W SCHINDLER The biogeochemistry of persistent organic pollutants in a subalpine lake.

16:00 Mark D RAUSHER Resistance management: lessons from coevolution.

Sunday Evening

19:00 - 20:00 **Students Meet the Board**

20:00 - 22:30 ESC-ESM 2002 Mixer

Monday, October 7, Session 2

Symposium: Human impacts on forests: consequences for insect populations.

Organized by Bob Lamb and Richard Westwood

08:30 Introduction. Richard Westwood

08:40 Jesse A LOGAN, J Régnière, JA Powell. Assessing the impacts of global climate change on forest insects.

09:20 Jens ROLAND, S Lele, B van Hezewijk Forest structure alters forest tent caterpillar population dynamics.

10:00 - 10:30 Refreshments

10:30 René I ALFARO, J King. Deployment of Sitka spruce with genetic resistance to the

- white pine weevil in British Columbia: maintaining host/insect balance.
- 11:00 Gaétan MOREAU. Is intensive silviculture responsible for outbreaks of balsam fir sawfly?
- 11:30 A Richard WESTWOOD, NJ Holliday. Can butterflies be used as reliable indicators of diversity at the site and landscape level in managed spruce and pine forests?

Monday, October 7, Session 3

Symposium: Crops as new habitats for insects - canola as a case study.

Organizer: John Gavloski

- 08:30 John GAVLOSKI. Crops as new habitat for insects.
- 08:40 Owen OLFERT, P Mason. The relationship between increased canola production in western Canada and incidence of the bertha armyworm, *Mamestra configurata*.
- 09:20 Bob ELLIOTT. Antixenosis and tolerance of *Brassica* cultivars to flea beetles - an historical perspective.
- 10:00 - 10:30 Refreshments
- 10:30 H CÁRCAMO, J Gavloski, J Soroka, J Otani. Abundance of *Lygus* bugs in canola grown adjacent to alfalfa.
- 11:15 Lloyd M DOSDALL, R Weiss, O Olfert, H Cárcamo. Invasion of canola by a new pest, the cabbage seedpod weevil.

Monday, October 7, Session 4

President's Prize Papers

Moderator: Donna Giberson

- 09:00 Ankush JOSHI, Denise L Olson. Effect of ground cover on the survival of overwintering *Aphthona* flea beetles.
- 09:15 Michael L CROWE, RS Bourchier. The affect of plant-insect interactions on interspecific competition within a component community of phytophagous insects.
- 09:30 N. RUDZIK, SM Smith. Recruitment of natural enemies to an introduced bark beetle.
- 09:45 Robyn M UNDERWOOD, Robert W Currie. Formic acid fumigation of indoor-wintered honey bee colonies for *Varroa destructor* Anderson and Trueman control.
- 10:00 - 10:30 Refreshments
- 10:30 David P SHORTHOUSE, JR Spence, WJA Volney. Spider wanderings as a correlated random walk.
- 10:45 David WADE. Community level effects of burn season (spring, summer, fall) on the spider (Araneae) fauna of a tallgrass prairie in southern Manitoba.
- 11:00 Steve OFFMAN. Complexity of component communities associated with a stem gall on wild roses along geographic gradients in northern Ontario.
- 11:15 Christie BORKOWSKY, Richard Westwood. Enhancing pollination of the endangered western prairie fringed orchid, *Platanthera praeclara* (Sheviak and Bowles), on the Manitoba Tall Grass Prairie Preserve in southeastern Manitoba.
- 11:30 Lisa BASPALY. Pool size and infusion preference of *Culex tarsalis*, *Culex restuans* and *Culiseta inornata* in Winnipeg, Manitoba.

Monday, October 7, Session 5

Symposium: Biological control and the native fauna and flora.

Organized and moderated by Neil Holliday

- 13:30 Jane MEMMOTT. Non-target effects in biological control: a food web approach.
- 14:00 Jens ROLAND. Biological control of the winter moth (*Operophtera brumata*) in Canada: interaction between introduced parasitoids and generalist predators.
- 14:30 Ulrich KUHLMANN. Non-target risk assessment in classical biological control of arthropods: the perspective of a practitioner.
- 15:00 - 15:30 Refreshments
- 15:30 Sandy SMITH. Impact of an introduced scolytid on its native competitor and natural enemy complex: can identifying a 'predator gap' help justify classical biological control?
- 16:00 Rose DE CLERCK-FLOATE. Post-release revelations on the host range of a root weevil.
- 16:30 Discussion

Monday Evening

20:00 - 22:00 ESC President's Reception

Monday, October 7, Session 6

President's Prize Papers

Moderator: Paul Fields

- 13:30 Matthew W CARROLL, IV MacRae, RA Suranyi, DW Ragsdale, EB Radcliffe. Site-specific management of green peach aphids in seed potato - windows of opportunity for targeted application.
- 13:45 Erin BULLAS. An investigation of varietal preferences exhibited by the potato leafhopper, *Empoasca fabae*, in edible beans, *Phaseolus vulgaris*.
- 14:00 Loida M TOBIAS, DL Olson, AL Thompson. Screening for resistance to green peach aphid, *Myzus persicae* (Sulzer) (Hemiptera:Aphididae), in *Solanum tuberosum*-derived germplasm.
- 14:15 Jennifer L BROCKMANN. Behavioural responses of ovipositing Hessian flies (*Mayetiola destructor* Say) to host plant chemicals.
- 14:30 Yasmin AKHTAR, MB Isman. Preventing habituation in cabbage looper, *Trichoplusia ni* (Lepidoptera: Noctuidae), by binary and tertiary mixtures of feeding deterrent compounds.
- 14:45 Frank B ANTWI, DL Olson, JJ Knodel. Field evaluation of biorational insecticides for managing the crucifer flea beetle, *Phyllotreta cruciferae* (Coleoptera: Chrysomelidae), on canola.
- 15:00 - 15:30 Refreshments
- 15:30 Erin HODGSON, I MacRae, K Ostlie, R Venette, D Ragsdale. Comparing spatial and temporal colonization of soybean aphid.
- 15:45 Karen M GROSS, MO Harris. The influence of Hessian fly feeding on aphid host selection.

16:00 Heritage Lecture - Dan L JOHNSON. The history of grasshopper outbreaks and research in Canada.

Monday Evening

20:00 - 22:00 ESC President's Reception

Monday, October 7, Session 7

President's Prize Papers

Moderator: Rhéal Lafrenière

- 13:30 R LAFFIN, D Langor, F Sperling. Gene flow between genetically divergent populations of *Pissodes strobi*.
- 13:45 Mireille MARCOTTE, J Delisle, JN McNeil. Impact of the obliquebanded leafroller (OBL) male mating history on post-mating receptivity of females.
- 14:00 Robert JOHNS, D Quiring, D Ostaff. Intracrown heterogeneity in temporal and spatial resource quality influences the foraging behaviour of a sawfly larva.
- 14:15 Colleen M SIMPSON, ML Reid. Thinning the boreal forest: do bark beetles benefit?
- 14:30 Pierre PAQUIN. Tracking diversity patterns in boreal forest succession with beetle trophic guilds.
- 15:15 Joshua JACOBS, J Spence. Diversity of saproxylic beetles along a forest successional pathway: from wildfire to old-growth to harvesting.
- 15:00 - 15:30 Refreshments
- 15:30 Lisa CAPAR, AR Westwood. Effect of regeneration type on the ecological diversity of carabid beetles (Coleoptera: Carabidae) in black spruce forests (*Picea mariana*) in eastern Manitoba.
- 15:45 DE SAUNDERS, AR Westwood. Effects of Mimic® (tebufenozide) applications on the diversity of non-target Lepidoptera in Manitoba's boreal forests.
- 16:00 JK SHADDOCK, AR Westwood. Comparing the diversity of carabid beetle populations (Coleoptera: Carabidae) in burned and harvested aspen-dominated forest stands in western Manitoba.

Monday Evening

20:00 - 22:00 ESC President's Reception

Tuesday, October 8, Session 8

Symposium: Understanding the chemical language of insects.

Organized and moderated by Désirée VANDERWEL

- 09:00 Stephen FOSTER. Biosynthesis of sex pheromone in moths: role of the glandular lipids.
- 09:30 Johanne DELISLE. Pheromone physiology in tortricids with different reproductive strategies.
- 10:00 - 10:30 Refreshments
- 10:30 Gerhard GRIES, D Babor, B Duthie, S Takacs, P Schaefer, G Khaskin, R Gries.

Getting the message across: communication within and among developmental stages in insects.

- 11:00 Steven J SEYBOLD. Recent progress in the biochemistry and molecular biology of isoprenoid pheromone production in bark beetles (Coleoptera: Scolytidae).
- 11:30 Désirée VANDERWEL. Pheromone-mediated mating behaviour in the yellow mealworm beetle, *Tenebrio molitor*: who? what? when? where? why? and how?

Tuesday, October 8, Session 9

Symposium: Illuminating the 'green' box: challenges in quantifying the impacts of insect herbivores.

Organized and moderated by Rose De Clerck-Floate

- 08:45 Rose DE CLERCK-FLOATE. Introduction.
- 09:00 Ragan CALLAWAY. Soil microbes affect interactions among natives, invasives, and herbivores.
- 09:30 Robert PETERSON. Relationships between insect injury, plant physiological response, and crop yield.
- 10:00 - 10:30 Refreshments
- 10:30 Stephen MATTER. *Tetraopes tetraophthalmus* feeding on *Asclepias syriaca*: problems and considerations in assessing the impact of herbivory.
- 11:00 Barry COOKE. Impact of forest tent caterpillar defoliation on wood properties in trembling aspen.
- 11:30 Alec McCLAY. Is it working yet? Evaluating the impact of biocontrol agents on weeds.

Tuesday, October 8, Session 10

Regular Submitted Papers

Moderator: Patricia MacKay

- 08:45 Marjorie AH SMITH, RJ Lamb. Protecting the wheat midge resistance gene in common wheat using refugia.
- 09:00 PE HALLETT. Analysing spatial dispersal within managed hives of solitary bees and wasps (Hymenoptera).
- 09:15 Robert R McGREGOR, DR Gillespie, DMJ Quiring, MRJ Foisy. Intraguild predation by *Dicyphus hesperus* Knight (Heteroptera: Miridae) on *Encarsia formosa* Gahan (Hymenoptera: Aphelinidae).
- 09:30 DA RAWORTH, MC Robertson, S Bittman. Carabids in tall fescue forage grass and response to different nutrient inputs.
- 09:45 Timothy T WORK, JR Spence, J Volney, K Cryer. Habitat composition versus habitat structure: evaluating coarse filter strategies for maintaining invertebrates in boreal forests.
- 10:00 - 10:30 Refreshments
- 10:30 Terry D GALLOWAY. Lice (Phthiraptera) infesting Manitoba's provincial bird, the great gray owl, *Strix nebulosa*.
- 10:45 DB STRONGMAN, G Simpson, HN LeBlanc. Blow flies associated with pig carcasses in Nova Scotia.

- 11:00 Y ALARIE, RG Beutel. Larval morphology of the Hygrobiidae (Coleoptera: Adepaha: Dytiscoidea) with phylogenetic considerations.
- 11:15 Pierre PAQUIN, Marshal C Hedin. Application of molecular tools for conservation: the case of blind *Cicurina* (Araneae: Dictynidae) from Texas caves.
- 11:30 RS Vetter, AH Roe, RG BENNETT, CR Baird, LA Royce, WT Lanier, AL Antonelli, PE Cushing. Dispelling myth and hyperbole: the distribution and relative abundance of two invasive funnelweb spiders, *Tegenaria agrestis* and *T. duellica* (Araneae, Agelenidae), in Canada and the United States.
- 11:45 IL WISE, WJ Turnock. The relative abundance of native coccinellids in Manitoba before and after the appearance of the seven-spotted lady beetle (*C7*), *Coccinella septempunctata* L.

Tuesday, October 8, Session 11

Symposium: Arthropods of Canadian grasslands: ecology and interactions in grassland habitats.

Organized and moderated by Terry Wheeler

- 13:30 TA WHEELER. Introduction.
- 13:40 JD SHORTHOUSE. Attributes of Canada's diverse grasslands.
- 14:00 TA WHEELER, S Boucher. Trophic guilds of higher Diptera in xeric Yukon grasslands.
- 14:20 David WADE. Spiders (Araneae) collected in a tallgrass prairie in southern Manitoba and their importance to prairie conservation.
- 14:40 Rob E ROUGHLEY. The use of fire as a biodiversity and conservation management tool on tallgrass prairie.
- 15:00 - 15:30 Refreshments
- 15:30 Michael ALPERYN. Ponds in prairie habitats: a changing dynamic illustrated by predaceous water beetles.
- 15:50 Dan L JOHNSON. Temporal changes in the grasshopper (Orthoptera: Acrididae) fauna of Alberta grassland, in response to fire, weather and vegetation changes.

Tuesday, October 8 Session 12

Symposium: Graduate Student Symposium

Organized and moderated by Rob Bouchier

- 13:30 Madlen DENOTH, JH Myers. Between the devil and the deep blue sea: biological control of purple loosestrife (*Lythrum salicaria*) in British Columbia.
- 14:00 Vanessa CARNEY, RA De Clerck-Floate. *Mecinus janthinus* Germar (Coleoptera: Curculionidae) on the rangeland weed, *Linaria dalmatica* (L.) Mill., community.
- 14:30 Xingwei HOU, P Fields. Control of stored-product insects with protein-enriched pea flour.
- 15:00 - 15:30 Refreshments
- 15:30 Brian H VAN HEZEWIJK, J Roland. The spatial dynamics of a host-parasitoid.
- 16:00 Wade JENNER, U Kuhlmann, B Roitberg. Assessing the parasitoid community attacking a concealed cherry bark pest.

Tuesday, October 8, Session 13

Regular Submitted Papers

Moderator: Brent Elliott

- 13:30 Brent G ELLIOTT, Ian Wise. *Lygus* spp. (Heteroptera: Miridae) as a pest of buckwheat in Manitoba.
- 13:45 Laurence D CHARLET. Incidence and damage to confection sunflower by lygus bugs in North and South Dakota.
- 14:00 Janet J KNODEL, DL Olson, BK Hanson, R Henson. Interactions of planting dates - insecticides for pest management of the crucifer flea beetle (*Phyllotreta cruciferae* (Goeze)) in canola in North Dakota.
- 14:15 C VINCENT, I Pronier, J-C Côté, S Todorova. Progress in obliquebanded leafroller management with bioinsecticides.
- 14:30 Martin SHAPIRO. Enhancement in activity of homologous and heterologous baculoviruses infectious to the beet armyworm and fall armyworm (Lepidoptera: Noctuidae) by a baculovirus from the gypsy moth (Lepidoptera: Lymantriidae).
- 14:45 DA RAWORTH, MC Robertson. Aphids and blueberry scorch virus.
- 15:00 - 15:30 Refreshments
- 15:30 Ian MACRAE, D Ragsdale, R Venette. Remote sensing of buckthorn and early season scouting of soybean aphid.
- 15:45 Robert A SURANYI, IV MacRae, MW Carroll, DW Ragsdale, EB Radcliffe. Green peach aphid, *Myzus persicae* (Sulzer) (Hemiptera: Aphididae), development on harvested canola.
- 16:00 Edward B RADCLIFFE, DW Ragsdale, RA Suranyi, IV MacRae. Aphid alert.
- 16:15 MJ UDDIN, NJ Holliday, PA MacKay, W Powell, JA Pickett, S Graves. Attraction of insect natural enemies to aphid sex pheromones in fields of alfalfa.

16:30-18:00 PM ESC Annual General Meeting

18:30-21:30 PM Banquet

Wednesday, October 9, Session 14

Workshop: North American dragonflies.

Organized and moderated by Terry Galloway and Jim Duncan

- 08:30 Terry GALLOWAY. Introduction.
- 08:40 Philip S CORBET. Dragonflies: flagships of Canada's wetlands.
- 09:40 Rob CANNINGS. The dragonflies of northern British Columbia: field surveys, collections development, conservation and public education.
- 10:00 - 10:30 Refreshments
- 10:30 John ACORN. Alberta Odonata: a growing fauna, and a growing interest.
- 10:50 Brent ELLIOTT. Odonata in Manitoba: diversity and transition.
- 11:10 Paul M BRUNELLE. Acquisition and management of Odonata for conservation study.
- 11:30 Donna J GIBERSON, Michelle Dobrin. Dragonflies at the edges: studies of Odonata along the Prince Edward Island coast and some northern rivers.

13:30-16:30 Dragonflies: A status assessment workshop.**Moderated by Jim Duncan****Wednesday, October 9, Session 15****Workshop: *Delia* spp. as pest of crops in Canada.****Organized and moderated by Peggy Dixon**

- 08:30 Peggy DIXON. Introduction.
- 08:35 Julie J SOROKA, LM Doslall, OO Olfert, E Seidle. Occurrence of root maggot injury to canola in western Canada.
- 09:00 Neil J HOLLIDAY, A Hawkins-Bowman, R Haverluck, S Offman, J Gavloski, DL McLaren. Patterns of occurrence of *Delia radicum* in canola in Manitoba.
- 09:30 Lloyd M DOSDALL, GW Clayton, KN Harker, JT O'Donovan, FC Stevenson. Weed removal and root maggot (*Delia* spp.) infestations in canola: making pest management strategies compatible.
- 10:00 - 10:30 Refreshments
- 10:30 Peggy L DIXON, JR Coady, CK Parsons. Undersowing brassicas for management of *Delia radicum*, the cabbage maggot.
- 11:00 KS HEMACHANDRA, NJ Holliday, U Kuhlmann. The parasitoid guild of *Delia radicum* in canola in the Canadian Prairies and Europe.
- 11:30 Guy BOIVIN. Semiochemical use in biological control of *Delia* spp.

12:00-2:00 PM. ESC Governing Board**Wednesday, October 9, Session 16****Regular Submitted Papers****Moderator: Ian Wise**

- 08:45 Lynn C WESTCOTT, SF Pernal, D. Nelson. Honey bee pollination of hybrid canola in southern Alberta.
- 09:00 Lucie ROYER, J Luther, D Piercey, C Marks. Risk assessment of defoliation by hemlock looper based on stand characteristics.
- 09:15 JE COSSENTINE, EK Deglow, LBM. Jensen. Biological control of orchard leafrollers using indigenous parasitoids.
- 09:30 RS BOURCHIER A Reynolds, S ERB. Mating behaviour of *Chamaesphecia crassicornis* (Lepidoptera: Sesiidae), a potential weed biocontrol agent of leafy spurge, *Euphorbia esula* (Euphorbiaceae).
- 09:45 RS BOURCHIER, ML Crowe. Post-hoc assessment of biological control: interspecific interactions between biological control agents of spotted knapweed (*Centaurea biebersteinii* DC (= *maculosa* Lam.)) in southeastern British Columbia.
- 10:00 - 10:30 Refreshments
- 10:30 KM ANDERSON, MO Harris. The fitness cost of major gene resistance to hessian fly.
- 10:45 MIRANPOUR, TD Galloway. Arrestment of three species of *Telenomus* (Hymenop-

tera: Scelionidae) by a contact kairomone extracted from the abdomens and egg masses of their hosts, *Hybomitra* spp. and *Chrysops* spp. (Diptera: Tabanidae).

- 11:00 Edward B. MONDOR. Attack of the clones: aphid cornicle droplets as directional alarm signals.
- 11:15 Sheila M Fitzpatrick, JT Troubridge, KA Weitemeyer. Delayed mating affects fecundity of the blackheaded fireworm of cranberry, *Rhopobota naevana* (Hbn.) (Lepidoptera: Tortricidae).

**Scientific Programme Abstracts for the
2002 Joint Annual Meeting of the
Entomological Society of Manitoba
and the
Entomological Society of Canada**

Winnipeg, Manitoba
5-9 October, 2002

Insects and Humans: Confrontation and Coexistence

(S) - Session number, (P) - Poster number

The name of the presenter is capitalized.

(S14) John ACORN, Department of Renewable Resources, University of Alberta, Edmonton, AB, T6G 2H1.

Alberta Odonata: a growing fauna, and a growing interest.

In the last 40 years, our understanding of the Alberta odonate fauna has improved dramatically. We now have detailed information on geographic ranges, habitat associations, and phenologies. Some species appear to have invaded Alberta in recent decades, aided by anthropogenic habitats, and by a 20-year warming trend in our climate.

(S6) Yasmin AKHTAR and Murray B. Isman, Faculty of Agricultural Sciences, University of British Columbia, Vancouver BC V6T 1Z4. Preventing habituation in cabbage looper, *Trichoplusia ni* (Lepidoptera:Noctuidae) by binary and tertiary mixtures of feeding deterrent compounds.

The effect of rearing larvae of *Trichoplusia ni* on individual feeding deterrents and on mixtures of deterrents on their subsequent gustatory sensitivity was measured in paired choice leaf disc bioassays. Our experiment supports the hypothesis that mixtures of deterrents can prevent habituation, and provides one explanation for the multiplicity of chemical defences found in many plants.

(S10) Y. ALARIE¹ and R. G. Beutel², ¹Department of Biology, Laurentian University, Sudbury, ON; ²Friedrich-Schiller-Universität, Institut für Spezielle Zoologie

und Evolutionsbiologie, Jena, Germany. Larval morphology of the Hygrobiidae (Coleoptera: Adephaga: Dytiscoidea) with phylogenetic considerations.

The larval ground plan of Hygrobiidae is discussed. The Australian species *H. watti* and *H. australasiae* are related phylogenetically by presence of a bluntly rounded mandible and by the apical position of the primary pore MNd in instar I. The hypothesis of phylogenetic relationship [Amphizoidae + (Dytiscidae + Hygrobiidae)] is indicated by several larval character states. Informal groupings of Hygrobiidae with the dytiscid subfamilies Matinae and Hydroporinae are apparent based on larval morphology.

(S2) René I. ALFARO¹, John King², ¹Canadian Forest Service, Victoria, BC. ²BC Ministry of Forests, Victoria, BC. Deployment of Sitka spruce with genetic resistance to the white pine weevil in British Columbia: maintaining host/insect balance.

The white pine weevil, *Pissodes strobi*, a native insect, is an important pest that limits Sitka, Engelmann, and White spruce reforestation in western Canada. This insect reduces timber values and hinders plantations from achieving a “free to grow” status. *Pissodes strobi* has one generation per year. Eggs are laid in the leader, in punctures excavated under the bark. The larvae mine under the bark, girdling and killing the apical shoot. Damaged trees have poor quality and do not develop into straight trees suitable for lumber production. This presentation describes a collaborative research project aimed at screening spruce trees genotypes for resistance to the white pine weevil and at understanding the genetic breadth of both the host and the pest for attributes that are relevant to the development and deployment of resistance spruce stocks. Several spruce genotypes with heritable resistance have been found, and these are in the process of being propagated for inclusion in seed orchards and reforestation programs in British Columbia. We hope that these genotypes will help in restoring Sitka spruce as the species of choice in many coastal habitats and reduce losses in other species. Deployment of resistance against a native insect requires that we balance the need for increased plantation of resistant stock to boost productivity, against the increased risk of insect adaptation, which may result if too much resistant stock is used.

(P209) Mohammad AL-MAZRA'AWI¹, Peter Kevan¹, Bruce Broadbent², ¹Department of Environmental Biology, University of Guelph, Guelph, ON, N1G 2W1; ²SCPFRC, Agriculture and Agri-Food Canada, London, ON. Biological control of the tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), by *Beauveria bassiana* (Balsamo) delivered by the European honey bees to canola flowers.

A dry inoculum of the entomopathogenic fungus *Beauveria bassiana* was disseminated on the bodies of honey bees to the flowers of canola for the management of the tarnished plant bug. Honey bees efficiently delivered *B. bassiana* to canola were 69.2% of the flowers contained the fungus spores. Adults of *L. lineolaris* collected from the treated plants showed average mortality of 53.7% compared to 10.3% in the controls.

(S11) Michael ALPERYN, Department of Entomology, University of Manitoba, Winnipeg, MB, R3T 2N2. Ponds in prairie habitats: a changing dynamic illustrated by predaceous water beetles.

Predaceous water beetles (Coleoptera: Dytiscidae) were collected along a transect of southern Manitoba. Thirty-two ponds were sampled once per month (May – September) employing volumetric sampling and bottle traps. Factors affecting the dytiscid fauna will be discussed in relation to prairie habitats using boreal pond ecosystems for comparison.

(S16) K. M. ANDERSON and M. O. Harris, Department of Entomology, 202 Hultz Hall, North Dakota State University, Fargo, ND 58105. The fitness cost of major gene resistance to hessian fly.

Wheat genotypes with major gene resistance to Hessian fly can successfully defend themselves from Hessian fly attack, but at what cost to fitness? Three winter wheat genotypes containing the H6, H9, or H13 resistance genes were examined. The fitness costs of plants infested with Hessian fly were estimated by measuring various plant reproductive traits relative to uninfested plants.

(S6) Frank B. ANTWI, Denise L. Olson, and Janet J. Knodel, Department of Entomology, North Dakota State University, Fargo ND, 58105. Field evaluation of biorational insecticides for managing the crucifer flea beetle, *Phyllotreta cruciferae* (Coleoptera: Chrysomelidae), on canola.

Field studies were conducted in 2001 and 2002 with the biorational insecticides *Saccharopholyspora spinosa*, *Beauveria bassiana*, Azadirachtin, and kaolin, a particle film, at low, medium and high rates to assess their impact on the crucifer flea beetle *Phyllotreta cruciferae* (Goeze). *Saccharopholyspora spinosa* showed the best efficacy against the crucifer flea beetle.

(S4) Lisa Baspaly, Department of Entomology, University of Manitoba, Winnipeg, MB, R3T 2N2 Canada. Pool size and infusion preference of *Culex tarsalis*, *Culex restuans* and *Culiseta inornata* in Winnipeg, Manitoba.

Mosquito surveillance methods using hay infusion and small ovipools were tested. *Culex tarsalis* females prefer standing tap water over hay infusion for oviposition. When corrected for surface area, there was no difference in the efficacy of medium, large and traditional metre-square pools for surveillance of *Culex tarsalis*, *Culex restuans* and *Culiseta inornata*.

(S15) Guy BOIVIN, CRDH, Agriculture et Agroalimentaire Canada, 430 Boul. Gouin, Saint-Jean-sur-Richelieu, Québec Canada J3B 3E6. Semiochemical use in biological control of *Delia* spp.

The staphylinid beetle, *Aleochara bilineata*, could be an efficient biological control agent against several species of *Delia* if kairomones are used. These kairomones

increase the predatory behaviour of the adult beetle that can significantly decrease egg counts and damage caused by *Delia* spp. However, our capacity to control, and even monitor, *Delia* populations is challenged by the presence of subpopulations with different developmental biology.

(S4) Christie BORKOWSKY¹ and Richard Westwood², ¹Department of Entomology, University of Manitoba, Winnipeg, MB R3T 2N2, Canada. ²Department of Biology, University of Winnipeg, Winnipeg, MB Canada. Enhancing pollination of the endangered western prairie fringed orchid, *Platanthera praeclara* (Sheviak and Bowles), on the Manitoba Tall Grass Prairie Preserve in southeastern Manitoba.

The floral structure of the western prairie fringed orchid, *Platanthera praeclara* (Sheviak and Bowles), limits pollinators to Sphingidae that possess a long proboscis. Under natural conditions, rates of seedpod development are extremely low. Ultraviolet lights are used to lure pollinators from surrounding areas and increase their feeding activity among the orchids.

(S16) R.S. Bouchier, A. Reynolds and S. ERB, Agriculture and Agri-Food Canada, Lethbridge Research Centre, Lethbridge, AB T1J 4B1 Canada. Mating behaviour of *Chamaesphecia crassicornis* (Lepidoptera: Sesiidae), a potential weed biocontrol agent of leafy spurge, *Euphorbia esula* (Euphorbiaceae).

Mating behaviour of *Chamaesphecia crassicornis* was studied to improve mass rearing techniques for eventual biocontrol releases. Factors such as mate status, insect age, copulation duration and weather variables were tested for their contribution to mating success and female fecundity. Maximum oviposition of viable eggs was achieved with single mated females, under natural light, on days with some cloud cover.

(S16) R. S. BOURCHIER¹ and M. L. Crowe^{1,2}, ¹Agriculture & Agri-Food Canada Research Centre, Lethbridge, AB, Canada. ²Department of Biology, University of Lethbridge, Lethbridge, AB, Canada. Post-hoc assessment of biological control: interspecific interactions between biological control agents of spotted knapweed (*Centaurea biebersteinii* DC (= *maculosa* Lam.)) in southeastern British Columbia.

Competitive interactions can be an important component affecting the success of biological control. Spotted knapweed has been the target of an aggressive operational biological control program dating back to the late 1960's that has resulted in the establishment of nine insects attacking knapweed in BC. Population densities and species interactions were assessed for four seed-head feeding and two root-feeding biocontrol agents at 38 biocontrol release sites. Attack rates were assessed relative to competing species, plant characteristics and history of the releases site to improve the future redistribution of established knapweed biocontrol agents and assess requirements for additional biocontrol agents.

(S6) Jennifer L. Brockmann, Department of Entomology, North Dakota State University, Fargo, ND 58105 USA. Behavioural responses of ovipositing Hessian flies (*Mayetiola destructor* Say) to host plant chemicals.

In 2000, Morris et al. reported on the identification of two ovipositional stimulants for the Hessian fly, 1-octacosanal and 6-methoxy-2-benzoxazolinone. Here we report on the results of behavioural observations to determine which behaviours or sequence of behaviours leading up to oviposition, are stimulated by these two plant chemicals.

(S14) Paul M. BRUNELLE, 2460 John Street, Unit 1, Halifax, Nova Scotia, B3K 4K7 Canada. Acquisition and management of data on Odonata for conservation study.

Past study of Odonata was principally taxonomic; however, since the 1980s, there has been an increased desire to list species of dragonflies for conservation purposes. I will speak to the appropriate procedures for assessing Odonata for ranking and listing, and to the means whereby professional and volunteer surveys can be employed to increase the amount and quality of specific data for an area.

(S6) Erin BULLAS, Department of Plant Agriculture, University of Guelph, Guelph, ON, N1G 2W1 Canada. An investigation of varietal preferences exhibited by the potato leafhopper, *Empoasca fabae*, in edible beans, *Phaseolus vulgaris*.

The potato leafhopper can be a serious pest of edible beans. This pest appears to demonstrate preferences for different varieties of beans. This study investigates whether varietal preferences exhibited by the potato leafhopper are driven by visual and olfactory cues.

(S9) Ragan CALLAWAY, Division of Biological Sciences, University of Montana, Missoula, Montana, 59812 USA. Soil microbes affect interactions among natives, invasives, and herbivores.

The introduction of insects as biocontrols assumes the success of invasive plants is due to the lack of natural enemies. However, damage to *Centaurea maculosa* may decrease, increase, or have no effect on its performance. Variation in the response of *Centaurea* may be due to abiotic conditions and soil microbes.

(S14) Rob CANNINGS, Curator of Entomology, Royal British Columbia Museum, 675 Belleville Street, Victoria BC V8W 9W2 Canada. The dragonflies of northern British Columbia: field surveys, collections development, conservation, and public education.

This 6-year project, begun in 2000, determines the status and habitat/management requirements of the 63 species (11 are considered to be at risk) recorded north of 52 degrees in BC. Other goals include improving the scope of the Royal BC Museum's collection, increasing public awareness of dragonfly biology and conservation, and fostering an ongoing, local interest in dragonfly monitoring and research.

(S7) Lisa CAPAR¹ and A. R. Westwood², ¹Department of Entomology, University of Manitoba, Winnipeg, MB, Canada. ²Center for Forest Interdisciplinary Research, University of Winnipeg, Winnipeg, MB, Canada. Effect of regeneration type on the ecological diversity of carabid beetles (Coleoptera: Carabidae) in black spruce forests (*Picea mariana*) in eastern Manitoba.

Ecosystem diversity of black spruce (*Picea mariana*) forests of Eastern Manitoba disturbed by either natural fire or harvest are compared using carabid beetle (Coleoptera: Carabidae) and vegetative biodiversity indices. This study provides baseline data in black spruce dominated boreal forest to assess long term effects of disturbances.

(P212) H. CÁRCAMO¹, R. Byers¹, B. Beres¹, F. Clarke² and R. DePauw², Agriculture and Agri-Food Canada, ¹Lethbridge, AB and ² Swift Current, SK Canada. Effect of wheat cultivar on the wheat stem sawfly, *Cephus cinctus* (Hymenoptera, Cephidae).

The wheat stem sawfly has resurged in the last four years to become a major pest of wheat in southern Alberta and Saskatchewan. Our ongoing research shows that solid stem cultivars such as AC Abbey and AC Eatonia significantly reduce sawfly survivorship and fitness (weight, size, fecundity) compared to hollow stem cultivars such as CDC Teal and AC Cadillac.

(S3) H. CÁRCAMO¹, J. Gavloski², J. Soroka³ and J. Otani⁴, ¹Agriculture and Agri-Food Canada, Lethbridge, AB. ²Manitoba Agriculture and Food, Carman, MB. ³Agriculture and Agri-Food Canada, Saskatoon, SK. ⁴Agriculture and Agri-Food Canada, Beaverlodge, AB. Abundance of *Lygus* bugs in canola grown adjacent to alfalfa.

Lygus bugs are an old pest of alfalfa but a relatively new problem in canola. We sampled canola and alfalfa fields grown adjacent to determine potential *Lygus* bug movement between the two crops, especially migration to canola after alfalfa hay harvest. Our results suggest that alfalfa is not a major source of *Lygus* populations in canola in the study areas where *L. borealis* is more common in alfalfa and *L. lineolaris* in canola.

(S12) Vanessa CARNEY¹ and R. A. De Clerck-Floate², ¹Biology Department, University of Lethbridge, Lethbridge, AB, T1K 3M4. ²Agriculture and Agri-Food Canada, Lethbridge, AB, T1J 4B1 Canada. At home on the range: evaluating the quality of a biocontrol weevil following its establishment on Dalmatian toadflax.

The relationship between host resource availability and population quality of an endophagous insect is examined using the weed, Dalmatian toadflax, and its biocontrol agent, *Mecinus janthinus*, as a model. Insect fitness, measured by progeny survival, adult size and fecundity, is assessed against shoot vigour and across levels of intraspecific weevil competition.

(S6) Matthew W. CARROLL, I.V. MacRae, R.A. Suranyi, D.W. Ragsdale, and E.B. Radcliffe, Department of Entomology, University of Minnesota, Saint Paul, MN 55108 USA. Site-specific management of green peach aphids in seed potato – windows of opportunity for targeted application.

Green peach aphid (GPA), *Myzus persicae* (Sulzer), is the primary vector of potato leaf roll virus. An opportunity to manage GPA at the field margins exists but the window available for treatment is unknown. The spatial and temporal distribution of GPA in potatoes was assessed and treatment windows determined.

(S13) Laurence D. CHARLET, USDA, ARS, Northern Crop Science Laboratory, Box 5677, University Station, Fargo, ND 58105 USA. Incidence and damage to confection sunflower by lygus bugs in North and South Dakota.

Confection sunflower has experienced damage by lygus bug feeding. Fields were surveyed for damage and studies were conducted to determine injury levels and susceptible stages. Adults damaged 10 to 20 seeds per head, all reproductive growth stages were vulnerable to attack, and damage occurred in both North and South Dakota.

(P217) Man-Young CHOI¹, Bernard D. Roitberg², and David A. Raworth³, ¹Honam National Agricultural Experiment Station, RDA, Korea. ²Biological Sciences Simon Fraser University. ³Pacific Research Station Agrifood-Canada. Oviposition site selection by aphidophagous gall-midge, *Aphidoletes aphidimyza*, using honey dew of a host aphid, *Myzus persicae*.

We studied the effect of *Myzus persicae* honeydew volatiles on the oviposition site seeking behaviour of aphidophagous gall-midge, *Aphidoletes aphidimyza*, in a wind tunnel bioassay. Treatments included: plants infested with aphids, plants alone, honeydew collected on plants, and honey dew on tin foil. The midges responded positively to treatments in which honeydew was involved.

(S9) Barry COOKE, Natural Resources Canada, Canadian Forestry Service, Laurentian Forestry Centre, P.O. Box 3800, Ste-Foy, QC, G1V 4C7. Impact of forest tent caterpillar defoliation on wood properties in trembling aspen.

When trembling aspen are defoliated by forest tent caterpillar, the annual ring produced that season has a whitish tone - but why? We examined the possibility that this is a result of changes in lignin production that might be part of a coordinated, systemic plant molecular response to physical wounding.

(S14) Philip S. CORBET, Crean Mill, St Buryan, Cornwall TR19 6HA U.K. Dragonflies: flagships of Canada's wetlands.

Dragonflies in Canada constitute a rich and varied resource for the investigator, due largely to the foundation laid by E.M. Walker in his fine monographs. Because populations of some species exist across a wide latitudinal range, they offer fruitful opportunities for investigating climate-dependent life-cycle strategies needed for seasonal regulation.

(S16) J.E. COSENTINE, E.K. Deglow and L.B.M. Jensen, Agriculture and Agri-Food Canada, Pacific Agri-Food Research Centre, Summerland, BC, V0H 1Z0, Canada. Biological control of orchard leafrollers using indigenous parasitoids.

Leafrollers in organic orchards in the southern interior of BC are hosts to a rich complex of parasitoid species. Key parasitoid species have been colonized to evaluate the potential to augment indigenous populations. The progress and challenges in supplementing leafroller parasitism in fruit orchards will be discussed.

(S4) Michael L. CROWE,^{1,2} and **R.S. Bouchier**¹,¹Agriculture & Agri-Food Canada Research Centre, Lethbridge, AB; ²Department of Biology, University of Lethbridge, Lethbridge, AB, Canada. The effect of plant-insect interactions on interspecific competition within a component community of phytophagous insects.

A gall-fly, *Urophora affinis*, and a seedhead weevil, *Larinus minutus*, are two introduced biocontrol agents released against spotted knapweed, *Centaurea maculosa*. The two species compete asymmetrically. The fly interfered with the weevil indirectly, resulting in lower weevil attack rates and reduced survivorship, particularly as fly densities increased.

(S5) Rose DE CLERCK-FLOATE, Agriculture and Agri-Food Canada, Lethbridge Research Centre, P.O. Box 3000, Lethbridge, Alberta, T1J 4B1. Post-release revelations on the host range of a root weevil.

Potential non-target attack on native North American plant species was investigated post-release of a European weevil (*Mogulones cruciger*) introduced to Canada to control the rangeland weed, houndstongue (*Cynoglossum officinale*). Comparisons of laboratory/garden host-specificity test results to attack in the field indicate over-estimations of the predicted ecological host range and level of attack on non-targets.

(S8) Johanne Delisle, Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre, P.O. Box 3800, 1055 du P.E.P.S., Sainte-Foy (Qc) G1V 4C7 Canada. Pheromone physiology in tortricids with different reproductive strategies.

While the SBW and the OBL are similar with respect to pheromone synthesis, they have different physiological mechanisms regulating the inhibition of pheromone synthesis following mating. This aspect will be discussed in relation with their different reproductive strategies, such as a post-mating migratory flight in the SBW but not in the OBL

(S12) Madlen DENOTH, Judith H. Myers, Department of Zoology, The University of British Columbia, 6270 University Boulevard, Vancouver BC, V6T 1Z4 Canada. Between the devil and the deep blue sea: biological control of purple loosestrife (*Lythrum salicaria*) in British Columbia.

We examined the performance of the biocontrol agent of purple loosestrife, *Galerucella californiensis*. While the damage inflicted on the target weed can be significant, the success by the control agent is variable. Our results suggest that the abiotic environment determines if biological control is favored or disrupted.

(S15) Peggy L. DIXON¹, Juanita R. Coady² and Carolyn K. Parsons¹, Agriculture and Agri-Food Canada, P.O. Box 39088, St. John's, NF A1E 5Y7, ¹Department of Forest Resources and Agri-foods, Fortis Tower, Corner Brook, NF A2H 6J8². Undersowing brassicas for management of *Delia radicum*, the cabbage maggot.

Undersowing vegetable brassicas reduces cabbage maggot oviposition according to the theory of appropriate/inappropriate landings. We present results from rutabaga undersown with clover, and cauliflower undersown with winter wheat. Research on other aspects of management of the cabbage maggot (forecasting, adult emergence patterns and egg traps) will be discussed briefly.

(S15) L.M. DOSDALL¹, G.W. Clayton², K.N. Harker², J.T. O'Donovan³, and F.C. Stevenson⁴, ¹University of Alberta, Edmonton, AB. ²Agriculture and Agri-Food Canada, Lacombe, AB. ³Agriculture and Agri-Food Canada, Beaverlodge, AB. ⁴Rogers Road, Saskatoon, SK. Weed removal and root maggot (*Delia* spp.) infestations in canola: making pest management strategies compatible.

Early weed removal gives the crop a competitive advantage over weeds and is widely recommended for optimal crop production. However, in field experiments, we found that root maggot infestations in canola declined significantly with a delay in weed removal. Weedy backgrounds minimized opportunities for female flies to complete the behaviours required for oviposition, leading to reduced infestations in heterogeneous environments. In some situations, it may be appropriate to ameliorate root maggot damage by maintaining some weedy background.

(S3) L.M. DOSDALL¹, R. Weiss², O. Olfert², and H. Cárcamo³, ¹University of Alberta, Edmonton, AB. ²Agriculture and Agri-Food Canada, Saskatoon, SK. ³Agriculture and Agri-Food Canada, Lethbridge, AB. Invasion of canola by a new pest, the cabbage seedpod weevil.

The cabbage seedpod weevil, *Ceutorhynchus obstrictus* (Marsham), has dispersed rapidly through cropland in western Canada since its discovery in Alberta in 1995. Migration to canola occurs primarily in bud and early flower, but thereafter adults remain primarily in the inflorescence. The CLIMEXTM model predicts establishment of this pest throughout the entire region of canola production in western Canada. Parasitoids of *C. obstrictus* have recently begun to disperse through canola cropland in pursuit of the weevil.

(S3) Bob ELLIOTT, Agriculture and Agri-Food Canada, Saskatoon, SK. Antixenosis and tolerance of *Brassica* cultivars to flea beetles - an historical perspective.

Flea beetles have been a chronic pest of *Brassica* crops in western Canada since the early 1940's. A six-year field study was conducted to evaluate antixenosis and tolerance of rapeseed, mustard and canola cultivars to flea beetles. Cultivars differed in their attractiveness, palatability and tolerance to flea beetles. Tolerance varied depending on environmental conditions, seed size and seed quality.

(S14) Brent ELLIOTT, Manitoba Agriculture and Food, Carman, MB. Odonata in Manitoba: diversity and transition.

Manitoba is a province with a tremendous diversity of habitat available for Odonata. The geographic location of Manitoba also places it in a unique position and serves as a transition point from eastern to western species. Manitoba dragonfly projects, species composition and the transitional nature of the fauna will be discussed.

(S13) Brent G. ELLIOTT¹, Ian Wise², ¹Manitoba Agriculture and Food, Box 1149, 65 - 3rd Ave NE, Carman, MB. ²Cereal Research Centre, AAFC, 195 Dafoe Rd., Winnipeg, MB, R3T 2M9. *Lygus* spp. (Heteroptera: Miridae) as a pest of buckwheat in Manitoba.

Buckwheat grown in Manitoba was not considered as a suitable host for *Lygus* because of its late growth habits. However, recent reports have indicated *Lygus* were feeding and causing possible yield losses in buckwheat. Studies were initiated to determine the phenology, species composition and within field distribution of *Lygus* spp. in buckwheat in Manitoba.

(P207) Paul FIELDS, Cereal Research Centre, Agriculture and Agri-Food Canada, Winnipeg, MB, R3T 2M9. Laboratory selection for resistance to diatomaceous earth.

At the end of the three years of selection using occasional high doses of DE, *Sitophilus oryzae* had a LD₅₀ four times the control, *Cryptolestes ferrugineus* had a LD₅₀ three times the control, *Tribolium castaneum* had a LD₅₀ two times the control. Constant low doses, or top half treatment did not increase resistance.

(S16) Sheila M. FITZPATRICK, James T. Troubridge and Karen A. Weitemeyer, Agriculture and Agri-Food Canada, Pacific Agri-Food Research Centre, PO Box 1000, Agassiz, BC V0M 1A0, Canada. Delayed mating affects fecundity of the blackheaded fireworm of cranberry, *Rhopobota naevana* (Hbn.) (Lepidoptera: Tortricidae).

When pheromone-based mating disruption is used to manage blackheaded fireworm, most males fail to find and mate with receptive females, but some succeed. If mate search is slowed by the atmosphere of disruptant, mating will occur later than normal. The effects of delayed mating were studied in the lab. Among moths of the first flight (June), the incidence of mating was highest for male-female pairs two or four days old. Females in six- or eight-day-old pairs often died or did not

mate. The mean number of fertile eggs in the first flight was highest for females mated at one day of age, and declined steadily with advanced age at mating. Among moths of the second flight (July - August), which mature more slowly, live longer and lay diapause eggs, a different pattern was observed.

(P231) O.S. Flint¹ and D.J. GIBERSON², ¹Department of Entomology, Smithsonian Institution, Washington, DC 20560, USA. ²Dept. of Biology, University of Prince Edward Island, Charlottetown, PE, C1A 4P3 Canada. Salt marsh caddisflies: discovery of the larva and larval habitat of *Limnephilus ademus* in salt marshes in Prince Edward Island, Canada.

Limnephilus ademus adults were collected in emergence traps in saltmarshes during biting fly surveys in 1993, prompting subsequent study on the larvae. Saltmarshes are abundant and important coastal habitats in eastern Canada. We present a description of the larva of *L. ademus*, plus information on ecology and habitat.

(P215) R. FOOTIT¹, E. Maw¹, R. Barrette², ¹Eastern Cereal and Oilseed Research Centre, Agriculture and Agri-Food Canada, Central Experimental Farm, Ottawa, Ontario K1A 0C6. ²National HIV Laboratory, Health Canada, Postal Locator 0603A1, Bldg. 06, Ottawa, Ontario K1A 0L2 Phylogeny of *Aphis* L. species (Hemiptera: Aphididae) using microsatellite flanking region sequences.

The taxonomy of the genus *Aphis* L. is difficult due to the large number of species and a continuous gradient of morphological variation. We have developed a preliminary phylogeny for some species of *Aphis* using microsatellite flanking region sequence (MFRS). MFRS markers are useful for determining relationships both with and among species.

(S8) Stephen FOSTER, Department of Entomology, North Dakota State University, PO. Box 5346, Fargo, ND 58105, USA. Biosynthesis of sex pheromone in moths: role of the glandular lipids.

Most moth species biosynthesize sex pheromones via synthesis and metabolism of fatty acids. During biosynthesis, large amounts of fatty acyl pheromone precursors are incorporated into triacylglycerols and other lipid classes in the pheromone gland. Whether these fatty acyl moieties have a role in pheromone biosynthesis or not has rarely been studied. Evidence for possible roles is discussed.

(P211) K.M. FRY, Alberta Research Council. Bag 4000 Vegreville AB T9C 1T4 Canada. Spatial distribution of Thysanoptera in canola.

To obtain a better understanding of the potential for Thysanoptera to affect yield in canola a comprehensive survey of the thrips fauna in canola fields in Alberta and small plot experiments were conducted between 1997 and 2002. Spatial distribution, host plant preferences and damage by thrips will be addressed.

(S10) Terry D. GALLOWAY, Department of Entomology, Faculty of Agricultural and Food Sciences, University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2. Lice (Phthiraptera) infesting Manitoba's provincial bird, the great gray owl, *Strix nebulosa*.

Sixty-seven (61.5%) of 109 Great Gray Owls salvaged from the Manitoba Wildlife Rehabilitation Organization and from Manitoba Conservation (1994-2002) were infested with *Strigiphilus remotus* at a mean intensity of 63.3 (1-867) lice per infested bird. *Kurodaia magna* infested 15 of 109 owls (12.8%) at a mean of 68.5 per infested owl (1-238). Nine birds were infested with both *S. remotus* and *K. magna*. The implications of extracting information on the ectoparasite fauna of salvaged birds will be discussed.

(S3) John GAVLOSKI, Manitoba Agriculture and Food, Carman, MB. Crops as new habitat for insects.

The introduction of canola (*Brassica napus* and *Brassica rapa*) into the landscape of the Canadian prairies resulted in a dramatic and quite sudden increase in the level of cruciferous plants available to herbivores. This had a substantial effect on some of the generalists herbivores and crucifer specialists that were present. This symposium demonstrates how four species of insects have and continue to respond to this relatively new habitat, which itself continues to undergo chemical and ecological modifications.

(S14) D.J. GIBERSON¹, Michelle Dobrin², ¹Department of Biology, University of Prince Edward Island, Charlottetown, PE, C1A 4P3 Canada. ²Freshwater Institute, Fisheries and Oceans Canada, Winnipeg MB R3T 2N6 Canada. Dragonflies at the edges: studies of Odonata along the Prince Edward Island coast and some northern rivers.

Odonata were studied in PEI National Park (1997-2000) to determine species composition, phenology, and distribution. Thirty-eight species of Odonata were recorded for the park, of 60 or so known from the province. Further collections were made along two northern Canadian rivers (the Horton and the Thelon) during 2000 and 2002.

(P230) D.J. GIBERSON, D. Blacquiere, Department of Biology, University of Prince Edward Island, Charlottetown, PE, Canada C1A 4P3. A microlimnological study of the fluid habitat of the northern pitcher plant, and relationships with its insect inhabitants.

Little information is available on the physical/chemical habitat within the purple pitcher plant and how it affects the insect inhabitants. Water chemistry and temperature were measured biweekly plus hourly (during daylight) on three sample dates, in addition to regular biological collections. All factors were extremely variable, both seasonally and diurnally.

(P228) G.A.P. GIBSON¹ K.D. FLOATE², Agriculture and Agric-Food Canada, ¹ Eastern Cereal and Oilseed Research Centre, Ottawa, ON, K1A 0C6; ² Lethbridge Research Centre, Lethbridge, AB T1J 4B1 Canada. Parasitic wasps (Hymenoptera) of filth flies (Diptera: Muscidae) on dairies in Ontario and Quebec.

A survey on dairies near Ottawa, Ontario, Canada, identified a parasitoid fauna of filth flies similar to that reported for dairies in New York state, and very distinct from similar surveys in Alberta and Manitoba. Recovered parasitoids comprised 15 species with more than 60% of individuals in the genus *Spalangia*.

(S8) G. GRIES, D. Babor, B. Duthie, S. Takacs, P. Schaefer¹, G. Khaskin, R. Gries, Department of Biological Sciences, Simon Fraser University, Burnaby, British Columbia. V5A1S6. Canada. ¹United States Department of Agriculture, Agricultural Research Service, Beneficial Insects Introduction Research Laboratory, Newark, Delaware 19713 USA. Getting the message across: communication within and among developmental stages in insects.

We will present recent findings of intraspecific communication signals employed among developmental stages of holometabolous insects (house flies, *Musca domestica*; codling moth, *Cydia pomonella*), and will show that the type of communication system (signal) employed by adult insects may be dependent upon characteristics of larval resources (webbing clothes moth, *Tineola bisseliella*) and community composition (gypsy moth, *Lymantria dispar*; nun moth, *Lymantria monacha*).

(S6) K. M. GROSS, M. O. Harris, Department of Entomology, North Dakota State University, 202 Hultz Hall, Fargo, ND 58105, USA. The influence of Hessian fly feeding on aphid host selection.

This study explored the interaction between two herbivores that attack wheat plants, *Mayetiola destructor* (Say) and *Rhopalosiphum padi* (Linnaeus). Alate aphids were given a choice of plants that had been fed upon by Hessian fly larvae for different periods of time. Resulting aphid abundances were measured 10 days after aphid introduction.

(S10) P.E. HALLETT, Departments of Physiology and Zoology, University of Toronto, Toronto, ON. Analysing spatial dispersal within managed h³Senior Scholar, Department of Botany University of Manitoba, Winnipeg, MB. Blue stain fungi associated with the European pine shoot beetle, *Tomicus piniperda*, in red pine in Ontario.

Fungi, including *Ophiostoma ips*, *O. minus*, *Leptographium procerum*, *L. lundbergii*, and a species complex centered on *L. wingfieldii* were isolated from beetle galleries and sapwood stain in trees and trap logs infested with, *T. piniperda*, as well as from trapped beetles. Fungi were identified employing morphological and molecular criteria.

(S15) K. S. HEMACHANDRA¹, N. J. Holliday¹, U. Kuhlmann², ¹Department of Entomology, University of Manitoba, Winnipeg, MB R3T 2N2. ²CABI Bioscience Centre Switzerland, Rue des Grillons 1, CH-2800 Delémont Switzerland. The parasitoid guild of *Delia radicum* in canola in the Canadian Prairies and Europe.

The parasitoid guilds of *D. radicum* in prairie Canadian and European canola were compared to assess feasibility of classical biocontrol. In both localities, the guild consists mainly of *Aleochara bilineata*, *Trybliographa rapae*, and *Phygadeuon* spp. *Aleochara verna* occurs in the prairies and this or the morphologically similar *A. bipustulata* occurs in Europe. Levels of parasitism of *D. radicum* in the prairies and Europe will be presented.

(P204) Allison E. HENDERSON, Centre for Environmental Biology, Simon Fraser University, 8888 University Drive, Burnaby B.C. V5A 1S6 Canada. Pheromone identification for a Costa Rican weevil, *Exophthalmus jekelianus*: potential implementation of a pheromone-based coffee IPM plan in Costa Rica.

This project aims to identify a pheromone for an economically important polyphagous Costa Rican weevil, *Exophthalmus jekelianus* (Coleoptera: Curculionidae), on coffee, *Coffea arabica*, by exploring its chemical and behavioural ecology. Results of weevil choice y-tube bioassays and behavioural observations in Costa Rican shade and non-shade coffee plantations will be reported.

(S6) Erin HODGSON, Ian MacRae, Ken Ostlie, Rob Venette, Dave Ragsdale, 219 Hodson Hall, 1980 Folwell Ave., University of Minnesota, St. Paul, MN 55108, USA. Comparing spatial and temporal colonization of soybean aphid.

Four commercial soybean fields were grid sampled in 2002 for soybean aphid, *Aphis glycines* Matsumura, in southern Minnesota. Each field was sampled twice per week, beginning with early vegetative plants. Initial colonization was also monitored by a series of eight pan traps integrated into each field.

(S15) N.J. HOLLIDAY¹, A. Hawkins-Bowman¹, R. Haverluck¹, S. Offman¹, J. Gavloski², D.L. McLaren³, ¹Department of Entomology, University of Manitoba, Winnipeg, MB R3T 2N2. ²Soils and Crops Branch, Manitoba Agriculture and Food, Box 1149, Carman, MB, R0G 0J0. ³Agriculture and Agri-Food Canada, Brandon Research Centre, P.O. Box 1000A, R.R.#3 Brandon, MB R7A 5Y3. Patterns of occurrence of *Delia radicum* in canola in Manitoba.

In field plots, higher seeding densities and zero tillage were associated with reduced root damage to canola. A similar response to plant density was seen in commercial fields, but here, the strongest correlate with root damage was rotation interval. In commercial fields without windbreaks, larval density and root damage were highest at field margins; no such elevation was observed near windbreaks.

(S12) Xingwei HOU¹, Paul Fields², ¹Department of Entomology, University of Manitoba; ²Cereal Research Centre, Agriculture and Agri-Food Canada. Control of stored-product insects with protein-enriched pea flour.

Protein-enriched pea flour was toxic and repellent to common stored-product insects *Sitophilus oryzae* and *Cryptolestes ferrugineus*, but it was not toxic to their parasitoids, *Anisopteromalus calandrae* and *Cephalonomia waterstoni*. The results from a granary trial on barley and a 330-kg-barrel test on wheat will be presented.

(S16) Sh. IRANIPOUR, A. Kharrazi Pakdel, Gh. Radjabi, Gh. Rasoulian, H. Karim Modjeni, Department of Plant Protection, University of Tehran, Karaj, Iran. Age specific mortality and temperature-dependent development of immature stages of a Sunn pest (*Eurygaster integriceps* Put.) (Heteroptera: Scutelleridae) at four constant temperatures.

Stage mortalities of Sunn pest, *Eurygaster integriceps* Put., immatures studied using age-specific life tables in four constant temperatures on MAHDAVI wheat cultivar kernels, revealed that 7-34% of the initial cohort developed to the adult stage. The highest mortality occurred at 22 and the lowest at 25°C. Second instar nymphs experienced the highest mortality, and the first instar had the lowest. The lower developmental threshold was determined as 18.9°C in Iran. An accumulation of 275 degree-days is needed to complete pre-adult development.

(S16) M. IRANIPOUR, T.D. Galloway, Department of Entomology, University of Manitoba, Winnipeg, MB. Arrestment of three species of *Telenomus* (Hymenoptera: Scelionidae) by a contact kairomone extracted from the abdomens and egg masses of their hosts, *Hybomitra* spp. and *Chrysops* spp. (Diptera: Tabanidae).

Three *Telenomus* spp., parasitoids of tabanid eggs, were arrested by contact with hexane extracts of their hosts, *Hybomitra* and *Chrysops* spp. In contrast, hexane extracts of adult Stratiomyiidae, Pentatomidae, and Pyralidae did not elicit the arrestment response. Parasitoids did not respond to extracts from a distance.

(P232) Alida F. JANMAAT, J. Myers, Department of Zoology, University of British Columbia, 6270 University Blvd. Vancouver, British Columbia, V6T 1Z4. Inheritance of resistance to *Bacillus thuringiensis kurstaki* in *Trichoplusia ni*.

Resistance to the control product, *Bacillus thuringiensis kurstaki* (*Btk*), has developed in populations of *Trichoplusia ni* residing in commercial vegetable greenhouses in British Columbia. To determine the inheritance of resistance, F1 progeny of reciprocal crosses of resistant adults and adults of a susceptible laboratory colony were assayed for resistance. Backcrosses of the F1 progeny to the parental populations were performed to determine if the resistance trait is due to a single gene.

(S7) Joshua JACOBS, John Spence, University of Alberta, Edmonton, AB, Canada. Diversity of saproxylic beetles along a forest successional pathway: from wildfire to old-growth to harvesting.

Saproxylic beetles are dependant on dead and dying trees, and play important roles in forest processes. Saproxylic beetles were collected from undisturbed stands, a prescribed burned conifer stand and partially harvested conifer stands at the EMEND research site. Although the community structure appears similar, the composition of those communities differs.

(S12) Wade JENNER¹, Ulrich Kuhlmann², Bernie Roitberg¹, ¹Department of Biological Sciences, Simon Fraser University, Burnaby, BC Canada. ² CABI Bioscience Centre Switzerland, Delémont, Switzerland. Assessing the parasitoid community attacking a concealed cherry bark pest.

A multi-scale assessment of the distribution of parasitoids attacking the cherry bark tortrix, *Enarmonia formosana* Scopoli, on cherry trees in Europe was conducted. The rate of parasitism by the dominant larval-prepupal endoparasitoid, *Campoplex* cf. *dubitator*, was independent of host density per tree and the distribution of parasitoids was influenced by host tree characteristics.

(S7) Robert JOHNS, Dan Quiring, Don Ostaff, P.O. 44455, 28 Denene Drive, University of New Brunswick, Fredericton, NB, E3B 6G8 Canada. Intracrown heterogeneity in temporal and spatial resource quality influences the foraging behaviour of a sawfly larva.

Yellow-headed spruce sawfly larvae feed as early instars on protected inner shoots of black spruce branches but disperse after fourth instar to complete development feeding on exposed apical shoots. We examine the adaptive value of this foraging behaviour and test several hypotheses to explain why it has evolved.

(S11) Dan L. JOHNSON, Lethbridge Research Centre, Agriculture and Agri-Food Canada, Lethbridge, AB, T1J 4B1. Temporal changes in the grasshopper (Orthoptera: Acrididae) fauna of Alberta grassland, in response to fire, weather and vegetation changes.

Grasshopper species composition varies among natural regions within the grassland biome, and changes over time as a function of weather, which affects the reproduction, survival and development, and vegetation, in accordance with food plant preferences and nutritional needs. Short-term changes following grassland fire have also been monitored.

(S7) Dan L. JOHNSON, Lethbridge Research Centre, Agriculture and Agri-Food Canada, Lethbridge, AB, T1J 4B1. The history of grasshopper outbreaks and research in Canada.

Short-horned grasshoppers (Acrididae) have an intricate ecological relationship with post-glacial grassland in Canada, and their activities have also greatly impressed the human residents. Periodic outbreaks have continued to the present day, often involving dramatic changes in species and damage, among years and locations. The research response will be reviewed.

(S4) Ankush JOSHI, Denise L. Olson, Department of Entomology, North Dakota State University, Fargo, ND, 58102, USA. Effect of ground cover on the survival of overwintering *Aphthona* flea beetles.

Currently we do not understand the importance of ground cover to the ability of the introduced biocontrol agents of leafy spurge, *Aphthona* flea beetles, to overwinter. Field studies were conducted in southeast North Dakota to determine the effect of snow cover on the ability of the flea beetles to overwinter successfully.

(S13) KNODEL, J.J.¹, D.L. Olson², B.K. Hanson³, R. Henson⁴, ¹NC Research Extension Center, Minot, ND 58701. ²Department of Entomology, NDSU, Fargo, ND 58105. ³Langdon Res. Ext. Center, Langdon, ND 58249. ⁴Carrington Res. Ext. Center, Carrington, ND 58421 USA. Interactions of planting dates-insecticides for pest management of the crucifer flea beetle (*Phyllotreta cruciferae* (Goeze)) in canola in North Dakota.

Canola cv. RaideRR (open pollinated) was seeded at two different planting dates: mid and late May. Efficacy of different commercial insecticide seed treatments and a foliar insecticide were evaluated for control of the crucifer flea beetle. Trials were conducted at the research extension centres in Minot, Langdon, and Carrington..

(P208) Justin O. KNOTT, Mark A. Boetel, Phillip A. Glogoza, 202 Hultz Hall, North Dakota State University, Fargo, ND 58105. Tarnished plant bug abundance in relation to host crop phenology.

Tarnished plant bug (TPB), *Lygus lineolaris*, abundance was monitored among four host crops (alfalfa, canola, sugarbeet, and sunflower) at two locations in the Red River Valley during 2001 and 2002 to determine the influence of crop growth stage on population dynamics. Generally, significant TPB activity occurred during reproductive and/or high growth periods of all host habitats sampled.

(S5) Ulrich KUHLMANN, CABI Bioscience Centre, Rue des Grillons 1, 2800 Delémont, Switzerland. Non-target risk assessment in classical biological control of arthropods: the perspective of a practitioner.

Two ongoing arthropod biological control programs will be used to illustrate the value of the field host and natural enemy surveys in the area of origin to predict natural enemy habitats and host range in the area of introduction. In addition, the ecological information obtained by field surveys in the area of origin will aid in selecting non-target species for physiological host specificity testing under quarantine conditions in the area of introduction.

(P226) George KYEI-POKU, Berni Benkel, Mark. S. Goettel, Kevin Floate, Lethbridge Research Centre, Agriculture and Agri-Food Canada, Lethbridge, AB, T1J 4B1 Canada. Phylogenetic relationships of *Wolbachia* in a guild of wasps parasitic on filth flies (Diptera: Muscidae).

Type A and Type B strains of *Wolbachia* bacteria were identified in parasitoids (Hymenoptera) of filth flies (Diptera: Muscidae). Infections were detected in *Aphaereta pallipes* (A+B), *Brachymeria podagrica* (A), *Diapria conica* (A), *Kleidotoma* sp. (A), *Muscidifurax uniraptor* (A), *Nasonia vitripennis* (A+B), *Nasonia vitripennis* (A), *Pachycrepoideus vindemiae* (A), *Spalangia cameroni* (A), *Spalangia nigra* (A), *Spalangia nigroaenea* (A), *Tachinophaegus zealandicus* (A), *Trichomalopsis sarcophagae* (A) and *Urolepis rufipes* (A). A total of 53 populations representing 20 species, from seven countries were tested.

(P227) George KYEI-POKU, Kevin Floate, Berni Benkel, Mark. S. Goettel, Lethbridge Research Centre, Agriculture and Agri-Food Canada Lethbridge, AB, T1J 4B1 Canada. Attempts to introduce *Wolbachia* into uninfected parasitoids via rearing on a *Wolbachia*-infected host: false positives and ultimate failure.

Uninfected *Muscidifurax raptor*, *M. raptorellus* and *M. zaraptor* (Hymenoptera: Pteromalidae) were reared for ten generations on *Wolbachia*-infected horn fly, *Haematobia irritans* (Diptera: Muscidae). Despite initially positive results, this attempt to transfer infections of *Wolbachia* bacteria into the parasitoid species was unsuccessful. The false positives may have reflected undigested *Wolbachia* DNA in the parasitoid gut.

(S7) R. LAFFIN, D. Langor, F. Sperling, CW405 Department of Biological Sciences, University of Alberta, Edmonton, AB, T6G 2E9 Canada. Gene flow between genetically divergent populations of *Pissodes strobi*.

Previous studies of allozyme and RAPD variation in *Pissodes strobi* have demonstrated genetic divergences among populations. We surveyed mitochondrial DNA restriction site variation and sequenced each distinct haplotype to estimate gene flow among these populations. AMOVA, Fst, and nested clade analysis indicated low levels of gene flow.

(P205) J. Audrey LEATEMIA, Murray B. Isman, University of British Columbia, Vancouver, BC. Crude seed extract of *Annona squamosa* (Annonaceae) as a potential botanical insecticide.

Crude ethanolic seed extracts of *A. squamosa* (Annonaceae), collected from different locations and years in Mollucas, Indonesia, show potential for the development of botanical insecticides for local use against diamondback moth, *Plutella xylostella* (Yponomeutidae), in Indonesia. Aqueous solutions of ethanolic extracts as well as direct aqueous extracts of *A. squamosa* pooled from different locations and years were tested.

(S2) Jesse A. LOGAN¹, Jacques Régnière², and James A. Powell³, ¹USDA Forest Service, Forestry Sciences Laboratory, 860 N 1220 East, Logan, UT 84321, USA. ²Canadian Forest Service – Quebec, Laurentian Forestry Centre, 1055 du P.E.P.S.,

P.O. Box 3800, Sainte-Foy, Québec G1V 4C7. ³Department of Mathematics and Statistics, Utah State University, Logan, UT 84322, USA. Assessing the impacts of global climate change on forest insects.

All aspects of insect life systems are affected by climate. Temperature, in particular, is a pervasive force in insect ecology. We discuss the potential impacts of climate change on forest insects, ways to anticipate these effects, and their resultant management implications. We focus specifically on mountain pine beetle, spruce beetle, and gypsy moth.

(P202) D.B. Lyons¹, O. Anderbrandt², G.C. JONES¹, D. Reddy¹, B.V. Helson¹, ¹Canadian Forest Service, 1219 Queen St. E., Sault Ste. Marie, Ontario, P6A 2E5 Canada. ²Department of Ecology, Lund University SE-223 62 Lund, Sweden. The pheromone of *Diprion similis* (Hymenoptera: Diprionidae) revisited: chemical composition, attraction phenology, population calibration and DNA techniques to identify non-target species.

The pheromone of *D. similis*, which had been previously identified, was confirmed. The pheromone was used to determine the seasonal phenology of adult males and correlate trap catch with frass production, an index of population density. Two distinctively different sawflies were captured in the traps and RAPD-PCR techniques were used to confirm the identity of *D. similis* and identify the other species. We also field-tested a less purified precursor to determine its attractiveness.

(S13) Ian MACRAE, David Ragsdale, Robert Venette, Department of Entomology, University of Minnesota, St. Paul, MN 55108 USA. Remote sensing of buckthorn and early season scouting of soybean aphid

Soybean aphid, *Aphis glycines*, overwinters in various species of buckthorn, including *Rhamnus cathartica*, but is extremely difficult to sample there. We attempted a number of scouting methodologies, including locating suitable overwintering habitat using remote sensing. Success and economics of various scouting methods will be discussed.

(P225) Christy MacDOUGALL, Department of Biological Sciences, Simon Fraser University, Burnaby, BC Canada. Behaviour of *Anopheles gambiae* in response to disturbance while blood-feeding.

Behaviour of the mosquito *Anopheles gambiae* while blood feeding is poorly understood. This study examines their response to disturbance while consuming a blood meal using a membrane feeder as a host blood source. Mosquitos will be disturbed at different time intervals and I will investigate possible trade-offs associated with host desertion during feeding.

(S7) Mireille MARCOTTE^{1,2}, Johanne Delisle¹, Jeremy N. McNeil², ¹Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre, 1055 du

P.E.P.S., P.O. Box 3800, Sainte-Foy, Québec, G1V 4C7; ²Department of Biology, Université Laval, Sainte-Foy, Québec, G1K 7P4. Impact of the obliquebanded leafroller (OBL) male mating history on post-mating receptivity of females

The significant decline in the size of the spermatophore and the ejaculate transferred by males on successive matings suggests that they are limited in their ability to inseminate females. Therefore, we argue that females inseminated by previously-mated males would be more likely to remate than those mating with virgin males.

(P221) Véronique MARTEL, Guy Boivin, 7515 Christophe-Colomb, Montréal, Québec, H2R 2S8. Dispersion of *Trichogramma minutum* and *Trichogramma pintoi* (Hymenoptera: Trichogrammatidae).

Theory of local mate competition by Hamilton, claiming that multiple foundresses on a patch should lay a higher sex ratio has been verified for *T. minutum* and *T. pintoi*. One of this theory's assumption is that all mating occurs locally on the patch. This assumption will be verified in this experiment.

(S9) Stephen MATTER, Department of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221-0006 USA. *Tetraopes tetraophthalmus* feeding on *Asclepias syriaca*: problems and considerations in assessing the impact of herbivory.

I examined the impact of *Tetraopes tetraophthalmus* on the growth and reproduction of *Asclepias syriaca*, through experiments, manipulations, and observations. Experiments showed a strong effect of larvae on milkweed growth, and considerable variation in growth among clones. Removing adult beetles from milkweed showed that adults and larvae reduced the growth of milkweed clones by 35%, but little effect of adults on reproduction. Observations of adults on milkweed failed to predict growth. Inconsistencies arise due to problems in relating adult to larval abundance and because of genetic and environmental factors affecting growth.

(S9) Alec McClAY, Alberta Research Council, Bag 4000, Vegreville, AB, T9C 1T4, Canada. Is it working yet? Evaluating the impact of biocontrol agents on weeds.

Ideally, the impact of biocontrol agents on weeds should be evaluated in the field, using an experimental approach, population-level measures of impact, and on an appropriate temporal and spatial scale. The problems and pitfalls involved will be discussed in relation to some case histories.

(S10) Robert R. McGREGOR¹, D.R. Gillespie², D.M.J. Quiring², M.R.J. Foisy², ¹Department of Biology, Douglas College, P.O. Box 2503, New Westminster, B.C. V3L 5B2; ²Pacific Agri-food Research Center Agriculture and Agri-food Canada PO Box 1000 Agassiz, BC, V0M 1A0 Canada. Intraguild predation by *Dicyphus hesperus* Knight (Heteroptera: Miridae) on *Encarsia formosa* Gahan (Hymenoptera: Aphelinidae).

Intraguild predation by *Dicyphus hesperus* on immature *Encarsia formosa* could

disrupt biological control of greenhouse whitefly. Laboratory predation by *D. hesperus* on parasitized whitefly pupae increased with the proportion of parasitized pupae available. In screened cages, pupal parasitism was lower when 10 *D. hesperus* were released per cage vs. when two *D. hesperus* were released.

(S5) Jane MEMMOTT, School of Biological Sciences, University of Bristol, Woodland Road, Bristol, BS8 1UG, UK. Non-target effects in biological control: a food web approach.

The ecological impact of intentionally introduced biological control agents of insect pests is highly controversial. This debate is being fueled largely by anecdotal reports. In this talk, a community level approach will be used to quantify non-target interactions by pest biocontrol agents in Hawaii and by weed biocontrol agents in Australia.

(S16) Edward B. MONDOR, Department of Biological Sciences, University of Calgary, 2500 University Drive NW, Calgary, AB, T2N 1N4 Canada. Attack of the clones: aphid cornicle droplets as directional alarm signals.

When attacked, pea aphids, *Acyrtosiphon pisum*, often smear cornicle droplets onto predators. Along with protective benefits, this droplet provides clone-mates with a directional alarm cue as the pheromone diffuses from the predator. More aphids drop off a plant in response to a “marked” than to an “unmarked” ladybird beetle, *Harmonia axyridis*. Predator “marking” provides substantial inclusive fitness benefits to the droplet emitter.

(S2) Gaétan MOREAU, Faculty of Forestry and Environmental Management, University of New Brunswick, Fredericton, NB, E3B 6C2. Is intensive silviculture responsible for outbreaks of balsam fir sawfly?

Until recently, the balsam fir sawfly was considered a sporadic secondary pest of minor economic importance. However, it has become the most important forest defoliator in western Newfoundland and Nova Scotia. Results from several studies performed to determine how intensive silviculture affects sawfly defoliation and population dynamics will be presented.

(P229) Tonya MOUSSEAU, Robert E. Roughley, Department of Entomology, University of Manitoba, Winnipeg, MB, R3T 2N2 Canada. Piecing together the life cycle of *Brychius* sp. Thomson (Coleoptera: Haliplidae) found in Manitoba.

The life cycle pattern for species of the crawling water beetle genus, *Brychius* Thomson (Coleoptera: Haliplidae) is virtually unknown. A population of *Brychius* sp. from the Duck Mountains, MB, one of the many isolated Nearctic populations, may provide insight into the life cycle of this genus.

(P206) Dennis R. Nelson¹, Denise L. OLSON², ¹Biosciences Research Laboratory, USDA-ARS, 1605 Albrecht Boulevard, Fargo, ND 58105, USA; ²Department of Entomology, North Dakota State University, Fargo, ND 58105, USA. Methyl-branched alkanes of the adult flea beetles, *Aphthona lacertosa* and *Aphthona nigriscutis*.

An analysis was conducted of the hydrocarbon fraction of the cuticular waxes from two introduced biocontrol agents of leafy spurge, *Aphthona lacertosa* and *A. nigriscutis*. The adult beetles had a complex mixture of hydrocarbons on their cuticular surface consisting of alkanes, methylalkanes, alkenes and alkadienes as determined by gas chromatography-mass spectrometry.

(S4) Steve Offman, Department of Biology, Laurentian University, Sudbury, ON, P3E 2C6 Canada. Complexity of component communities associated with a stem gall on wild roses along geographic gradients in northern Ontario.

Component communities of parasitoids and inquilines associated with multichambered-stem galls induced by *Diplolepis spinosa* on *Rosa blanda* were different over two geographic gradients in northern Ontario. Inquilines were more abundant over the western gradient from Rainy River to Red Lake than they were in the eastern gradient from Manitoulin Island to Moosonee. The reasons for differences in community composition will be discussed.

(S3) O. OLFERT¹, P. Mason², ¹Agriculture and Agri-Food Canada, Saskatoon, SK. ²Agriculture and Agri-Food Canada, Ottawa, ON. The relationship between increased canola production in western Canada and incidence of the bertha armyworm, *Mamestra configurata*.

Bertha armyworm has been recognized as an agricultural pest in western Canada for more than 90 years. The first major outbreak occurred in 1944 on a new crop, rapeseed. The development of canola as a major crop led to an increase in crop damage by bertha armyworm and the subsequent widespread use of insecticides for control.

(S7) Pierre PAQUIN, Université de Montréal, Collection Ouellet-Robert, Département de Sciences biologiques, C.P. 6128, Succ. Centre-ville, Montréal, Québec H3C 3J7 Canada. Tracking diversity patterns in boreal forest succession with beetle trophic guilds.

Canadian boreal forest successions are naturally regulated by forest fires, which create serial stages of maturation. The age of forests has a significant overall relation on the trophic structure of beetles (G: $p = 0,001$; χ^2 : $p = 0,001$). The 4th corner analysis shows an effect of age of forest on species composition of mycophages ($p = 0,007$), xylophages ($p = 0,014$), and phytophages ($p = 0,001$). These guilds form the core of an artificial species group of 175 species identified as saproxylic, or those that directly or indirectly depend on dead wood for survival. PCoA ordination shows a strong relation between age of forest and saproxylic beetle species composition.

Saproxyllic species ordination in canonical space and environmental variables explain 83,44 % of the variance. The analysis shows an effect of the Coarse Woody Debris (CWD total and CWD class 1) variables in the first phases of the succession, and a strong influence of the canopy and CWD class 6 for the last portion. An ecological model of black spruce decay process in relation to age of forest is proposed.

(S10) Pierre PAQUIN, Marshal C. Hedin, Department of Biology, San Diego State University, 5500 Campanile Drive, San Diego, CA 92182-4614 USA. Application of molecular tools for conservation: the case of blind *Cicurina* (Araneae: Dictynidae) from Texas caves.

Many spider species in the genus *Cicurina* are obligate cave dwellers with high conservation status but few available specimens, limiting reliable species identification. Using mtDNA sequences (CO1, 1000 base pairs) and phylogenetic methods, we have estimated the genetic variability of voucher specimens, providing a molecular tool to identify immatures.

(S4) Dean E PEARSON, YK Ortega, KS McKelvey, LF Ruggiero, RM Callaway, University of Montana and USDA Forest Service, Rocky Mountain Research Station, Missoula, Montana, 59807, USA. Nontarget effects of host-specific biological control agents on native species.

Classical biological control is a powerful tool for controlling invasive species. Insects introduced for the biological control of invasive plants are currently considered safe so long as they remain host-specific, but we show that host-specific biological control agents can exhibit significant nontarget effects on native taxa through food web interactions.

(P213) Yvan PELLETIER, Catherine Clark, Potato Research Centre, AAFC, P.O. Box 20280, Fredericton, NB. E3B 4Z7 Canada. Use of reciprocal grafting to elucidate the mode of resistance of wild *Solanum* species to the Colorado potato beetle and the potato.

Reciprocal grafting technique was used to elucidate the mode of resistance of 6 wild *Solanum* species to the Colorado potato beetle (CPB) and the potato aphid. The aphid resistance factors of wild *Solanum* species were not translocated to the potato part of the graft. The development of the CPB was reduced on the potato part of the graft with some wild *Solanum* species, indicating that the factors of resistance for CPB might be translocated and differ from the factors responsible for aphid resistance.

(S9) Robert PETERSON, Agricultural & Biological Risk Assessment, Dept. of Entomology, Montana State University, 333 Leon Johnson Hall, Bozeman, MT 59717-3020, USA. Relationships among insect injury, plant physiological response, and crop yield.

Plant physiology provides a common language for characterizing plant stress and is essential for integrating understandings of both biotic and abiotic stress. Physiologically-based descriptions of plant stress in response to insect injury are crucial for both proximate and ultimate explanations of the impact of herbivory.

(P223) Jennifer PERRY, Department of Biological Sciences, Simon Fraser University, 8888 University Drive, Burnaby, BC, V5A 1S6 Canada. Trophic eggs and cannibalism in ladybugs (Coleoptera: Coccinellidae).

This project investigates sibling cannibalism and trophic eggs in ladybugs (Coleoptera: Coccinellidae). Trophic eggs do not hatch and are usually eaten by siblings. The goal is to determine, by modeling and laboratory experiments, the circumstances under which female ladybirds should be selected to lay trophic eggs.

(P216) Jason H. PETERSON, Department of Biological Sciences, Simon Fraser University, 8888 University Dr, Burnaby BC V5A 1S6. The implications of different suites of life history traits in *Aphis fabae*, when tended by ants.

This project aims to determine how different suites of life history traits in the aphid, *Aphis fabae* (Homoptera: Aphididae), will affect and be affected by ants during the life of the aphid colony. Results from behavioural observation and competition between aphid strains will be discussed.

(P219) Allison C. POFF¹, James T. Cronin², ¹Department of Biology, University of North Dakota, Grand Forks, ND 58202-9019; ²Department of Biological Sciences, Louisiana State University, Baton Rouge, LA 70803 USA. Host choice in the goldenrod gallfly, *Eurosta solidaginis* (Diptera: Tephritidae).

We investigated factors that could influence host choice in *Eurosta solidaginis*, including plant water stress and presence of conspecific ovipunctures. Results indicate plant preference varies depending on ovipuncture density in a way that fits the expectations of an ideal-free distribution. Overall, females are choosing plants that have higher offspring performance.

(S13) Edward B. RADCLIFFE, David W. Ragsdale, Robert A. Suranyi, Ian V. MacRae, University of Minnesota, St. Paul, MN 55108 USA. Aphid Alert.

Aphid Alert serves the potato industry of the northern plains with region-wide virus vector surveillance. We seek to develop predictive models of risk of PLRV and PVY spread. Vector abundance is predicted from meteorological observations and potato seed lot rejections predicted from vector abundance and previous year seed lot rejections.

(S1) Mark D. RAUSHER, Evolution, Ecology and Organismal Biology Group, Department of Biology, Duke University, Durham, NC 27708-0338, USA. Resistance management: lessons from coevolution.

In the past, evolutionary principles have been largely used to interpret historical events and the functions of organismal (including human) traits. Recently, however, evolutionary principles have begun to be applied to redirect the course of evolution. I will discuss three areas in which such “evolutionary engineering” seems promising. The first is the retardation of counter-resistance in agricultural pests to genetically engineered resistance in crops. A well developed strategy, based on population genetics principles, has been implemented to keep agricultural pests from winning the “coevolutionary war” with crop plants. The second involves biological control of pests by causing their populations to evolve to extinction. This area has not yet been implemented, but developments in molecular biology suggest that it may be so in the future. Finally, the third area, which is even more speculative, involves the possibilities of using growing information on the genetics of reproductive isolation between species to engineer mating barriers to prevent the escape of trans-genes into wild plant species.

(S13) D.A. RAWORTH, M.C. Robertson, Pacific Agri-Food Research Centre, P.O. Box 1000 - 6947 #7 Highway, Agassiz, BC V0M 1A0 Canada. Aphids and blueberry scorch virus.

Blueberry Scorch Virus was recently reported in the lower Fraser Valley, BC. The yield of infected plants drops rapidly, depending on cultivar and virus strain. Aphids are the most probable vector. Surveys of flying and resident aphids in commercial fields have provided candidates for transmission studies, and life history data for a known vector, *Ericaphis fimbriata*, that can be used to reduce virus spread.

(S10) D.A. RAWORTH, M.C. Robertson, S. Bittman, Pacific Agri-Food Research Centre, P.O. Box 1000 - 6947 #7 Highway, Agassiz, BC V0M 1A0 Canada. Carabids in tall fescue forage grass and response to different nutrient inputs.

Carabid ground beetles were sampled in a randomized complete block experiment involving different rates of dairy slurry or chemical fertilizer applied for 1, 2 or 4 years to tall fescue forage grass at Agassiz, BC. *Pterostichus melanarius* was the dominant species. Carabid predation can be enhanced by applying dairy slurry as opposed to chemical fertilizer in this system.

(S5) Jens ROLAND, Department of Biological Sciences, University of Alberta, Edmonton, Alberta T6G 2E9.

Biological control of the winter moth (*Operophtera brumata*) in Canada: interaction between introduced parasitoids and generalist predators.

The successful biological control of winter moth in oak forests on both coasts of Canada has been long held out as a dramatic example of successful control of exotic insect pests by the introduction of insect parasitoids. There is little doubt that the program was successful. In examining the details of winter moth collapse, however, it is apparent that, although introduced parasitoids added mortality to the larval stage of the pest, the patterns of pupal mortality caused by generalist beetle predators provide the most direct cause of moth population collapse and of its regulation at the

new low density. Interestingly, it is not native beetle species which are the predator responsible, but rather European species which were themselves introduced over a century ago.

(S2) Jens ROLAND¹, Subhash Lele², Brian van Hezewijk¹, ¹Department of Biological Sciences, and ²Department of Mathematical and Statistical Sciences, University of Alberta, Edmonton, AB, Canada. Forest structure alters forest tent caterpillar population dynamics.

Historical data suggest that the outbreaks of forest tent caterpillar (*Malacosoma disstria*) last longer in fragmented forests than in intact contiguous forests. These patterns imply that population processes on these populations are altered depending on forest structure. We fit population models with parameters estimating direct and lagged density-dependent effects, and dispersal, to spatial population data from 127 high-density and collapsing populations of forest tent caterpillar. We include the effects of the degree of forest fragmentation in estimating these parameters. Intrinsic growth is affected positively by forest continuity; more forest is associated with greater population growth. Direct density dependence is stronger (more negative) in fragmented forests, suggesting an effect of fragmentation on factors such as competition or dispersal. Lagged density-dependent effects remain poorly estimated due to the limited time-series over only the collapse-phase of the cycle. Dispersal is well estimated, and suggests that moth disperse further in fragmented landscape than in forested landscapes.

(S11) Rob ROUGHLEY, Department of Entomology, University of Manitoba, Winnipeg, MB R3T 2N2. The use of fire as a biodiversity and conservation management tool on tallgrass prairie.

The impact of fire management on selected elements of the flora and fauna of tallgrass prairie was studied (1997-2000). Fire as a disturbance is necessary for a healthy, dynamic tallgrass prairie. Spider, ground beetle and plant data are incorporated into a four year management plan using spring, summer and fall burns.

(S16) Lucie ROYER, Joan Luther, Douglas Piercey, Carl Marks, Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre, Corner Brook, Newfoundland, A2H 6J3 Canada. Risk assessment of defoliation by hemlock looper based on stand characteristics.

A prediction model of defoliation risk was produced using binary logistic regression of physical and biological characteristics of forest stands. The model was validated with independent random samples. The potential use of the model for early detection will be discussed, as well as its potential for generalization.

(S4) N. RUDZIK, S.M. Smith, Faculty of Forestry, University of Toronto, Earth Sciences Centre, 33 Willcocks St, Toronto, ON M5S 3B3 Canada. Recruitment of natural enemies to an introduced bark beetle.

Introduced species thrive in new environments partly due to a lack of population regulation by natural enemies. However, introduced species eventually accumulate natural enemies. This process was investigated by comparing the natural enemies found in pine shoot beetle (*Tomicus piniperda* (L.)) [Coleoptera: Scolytidae] populations of different ages.

(P214) Inderjit SAINI, Phillip Glogoza, North Dakota State University, Fargo, ND, USA. Screening of northern soybean varieties for resistance or tolerance to *Aphis glycines* (Homoptera: Aphididae).

Soybean aphid, *Aphis glycines* Matsumura, is a new, exotic insect pest in the United States. Eighty, "0" and "00" soybean varieties were evaluated under a controlled environment. Statistical design was an RCBD with sampling. Rating scales for aphid population and plant injury were used to assess plant condition. Varieties ranged from very susceptible to low tolerance.

(P224) Maxence F. SALOMON, Department of Biological Sciences, Simon Fraser University, 8888 University Drive, Burnaby, BC V5A 1S6 Canada. Influence of co-occurring house spiders (Araneae: Agelenidae) on settling decisions by Western Black Widow spiders, *Latrodectus hesperus* (Araneae: Theridiidae).

The present study examines the impact of different levels of web damage on Western Black Widow (*Latrodectus hesperus*) webs and the role of neighboring house spiders (*Tegenaria duellica* and *T. agrestis*) in web relocation processes. The results of field and laboratory experiments will be discussed.

(S7) D. E. SAUNDERS¹, A. R. Westwood², ¹Department of Entomology, University of Manitoba, Winnipeg, MB, Canada; ²Centre for Forest Interdisciplinary Research (C-FIR), University of Winnipeg, Winnipeg, MB, Canada. Effects of Mimic® (tebufenozide) applications on the diversity of non-target Lepidoptera in Manitoba's boreal forests.

This study assesses the impact of the bioinsecticide Mimic® (tebufenozide) on the diversity of non-target Lepidoptera when employed in an operational spray program against spruce budworm (*Choristoneura fumiferana*) (Lepidoptera: Tortricidae) in the boreal forests of Manitoba. The Lepidopteran communities in treated and untreated stands are compared to evaluate the potential ecological impact of Mimic.

(S1) D. W. SCHINDLER, University of Alberta, Edmonton, AB. The biogeochemistry of persistent organic pollutants in a subalpine lake.

Although many persistent organic pollutants (POPs) are no longer used in North America, freshwater and marine fishes of temperate and arctic regions have been found to contain high levels of toxic POPs such as DDT, HCH, dieldrin, toxaphene and PCBs. In some areas, concentrations are high enough to potentially affect the

health of humans and other fish-eating predators. Several studies have shown that these pollutants are transported long distances in the atmosphere. Atmospheric trajectories suggest that Eurasia may be an important source area for western Canada, although there are also regional sources of some contaminants. Semi-volatile POPs appear to migrate from warmer to colder regions as the result of cold condensation." Although the concentrations of POPs in rain and snow are only a few parts per trillion, biomagnification in long aquatic food chains of polar regions causes them to reach concentrations in predators that are as much as a million times higher than in precipitation. In contrast, the high concentrations of POPs in fish from subalpine Bow Lake in Banff National Park could not be explained by biomagnification. Instead, cooler temperatures and greater precipitation at high altitude cause increased deposition of POPs. Melting of glacial strata that had been contaminated with POPs the mid 20th century deliver also deliver large amounts of contaminants to lakes. For the more volatile pollutants, direct uptake at cold lake surfaces also appears to be an important source. POPs enter Bow Lake largely in dissolved form. As a result, they are taken up directly through the body walls of zooplankton, reaching high concentrations. The zooplankton transfer high concentrations to fish. Thus, high inputs plus direct uptake by crustaceans, rather than biomagnification in a long food chain, is the primary vector for delivering high concentrations of POPs to fish in Bow Lake.

(S8) Steven J. SEYBOLD, USDA Forest Service, Pacific Southwest Research Station, 720 Olive Drive, Davis, California 95616, USA. Recent progress in the biochemistry and molecular biology of isoprenoid pheromone production in bark beetles (Coleoptera: Scolytidae).

Application of biochemical and molecular techniques to study the genesis of scolytid aggregation pheromones has revealed that bark beetles are primarily responsible for the inherent synthesis of widely occurring pheromone components such as ipsenol, ipsdienol, and frontalin. Since many of the chemical signals are isoprenoids, the roles of the mevalonate biosynthetic pathway and the enzyme HMG-CoA reductase (HMG-R) have been investigated. This has led to the identification of endothelial cells in the anterior midgut as the site of synthesis and to the concept that *de novo* pheromone biosynthesis is regulated at least in part by the positive effect of juvenile hormone III (JHIII) on gene expression for HMG-R.

(S7) J.K. SHADDOCK¹, A.R. Westwood², ¹Department of Entomology, University of Manitoba, Winnipeg, MB, Canada; ²Centre for Forest Interdisciplinary Research (C-FIR), University of Winnipeg, Winnipeg, MB, Canada. Comparing the diversity of carabid beetle populations (Coleoptera: Carabidae) in burned and harvested aspen-dominated forest stands in western Manitoba.

This study examines the effects of forest harvesting on carabid beetle populations in aspen-dominated mixed-wood boreal forest stands. By comparing carabid communities in harvested stands with those in burned stands, we will be able to determine whether the carabids respond differently to an anthropogenic disturbance (harvesting) than to a natural disturbance (fire).

(S13) Martin SHAPIRO, U.S. Department of Agriculture, Agriculture Research Service, Bldg 011A, Rm 214, BARC-W, Beltsville, MD 20705-2350 USA. Enhancement in activity of homologous and heterologous baculoviruses infectious to the beet armyworm and fall armyworm (Lepidoptera: Noctuidae) by a baculovirus from the gypsy moth (Lepidoptera: Lymantriidae).

Nucleopolyhedroviruses (NPVs) from the beet armyworm, cotton bollworm, alfalfa looper, celery looper, and diamondback moth had good biological activity against beet armyworm larvae, whereas NPVs from the wax moth and *Rachiplusia ou* had low activity. The addition of the NPV from the gypsy moth enhanced the activities of all NPVs. In the case of the fall armyworm, only the homologous NPV was active. In all cases, however, the gypsy moth NPV enhanced viral activity.

(S4) David P. SHORTHOUSE¹, John R. Spence¹, W. Jan A. Volney², ¹Department of Biological Sciences, University of Alberta, Edmonton, AB; ²Canadian Forest Service, Northern Forestry Centre, Edmonton, AB, Canada. Spider wanderings as a correlated random walk.

Previous analyses of spider assemblages in the context of a large-scale experiment revealed temporally spatial associations to habitat structure. This prompted a scrutiny of spider movement on the ground floor. Path data were analyzed in an attempt to translate individual movement into measures of population redistribution.

(S11) Joseph D. SHORTHOUSE, Department of Biology, Laurentian University, Sudbury, ON, P3E 2C6. Attributes of Canada's diverse grasslands.

The integrity of Canada's grassland ecosystems has been greatly disrupted for either crop or livestock production with few remaining pristine areas. Arthropods are the most diverse, abundant and ecologically important animals in grassland habitats; however, we know surprisingly little about their biodiversity and ecological relationships and how they respond to habitat change. To address these issues, the Biological Survey of Canada (Terrestrial Arthropods) has launched a major project to study and report on the arthropods of Canadian grasslands that will culminate in three multi-authored books. The purpose of this presentation is to provide an overview of the abiotic and biotic attributes of Canada's grasslands that sets the stage for future contributions.

(S7) Colleen M. SIMPSON, Mary L. Reid, Department of Biological Sciences, University of Calgary, 2500 University Drive N.W., Calgary, AB, T2N 1N4 Canada. Thinning the boreal forest: do bark beetles benefit?

Stand thinning can alter both forest microclimate and tree quality. I studied how these dual effects affect reproduction in pine engraver bark beetles, *Ips pini* (Say). I found that beetles experienced greater reproductive success and were more dense in thinned stands and in logs originating from thinned stands, relative to the unthinned counterparts.

(S10) Marjorie A.H. SMITH, Robert J. Lamb, Cereal Research Centre, 195 Dafoe Road, Winnipeg, MB, R3T 2M9, Canada. Protecting the wheat midge resistance gene in common wheat using refugia..

The wheat midge's biology and behaviour suggest this insect could rapidly evolve virulence to overcome antibiosis resistance in wheat. Using both field experiments and computer models of population genetics, we explored the use of refugia where avirulent midge can develop, as a method to reduce the rate of virulence evolution.

(S5) Sandy SMITH, Faculty of Forestry, 33 Willcocks St, University of Toronto, Toronto, Ontario M5S 3B3. Impact of an introduced scolytid on its native conspecific and natural enemy complex; Can identifying a 'predator gap' help justify classical biocontrol?

In 1996, we initiated a long-term study to examine the pattern of establishment by the introduced pine shoot beetle, *Tomicus piniperda* (L.), in pine forests of southeastern Ontario. Sites where the beetle is well established have low densities of its major native competitor, *Ips pini* (Say). A number of natural enemies have moved from *Ips* to *Tomicus*, however, after seven years, we still observe relatively low predator populations, in contrast to *Tomicus* in its native Europe and to *Ips* in eastern Canada. Given such an ecological impact, the identification of such a potential 'natural enemy gap' for Canadian populations of *Tomicus* may help strengthen arguments for classical biocontrol.

(S15) J.J. SOROKA¹, L.M. Dosdall², O.O. Olfert¹, E. Seidle³, ¹Agriculture and Agri-Food Canada, Saskatoon Research Centre, Saskatoon, SK, S7N 0X2. ²University of Alberta, Edmonton, AB, T6G 2E1. ³Seidle Seed Farms, Medstead, SK, S0M 1W0. Occurrence of root maggot injury to canola in western Canada.

Infestation of and damage to canola roots by crucifer-feeding root maggots were examined from samples across the prairies and compared with damage levels seen in the previous decade. Both damage indices increased over all areas surveyed. A predictive model was developed that correlated canola species, ecoregion, and weather variables with root infestation and injury by maggots.

(S10) D.B. STRONGMAN, G. Simpson, H.N. LeBlanc, Biology Department, Saint Mary's University, Halifax, NS, Canada. Blow flies associated with pig carcasses in Nova Scotia.

Blow flies in the family Calliphoridae are significant colonizers of carrion. This paper reports species composition on pig carcasses in rural and urban areas of Nova Scotia over the summer and fall. These data expand the information available from the region and provide information useful in forensic entomology.

(S13) Robert A. SURANYI, I.V. MacRae, M.W. Carroll, D.W. Ragsdale, E.B. Radcliffe, Department of Entomology, University of Minnesota, Saint Paul, MN

55108 USA. Green peach aphid, *Myzus persicae* (Sulzer) (Hemiptera: Aphididae), development on harvested canola.

The effect of canola harvest on green peach aphid, *Myzus persicae* (Sulzer), populations was assessed. Over 50% of post-harvest collected late instar nymphs showed wing development. Canola remained viable as an aphid host for 7 to 12 days post-harvest, allowing sufficient degree-day accumulation for completion of wing development in surviving nymphs.

(P203) J. SWEENEY¹, P. de Groot², L. MacDonald², S. Smith³, C. Cocquemot⁴, M. Kenis⁵, J. Gutowski⁶, ¹Natural Resources Canada, Canadian Forest Service, PO Box 4000 Fredericton, NB, E3B 5P7; ²Natural Resources Canada, Canadian Forest Service, 1219 Queen St. East, Sault Ste. Marie, ON, P6A 5M7; ³Faculty of Forestry, University of Toronto, 33 Willcocks St., Toronto, ON, M5S 3B3 Canada; ⁴INRA-ENSA, U.F.R. d'Ecologie animale et de Zoologie agricole, 2, place Pierre Viala, 34060 Montpellier Cdex 01, France; ⁵CABI Bioscience Switzerland Centre, 1, Rue des Grillons, 2800 Delémont, Switzerland; ⁶ Forest Research Institute, Department of Natural Forests, 17-230 Białowieża, Poland. Trapping the brown spruce longhorn beetle, *Tetropium fuscum* (Fabr.): efficacy of different host volatiles and trap designs.

Capture of *Tetropium* spp. was compared among trap designs and host-volatile lures in field bioassays. Traps baited with lures containing a blend of monoterpenes simulating that emitted from cortical tissue of red spruce caught significantly more *T. fuscum* (Fabr.) than did unbaited traps in 2001. Results from 2002 trials are also presented.

(P222) Nikolai J. TATARNIC, John R. Spence, Department of Biological Sciences, University of Alberta, T5K 1R9 Canada. Mating behaviour of the crusader bug, *Mictis profana* (F.) (Coreidae).

The Crusader bug, *Mictis profana*, (Heteroptera: Coreidae), belongs to a group of predominantly Old-World genera whose males possess prominent abdominal tubercles. The function of these tubercles has never been described, however behavioural studies in Fiji and Canada suggest these structures appear to play a significant role in male courtship.

(S6) Loida M. Tobias, Denise L. Olson , Asunta L. Thompson, Department of Entomology and Plant Sciences, North Dakota State University, Fargo ND 58105, USA. Screening for resistance to green peach aphid, *Myzus persicae* (Sulzer) (Hemiptera: Aphididae), in *Solanum etuberosum*-derived germplasm.

Green peach aphid (GPA) is the major vector of potato virus Y (PVY). This virus has a significant economic impact on the potato industry in North Dakota. One strategy to reduce PVY transmission is to develop GPA resistant potato lines. Field studies are being conducted to screen *Solanum etuberosum* germplasm for GPA resistance.

(S13) M.J. Uddin¹, N.J. HOLLIDAY¹, P.A. MacKay¹, W. Powell², J.A. Pickett², S. Graves², ¹ Department of Entomology, University of Manitoba, Winnipeg, MB, R3T 2N2; ²Rothamsted Experimental Station, Harpenden, Herts, AL5 2JQ, UK. Attraction of insect natural enemies to aphid sex pheromones in fields of alfalfa.

The response of insect natural enemies to nepetalactone, a common compound in aphid sex pheromones, was examined in fields of alfalfa in summers 2000 and 2001 in Manitoba. Males of the lacewing, *Chrysopa oculata*, were attracted, but response of pea aphid parasitoids to nepetalactone was inconsistent. In a late season trial of related compounds, neomatabiol attracted the ladybird beetles, *Hippodamia tredecimpunctata* and *Coccinella septempunctata*.

(P210) M.J. Uddin¹, N.J. HOLLIDAY¹, P.A. MacKay¹, W. Powell², L.J. Wadhams², J.A. Pickett², ¹Department of Entomology, University of Manitoba, Winnipeg, MB, R3T 2N2 ²Rothamsted Experimental Station, Harpenden, Herts, AL5 2JQ, UK. Insect pest management in fields of seed alfalfa in the Canadian Prairies.

Lygus bugs, alfalfa plant bugs and pea aphids cause economic damage to alfalfa grown for seed production. Studies revealed that acceleration of natural enemy recolonization following insecticide application to seed fields would be beneficial. However, aphid sex pheromones which were found to attract insect natural enemies did not reduce these pest populations consistently.

(S6) Robyn M. UNDERWOOD, Robert W. Currie, Department of Entomology, University of Manitoba, Winnipeg, MB R3T 2N2 Canada. Formic acid fumigation of indoor-wintered honey bee colonies for *Varroa destructor* Anderson and Trueman control.

Formic acid fumigation can control varroa mites, but environmental conditions affect efficacy. Indoor, winter fumigation allows control of treatment conditions and is an ideal time to treat. Eighty-four colonies were treated in four groups; untreated control, 28 day low dose, 11 day medium dose, and 10 day high dose.

(S8) Désirée VANDERWEL, Department of Chemistry, University of Winnipeg, 515 Portage Avenue. Winnipeg, MB. R3B 2E9 Canada. Pheromone-mediated mating behaviour in the yellow mealworm beetle, *Tenebrio molitor*: who? what? when? where? why? and how?

The mating behaviour of *Tenebrio molitor* is surprisingly complex, and likely involves at least five male- and/or female-produced pheromones. Recent results regarding the types of pheromones involved, the biochemistry of pheromone production, and the factors involved in the regulation of pheromone production will be presented. This information will be placed in the context of the biology of the organism.

(S12) Brian H. VAN HEZEWIJK, Jens Roland, Department of Biological Sciences, University of Alberta, Edmonton, AB, T6G 2E9 Canada. The spatial dynamics of a host-parasitoid community.

Theory suggests that spatial processes can play an important role in stabilising host-parasitoid dynamics. In the willow pinecone gall midge community, we found differential dispersal rates among the host and

parasitoids were a necessary but not sufficient condition for stability; spatial and temporal variability in host refuges were also required.

(S10) Richard S. Vetter, Allan H. Roe, Robert G. BENNETT, Craig R. Baird, Lynn A. Royce, William T. Lanier, Arthur L. Antonelli, Paula E. Cushing, BC Ministry of Forests, 7380 Puckle Road, Saanichton, BC, Canada. Dispelling myth and hyperbole: the distribution and relative abundance of two invasive funnelweb spiders, *Tegenaria agrestis* and *T. duellica* (Araneae, Agelenidae), in Canada and the United States.

Two introduced funnelweb spider species have very successfully invaded parts of Canada and the United States. Myth and hyperbole surround them because one (*Tegenaria duellica*) is a very large spider and the bite of the other (the "hobo spider," *T. agrestis*) allegedly can cause necrotic lesions. We determined the current distribution and relative abundance of these two spiders in North America. *Tegenaria agrestis* occurs from southern British Columbia to southern Oregon and eastward to central Montana, western Wyoming, and northern Utah. It is generally rare west of the coastal mountain ranges but common inland. *Tegenaria duellica* has a similar distribution but is only abundant west of the coastal mountain ranges and is rare elsewhere. In coastal localities where they are sympatric the latter is usually numerically dominant although the reasons for this are unclear. The medical importance of *T. agrestis* may be exaggerated.

(S13) C. VINCENT¹, I. Pronier¹, J.-C. Côté¹, S. Todorova², ¹Horticultural Research and Development Centre, Agriculture and Agri-Food Canada, 430 Boul. Gouin, Saint-Jean-sur-Richelieu, QC, J3B 3E6; ²INRS-Institut Armand Frappier, Centre de microbiologie et biotechnologie, 531 boul. Des Prairies, Laval, QC, H7V 1B7 Canada. Progress in obliquebanded leafroller management with bioinsecticides.

The obliquebanded leafroller, *Choristoneura rosaceana* Harris (Tortricidae), has become resistant to several insecticides registered in Canada, particularly in apple-growing regions. As larvicidal alternatives to synthetic insecticides, we will present recent information on bioinsecticides such as a nucleopolyhedrovirus, an experimental (long lasting) formulation of *Bacillus thuringiensis* var *kurstaki* and a number of isolates of *Beauveria bassiana* (Balsamo) Vuillemin.

(S4) David WADE, Department of Entomology, University of Manitoba, Winnipeg, MB Canada. Community level effects of burn season (spring, summer, fall) on the spider (Araneae) fauna of a tallgrass prairie in southern Manitoba.

For tallgrass prairie, fire is the primary management tool and spiders are a primary predator. Therefore, understanding the effect of fire on spiders is very important. Results from this study indicate that fire is beneficial to the spider fauna and that late season burns are the best overall.

(S11) David WADE, Department of Entomology, University of Manitoba, Winnipeg, MB, R3T 2N2. Spiders (Araneae) collected in a tallgrass prairie in southern Manitoba and their importance to prairie conservation.

Spiders play a vital role in prairie habitats, both as a primary predator and as a tool for conservation. Many species of spiders inhabit tallgrass prairie. These species respond to fire disturbance and also exhibit habitat preferences. The responses of these species to fire is important for prairie conservation.

(S16) Lynn C. WESTCOTT, Stephen F. Pernal, Donald L. Nelson, Agriculture and Agri-food Canada, Beaverlodge Research Farm, Box 29 Beaverlodge AB T0H 0C0 Canada. Honey bee pollination of hybrid canola in southern Alberta.

Honey bees are 'employed' as pollinators of hybrid canola certified seed production fields in the Canadian Prairie Provinces. Our study was a preliminary investigation of honey bee foraging activity on the crop. Nectar production (total sugar and volume per flower) of the male and female parental lines of canola was also studied.

(P220) Richard Westwood¹, Christie BORKOWSKY², ¹Department of Biology, University of Winnipeg, Winnipeg, MB; ²Department of Entomology, University of Manitoba, Winnipeg, MB R3T 2N2. Pollination of the western prairie fringed orchid, *Platanthera praeclara* (Sheviak and Bowles), by Sphingidae in Manitoba.

The identity of the pollinating agents for the endangered western prairie fringed orchid *Platanthera praeclara* (Sheviak and Bowles) were unknown for the orchid population occurring in Manitoba. Various trapping methods lead to the discovery two species of Sphingidae, *Hyles gallii* (Rottenburg) and *Sphinx drupiferarum* J.E. Smith as primary pollinating agents.

(S2) A. Richard WESTWOOD¹, Neil J. Holliday², ¹Centre for Forest Interdisciplinary Research (C-FIR), University of Winnipeg, Winnipeg, MB, R3B 2E9; ²Department of Entomology, University of Manitoba, Winnipeg, MB, R3T 2N2. Can butterflies be used as reliable indicators of diversity at the site and landscape level in managed spruce and pine forests?

From 1991 and 2001, the impact of logging on the diversity of various arthropod groups in Manitoba spruce and pine forests has been studied using chronosequence studies pairing naturally burned and harvested forest stands of varying ages up to 70 years post burn or harvest. While the number of butterfly species colonizing logged sites is quite high, there may only be a few species that could be useful as indicators when assessing forest biodiversity from a sustainable forest management perspective.

(S11) Terry A. WHEELER and Stéphanie Boucher, Department of Natural Resource Sciences, McGill University, Macdonald Campus, Ste-Anne-de-Bellevue, QC, H9X 3V9. Trophic guilds of higher Diptera in xeric Yukon grasslands.

In a biodiversity inventory of Diptera in xeric Yukon grasslands, the saprophagous families dominant in many temperate habitats were not well-represented. Most of the diverse families and abundant species were phytophagous, predaceous or parasitic. The lack of decaying plant material on the dry slopes may account for the decreased dominance of saprophagous flies.

(S10) IL WISE, WJ Turnock, Cereal Research Centre, Agriculture and Agri-Food Canada, 195 Dafoe Road, Winnipeg, MB R3T 2M9. The relative abundance of native coccinellids in Manitoba before and after the appearance of the seven-spotted lady beetle (C7), *Coccinella septempunctata* L.

Before 1988 when C7 was first reported in Manitoba, three native species of coccinellids were dominant but by 1992 C7 had become the dominant species. Since 1993, *Hippodamia tredecimpunctata* has been the most common species followed by C7, while the abundance of at least four native species has declined.

(S10) Timothy T. WORK, John R. Spence, Jan Volney, Karen Cryer, Department of Renewable Resources, University of Alberta, 442 ESB, Edmonton Alberta. T6G 2H1 Canada. Habitat composition versus habitat structure: evaluating coarse filter strategies for maintaining invertebrates in boreal forests.

Under the coarse filter approach to maintaining biodiversity, habitat features such as vegetation composition and stand structure are managed to sustain ecological communities. Here we identify the importance of habitat composition versus habitat structure for carabid beetle communities in Alberta boreal mixedwood forests and evaluate coarse filter strategies for future forest management.

(P218) Gabriella ZILAHY-BALOGH, L.T. Kok, S.M. Salom, Department of Entomology, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0319 USA. Morphology of *Laricobius nigrinus* Fender (Coleoptera: Derodontidae), a predator of the hemlock woolly adelgid, *Adelges tsugae* Annand (Homoptera: Adelgidae).

Laricobius nigrinus, native to western North America is being evaluated as a potential biological control agent of the hemlock woolly adelgid, *Adelges tsugae* Annand (Homoptera: Adelgidae), in the eastern United States. Members of the genus *Laricobius* are known to feed on adelgids. Descriptions and illustrations of various developmental stages of *L. nigrinus* are displayed as there is limited published information on the morphology and biology of this predator.

***The Entomological Society of Manitoba gratefully
acknowledges the following organizations,
which provided financial support for the
Joint Annual Meeting of the Entomological Societies
of Canada and Manitoba, October 5-9, 2002
Winnipeg, Manitoba***

Bayer CropScience

Dow AgroServices

Syngenta

City of Winnipeg: Insects Control Branch

Department of Canadian Heritage

Environment Canada: Canadian Wildlife Service

Gustafson Partnership

Manitoba Conservation

Manitoba Agriculture & Food

Canadian Forest Service

Canadian Grain Commission

Canola Council of Canada

Health Canada: National Microbiology Laboratory

Louisiana Pacific, Ltd.

Monsanto Canada

Orkin PCO Services

AAA Plus Exterminators

Metro Pest Control

North South Consultants

Poulin's Exterminators

Swat Team Pest Services

Minutes of the Entomological Society of Manitoba Annual Business Meeting

Canad Inn, Pembina Highway, Winnipeg, MB
2:30 p.m., Friday, 29 November, 2002

Attendance of Members

President	Paul Fields
President-Elect	Neil Holliday
Past-President	Ian Wise
Secretary	Noel White
Treasurer	Bill Preston

Members

Michael Alperyn	Nicole Lauro
Christie Borkowsky	Pat MacKay
Terry Galloway	Tonya Mousseau
John Gavloski	Owen Olfert
Joel Gosselin	Marjorie Smith
Neil Holliday	Ray St. Godard
Mahmood Iranpour	Robyn Underwood
Bob Lamb	David Wade
	Richard Westwood

1. Acceptance of Agenda (Appendix A)

Motion: B. Lamb/T. Galloway CARRIED

2. Acceptance of the Minutes of the Last Annual General Meeting of November 3, 2001

Motion: R. Westwood/T. Galloway CARRIED

3. Business Arising From the Previous Minutes None

4. Reports

Motion: N. Holliday/B. Lamb to receive reports of the Executive and Committees
CARRIED

5. Executive Reports

Appendix B – President's Report (The incoming President will write a letter of appreciation to Desirée Vanderwel for her service as editor of the Proceedings.)

Appendix C -- Treasurer's Report

Appendix D – Regional Director to the Entomological Society of Canada's Report

Appendix E – Proceedings of the Entomological Society of Manitoba Editor's Report

Appendix F – Endowment Fund Board and Finance Committee

6. Committee Reports

Appendix G – Scholarship and Awards Committee

Appendix H – Publicity/Newsletter — The newsletter is available on our website. The membership will be contacted to determine who wants to receive a notice of the availability of the electronic version or a hard copy.

Appendix I – Social Committee

Appendix J – Youth Encouragement and Public Education Committee

Archives – No report

Scientific Program — The joint meeting with the Entomological Society of Canada was a success. Attendance was about 200. Don Dixon was Chair of the Organizing Committee.

Appendix K – Fund Raising Committee

Appendix L – Membership Committee

Appendix M – Internet Site Committee

7. Joint Annual Meeting Report

Will be received after the meeting.

8. Election Results

President-Elect — John Gavloski

Member-at-Large – Tonya Mousseau

Motion: B. Lamb/P. MacKay to destroy ballots

CARRIED

9. Transfer of Office

Paul Fields stepped down as President, Neil Holliday assumed the Office.

10. Appointment of Auditors

Motion: B. Preston/P. MacKay — That Doug Nicholson and Co. be reappointed as ESM auditors for 2002-2003.

CARRIED

11. Other Business

Graduate students indicated that all students presenting at ESM scientific meetings would like to receive feedback rather than just having winners announced.

SUGGESTION ACCEPTED

12. Adjournment 3:50 p.m.

Appendices

Appendix A:

Agenda of the Entomological Society of Manitoba 58th Annual Business Meeting, 29 November, 2002

1. Acceptance of Agenda.
2. Acceptance of the Minutes of the last Annual Meeting (3 November, 2002).
3. Business arising from the Minutes.
4. Reports - Executive

President	P. Fields
Treasurer	W. Preston
Regional Director to the ESC	P. MacKay
Editor of the Proceedings	T. Galloway
Endowment Fund Board	B. Timlick
5. Reports - Committees

Scholarship & Awards	R. Westwood
Finance	B. Timlick
Publicity / Newsletter	N. Lauro
Social	M. Alperyn
Youth Encouragement / Public Ed.	C. Borkowsky
Archives	R. Roughley
Scientific Programme	R. Lamb
Fund Raising	J. Gosselin
Membership	T. Mayert
Web Page	P. Fields
6. 2002 ESM/ESC joint meeting D. Dixon
7. Elections Results - scrutineer C. Demianyk

Destruction of ballots
8. New Business

9. Transfer of Office

10. Other Business — Appointment of Auditor

11. Adjournment

Appendix B: Report of the President - 2001 / 2002

One of the primary goals of the ESM is the advancement and promotion of entomology, and the exchange and dissemination of entomological knowledge. This year it was our pleasure to hold our meeting jointly with the ESC. There were more than 200 attendees, presenting 51 invited presentations, 57 submitted papers, and 33 posters. The social events of the meeting were well attended. The banquet was a great success, with two local comedians, Al Rae and Dean Jenkinson, providing the entertainment. The insect art show added another dimension to the poster sessions, and it was highlighted in the *Winnipeg Free Press*. It is no surprise to me that the winner of the art show chose the mighty rusty grain beetle as her subject. I had several people say to me that they thought the meetings were well organized. I thank all the people that put in hundreds of hours to make the meeting a great success. A special thanks goes to Don Dixon who was Chair of the Organizing Committee, Bob Lamb who was Program Chair, and Jo-Anne Buth who was Chair of the Fund-raising Committee and was unable to attend the meeting because of work commitments.

Several of our members were honoured at the national level. S. Hemachander (Hema) received an ESC Graduate Student Travel Award, Bob Lamb is this year's recipient of the ESC Gold Medal, the ESC's highest honour, Robyn Underwood received the Criddle Award for her work in the Youth Encouragement Committee and Christie Borkowsky was one of the three winners of the President's Prize for best student presentation. Congratulations to all of you!

Neil Holliday was asked if the Department of Entomology would be interested in hosting the north-central Branch of the Entomological Society of America meetings in March 2007. For those of you that haven't attended an NCB meeting, it attracts 200 to 300 delegates from across the American midwest. As Neil didn't feel the Department could organize the meeting due its size and the time of year, he approached the ESM, with the result that Brent Elliott and I have been given the task of investigating the possibility of having a joint NCB-ESM meeting in 2007. Either Brent or I plan to attend the next NCB meeting in Madison, Wisconsin in March, 2003 to speak with the executive of the NCB, and to become more familiar with their meeting format.

Finally, I would like to thank all the Chairs of the various committees that have worked hard throughout the year. They have made my time as President a pleasant and rewarding one. I will not detail their work here, as you can read about their work in their Committee Reports. Without these dedicated volunteers our Society could not function.

Paul Fields
ESM President

Appendix C: Report of the Treasurer**Entomological Society of Manitoba, Inc. Financial Statements
August 31, 2002****DOUG NICHOLSON* & CO.,
Certified General Accountant****AUDITOR'S REPORT**

To the Members of the
Entomological Society of Manitoba Inc.

I have examined the balance sheet of the **Entomological Society of Manitoba Inc.** as at **August 31, 2002** and the statement of revenues, expenditures and surplus for the year then ended. My examination was made in accordance with Canadian generally accepted auditing standards, and accordingly included such tests and other procedures, as I consider necessary in the circumstances.

In common with many non-profit organizations, the organization derives some cash revenue, the completeness of which is not susceptible to conclusive audit verification. Accordingly, my verification of these revenues was limited to the amounts recorded in the records of the organization and I was not able to determine whether any adjustments for unrecorded receipts from these sources might be necessary to income or surplus balances.

In my opinion, except for the effect of any adjustments, if any, which I might have determined to be necessary had I been able to satisfy myself concerning the completeness of the cash revenues referred to the above, these financial statements present fairly the financial position of the society as at August 31, 2002 and the results of its operations and the changes in its financial position for the year then ended in accordance with Canadian generally accepted accounting principles.

original signed by Doug Nicholson & Co.

Winnipeg, Canada
November 27, 2002

Doug Nicholson & Co.,
Certified General Accountant

**PROFESSIONAL CORPORATION*

**ENTOMOLOGICAL SOCIETY OF MANITOBA, INC.
BALANCE SHEET
AS AT AUGUST 31, 200**

ASSETS

CURRENT	<u>2002</u>	<u>2001</u>
Cash in bank	\$ 2,916	\$ 3,144
GST receivable	—	121
Canadian T-Bill fund (note 2)	3,660	3,593
Investments (note 3)	<u>36,137</u>	<u>35,552</u>
	<u>\$42,713</u>	<u>\$42,410</u>

LIABILITIES

LIABILITIES	<u>nil</u>	<u>nil</u>
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SURPLUS

SURPLUS	<u>42,713</u>	<u>\$43,182</u>
	<u>\$42,713</u>	<u>\$43,182</u>

APPROVED BY THE BOARD:

_____ President

_____ Treasurer

**The accompanying notes form an integral
part of these financial statements**

**ENTOMOLOGICAL SOCIETY OF MANITOBA, INC.
STATEMENT OF INCOME, EXPENSES AND SURPLUS
YEAR ENDED AUGUST 31, 2002**

REVENUE	2002	2001
Annual meeting	\$1,669	\$1,674
Donations	\$1,660	\$1,230
Fundraising committee	\$223	\$1,598
Interest income	\$1,963	\$2,017
Members fees	\$1,778	\$1,137
Miscellaneous	\$10	\$141
Proceedings	\$273	\$21
Youth encouragement & public education	\$620	-
	<u>\$8,196</u>	<u>\$7,818</u>
EXPENSES		
Awards and Scholarships	\$1,450	\$1,450
Donations	\$500	\$800
Fundraising	-	\$1,240
General	\$2,121	\$968
Meetings	\$3,765	\$3,254
Newsletter	-	\$442
Social Committee	-	\$25
Youth encouragement & public education	\$57	\$88
	<u>\$7,893</u>	<u>\$8,267</u>
EXCESS (DEFICIT) OF REVENUES OVER EXPENDITURES	303	-449
Add: Surplus, beginning of the year	\$42,410	\$42,859
SURPLUS, END OF YEAR	<u><u>\$42,713</u></u>	<u><u>\$42,410</u></u>

**The accompanying notes form an integral
part of these financial statements**

**ENTOMOLOGICAL SOCIETY OF MANITOBA, INC.
NOTES TO THE FINANCIAL STATEMENTS
AUGUST 31, 2002**

NOTE 1 SIGNIFICANT ACCOUNTING POLICIES

Income and expenses are recorded on the cash basis of accounting. There are no accruals of receivables or payables at the year-end. Inventory is expensed when it is purchased. Interest from investment certificates is paid out annually and no interest is accrued. Capital assets are written off when acquired and, therefore, there are no annual amortization allowances.

NOTE 2 INVESTMENT – T-BILL FUND

The Canadian T-Bill fund was opened February 28, 1997 with a principal balance of \$3,000. The T-Bill is shown at market value at year-end.

NOTE 3 INVESTMENT CERTIFICATES

Certificate Number	Interest Rate	Maturity Date	Par Value
960006276-1	4.5	Oct 31, 2002	\$3,000
960006276-2	5.3	Feb 10, 2003	\$10,800
55611-001	1.3	Feb 26, 2003	\$3,000
960006276-3	5.15	Sep 16, 2003	\$4,000
960006276-4	4.8	Dec 11, 2003	\$3,000
55611-0002	4.8	Apr 5, 2004	\$2,000
55611-0004	6	Nov 12, 2004	<u>\$10,337</u>
			\$36,137

NOTE 4 STATEMENT OF CHANGES IN FINANCIAL POSITION

A Statement of Changes in Financial Position is not included with these financial statements as the Society uses the cash basis of accounting and would not provide any useful information that cannot be attained by the Balance Sheet and the Statement of Revenues, Expenditures, and Surplus.

Appendix D: Report of the ESC Regional Director

On November 03, 2001 at the Annual Business Meeting of the ESM, I became Regional Director representing ESM on the Governing Board of the ESC. Since then I have reported on ESM activities to the ESC Board at the Interim Board Meeting in Ottawa in April 2002, which meeting I was not expected to and did not attend. I attended and reported to the ESC Board Meetings on October 05 and 09, 2002, held in conjunction with the Joint Annual Meeting of the ESM and ESC at the Delta Winnipeg Hotel. I also attended the Annual Business Meeting of the ESC on October 08, 2002 on your behalf. At that meeting Bernie Roitberg of Simon Fraser University passed the Presidency over to Sandy Smith of Forestry at the University of Toronto. Bob Lamb of our Society stepped into the position of Second Vice-President. During the scientific sessions, Bob Lamb received the Gold Medal of the ESC for 2002. The Joint Annual Meeting was, in the opinion of all attendees polled, both a scientific and a social success. As the accounts are wound up it appears that it will have been a financial success as well. Next year's ESC Meeting will be in Kelowna, B.C., November 01-05, 2003. In 2004 the meeting will be in P.E.I.

Several issues were raised at the two Board Meetings in October which may be of interest to ESM members. The ESC is concerned to maintain or increase the proportion of members in regional societies which are also members of the ESC. I would be pleased to receive feedback on this issue from ESM members. The ESC is planning to provide the Canadian Entomologist as an electronic version, on a trial basis, to members only and initially for no extra charge, starting in 2003. Eventually it will be provided in electronic version to institutions too. During this first trial year, members will be able to choose to receive just the hard copy, just the electronic version, or both. In order to facilitate this innovation it is important that members send in their membership renewals promptly this year. The management structure of the Canadian Entomologist is in the process of being restructured. Under the new structure, Jean Turgeon of CFS Sault Ste Marie will be Editor-in-Chief and under him there will be a series of Divisional Editors who will manage the review process for most manuscripts. The Journal has been functioning under this structure for some months now, and it appears to be working smoothly. Bob Lamb of our Society is one of the Divisional Editors. Jean Turgeon expects to step down as Editor-in-Chief next year. As of January 2003, the editorship of the Bulletin of the ESC will pass from Dan Johnson of AAFC Lethbridge, to Paul Fields of AAFC Winnipeg and a member of ESM.

Pat MacKay
Regional Director
November 2002

Appendix E: Report of the *Proceedings* Editor

Volumes 55 and 56 of the *Proceedings of the Entomological Society of Manitoba* were completed this year by Désirée Vanderwel. Volume 55 (1999) was mailed in December, 2001; approximately 225 copies were printed and sent. This volume contained 67 pages, with three submitted papers and the memorial for John Conroy, in addition to abstracts and Committee Reports from the Annual General Meeting. A total of 235 copies each of Volumes 56 (2000) and 57 (2001) were completed and printed at the University of Winnipeg print shop in November 2002; these volumes were distributed at the time of the Business Meeting. Volume 56 contained 39 pages, with one submitted paper, abstracts, and Committee Reports. Costs associated with production and mailing of Volumes 56 and 57 are not available at the time of this report, but will be submitted to the ESM Executive at a later date.

I would like to thank Désirée Vanderwel for her assistance in making the transition this year. Her help in completing Volumes 55 and 56 and in producing Volume 57 of the *Proceedings* was greatly appreciated. I would like to thank Noel White, Secretary of the ESM, for his efficient processing and handling of abstracts and Committee Reports. I appreciate very much the efforts of authors and reviewers for their contributions to the *Proceedings*. I would also like to remind potential authors to consider the *Proceedings* as a place to publish manuscripts that are of particular relevance to entomology in Manitoba.

Terry Galloway
Proceedings Editor

Appendix F: Report of the Endowment Fund Board and the Finance Committee

The Chair of the Finance Committee and the Treasurer met in November, 2002 to exchange information, review the annual budget, and assess the potential revenues and expenditures. Information from the financial statements was provided by the accountants on November 27, 2002.

In the 2001-02 fiscal year revenues exceeded expenditures by \$300. The deficit in 2000-02 was \$449. It is anticipated that revenue will be greater than expenditures in the 2002-03 year.

Budgets within the Society are always “best guess” situations. This is mostly due to Committee Chairs not submitting budgets when they are called for. I would suggest that the President call Committee Chairs for a budget meeting at a given time of year (say late June) to establish budgets or to assess where people are needed for chairs.

The fund-raising category in the 2002-03 budget allocation was set at \$500 with the anticipation that a profit will be made and this was estimated to be \$300 (\$800 revenue). The Society often does not see the profits of its endeavours until a year or more afterwards so the outcomes may not be reflected in the manner noted in the budget.

The Youth Encouragement Committee should be commended for their efforts in the past year. Note that they brought in over \$600 in revenue that I believe were from contributions from schools where presentations were provided in addition to funds provided by the ESC. The Fund-raising Committee should be encouraged to utilize the contributions that they attract to support future endeavours.

Please note * in the revenues for the ESC-ESM JAM. This is noted as \$1,000.00 as this was the amount used to support the meeting. The ESM often makes a considerably larger profit than this from hosting the JAM, so a larger profit than this may be realized when the final assessment has been made. The Society may consider placing some of these potential profits into the Endowment Fund as interest rates are continuing to be low and the Society may need more investment in order to maintain its current commitments.

The Committee continues to encourage members who have potential contacts for donations and to provide those contact names to the Fund-Rising Committee.

Blain Timlick, Chair
Bill Preston, Treasurer

REPORT OF THE ENDOWMENT FUND 2001-02 November 29, 2002

The Endowment Fund continues to provide the resources necessary to enable the Entomological Society to function. Costs associated with the Student Scholarship, the Proceedings and costs associated with the Annual General Meeting are all supported in part, by the Earnings of the Endowment Fund. In the past this support is in the range of \$2000 annually.

Currently the Endowment Fund is \$36,136 and the cap is currently \$40,000. The fund, along with bank account and T-Bill interest, generated over \$2000 in 2001-2002. The Fund currently has certificates generating between 1.3% and 6.0%. The Society may experience some change in revenue over the course of the next fiscal year as a large portion of the certificates come up for renewal. While cert. no. 55611-0001 is only gaining 1.3%, it is only a 1-year investment and the certificate 960006276-1 was recently renewed at a slightly higher rate (4.55% - to be recorded at the next AGM). The current return rate for the certificates is approximately \$1,800.00.

Endowment Fund Guaranteed Investment Certificates

Certificate Number	Principle	Interest Rate (%)	Maturity Date	Annual Interest
55611-0001	\$3,000	1.3	Feb 26, 2002	\$39.00
960006276-1	\$3,000	4.5	Oct 31, 2002	\$135.00
960006276-2	\$10,800	5.3	Feb 10, 2003	\$572.40
960006276-3	\$4,000	5.15	Sep 16, 2003	\$206.00
960006276-4	\$3,000	4.8	Dec 11, 2003	\$144.00
55611-0002	\$2,000	4.8	Apr 5, 2004	\$96.00
55611-0004	\$10,337	6	Nov 12, 2004	\$585.12
Total	\$36,137			\$1,777.52

Blaine Timlick, Chair
Bill Preston, Treasurer

ENTOMOLOGICAL SOCIETY OF MANITOBA INC. – BUDGET 2001-02

Budget Item	2001-02	2002-03	
	Actual	Actual and Proposed	2002-03 Projected
Endowment Fund Revenue	\$36,137	\$36,137	\$36,500
Membership Dues	\$1,778	\$1,500	\$1,500
Proceedings	\$273	\$200	\$200
Social Committee	\$0	\$0	\$0
Youth/Education Committee	\$620	\$200	\$200
Donations	\$1,660	\$1,500	\$1,500
Fund Raising Committee	\$223	\$800	\$800
Meeting ESM/AGM	\$0	\$1,500	\$1,500
ESC – ESM JAM	\$1,669	\$1,000	\$0
Miscellaneous	\$10	\$100	\$100
Investment Income	\$1,963	\$2,000	\$2,000
Totals	\$8,196	\$8,800	\$7,800
Expenses			
General Society Expenses	\$2,121	\$1,200	\$1,200
Proceedings	\$0	\$900	\$900
Newsletter	\$0	\$100	\$100
Social Committee	\$0	\$100	\$100
Youth/Education Committee	\$57	\$200	\$200
Fund Raising	\$0	\$500	\$500
Student Awards/Scholarship	\$1,450	\$1,500	\$1,500
Meeting ESM/AGM	\$0	\$3,500	\$3,500
ESC – ESM JAM	\$3,765	\$0	\$0
Donations	\$500	\$100	\$0
Other Committees	\$0	\$100	\$100
Representation at ESC	\$0	\$400	\$400
Totals	\$7,893	\$8,600	\$8,500
Year End Aug, 2002	\$303	\$200	(\$700)

Blaine Timlick, Chair
 Bill Preston, Treasurer

Appendix G: Report of the ESM Student Awards and ESM Scholarship Committee
Student Achievement Award

Awarded to a student who is in the last year of their Bachelor’s degree program. This award recognizes students who have shown exceptional interest in entomology as evidenced by their insect collections, insect photography, published articles of entomological interest, insect experiments and/or outstanding contributions during summer employment.

This year’s winner is Mr. Daniel Eilers. Mr. Eilers is in his final year of Zoology at the University of Manitoba. Daniel has taken many entomology courses and worked in entomological positions as a summer student. Daniel has also volunteered to help at public entomology displays put on by the ESM and the University of Manitoba.

Swat Student Award

This award is designed to foster and encourage an interest in entomology, particularly in natural methods of insect pest control and the proper use of insecticides. The award is presented to students with an interest in entomology and is based on superior scholastic ability, high research potential, originality and industriousness in the university courses and/or summer work. This award is open to students in any year of their undergrad program.

This year's winner is Ms. Jacqueline LeGal. Jacquie has taken a number of entomology courses and has greatly impressed Society members with her enthusiasm and interest in entomology. Jacquie has also worked in entomology projects during the summer and in her entomology collections course the instructors noted her collection was one of the finest ever submitted in the course.

ESM Graduate Scholarship

This scholarship is awarded to a student in a M.Sc. or Ph.D. program in entomology at the University of Manitoba. Students must be enrolled in their graduate program for at least 12 months prior to Oct 1 of the award year. This award recognizes superior scholastic ability, high research potential as evidenced by industriousness, good judgement, originality, a conscientious attitude and organization ability, and excellent communications skills.

This year's winner is Mr. K.S. "Hema" Hemachandra. Hema is currently in the final field season of his Ph.D. project working under the supervision of Dr. N. Holliday. Hema is assessing the potential of European natural enemies for classical biological control of the cabbage root maggot in canola in Canada. Previously Hema has received his degrees from the University of Peradeniya in Sri Lanka and the University of London, UK.

Désirée Vanderwel
Rob Anderson
Richard Westwood (Chair)

Appendix H: Report of the Publicity/Newsletter Committee for 2002

The Newsletter was published twice in 2002: once on May 14th and again on November 11th. Co-editing was provided by Michael Alperyn.

Nicole Lauro
Chair

Appendix I: Social Committee Report 2001-2002

On February 1st, 2002 the ESM hosted a luncheon at Oceana Restaurant in Winnipeg with invited guest speaker, John Gavloski. John gave an excellent slide presentation about his travels to southeast Asia to 25 ESM members.

The ESM hosted it's annual New Members Social on Thursday, May 9th. The venue took place at the residence of Mr. Mark Lowdon and featured the highly acclaimed "Around the World in 80 Plates" or so potluck dinner. Entertainment featured "Insects in film" where entomologists got to sharpen their bug trivia skills. Almost 20 ESM members welcomed the following new members to our Society: Maggie Glasgow, Lori-Ann Kaminski, Brian Rex, Ingrid Stevenson, Ray Godard, Mark Lowdon and Nancy Dewar.

Michael Alperyn
Chair

Appendix J: Report of the Youth Encouragement and Public Education Committee

In the past year, Youth Encouragement (YE) received 45 calls regarding school or daycare presentations and we were able to accommodate 38 of those requests. Nearly 950 students plus teachers and aids had the opportunity to learn about entomology. We received \$320.00 in donations for the ESM from the following groups: Angus McKay School (\$20.00), Champlain School (\$25.00), Linwood School (\$25.00), Robert H. Smith School (\$25.00), Hastings School (\$25.00), Bairdmore School (\$50.00), Bumper Crop Daycare (\$25.00), St. James YMCA Daycare (\$25.00), Heritage Park Children's Program (\$50.00), Ashworth Daycare (\$50.00). Nearly every graduate student in the Department of Entomology volunteered their time to give or assist with at least one presentation and four students participated in six or more presentations.

The Amazing Grains (AG) event, organized through Agriculture in the Classroom, went on the road this past June 12th and 13th to bring the program to students in the Brandon area. Approximately 800 students plus teachers and parents participated. The event returned to the Red River Exhibition Park in Winnipeg from September 17th to 19th. During this time, 1280 students as well as their teachers and parents from 20 classes passed through the five Amazing Insect sections. The AG program offers an excellent opportunity to expose students to the various disciplines within Entomology. However, it requires the willingness to take a few hours from your daily schedule to assist at the station. Graduate students from the Entomology Department are the driving force behind the Amazing Insects station but additional assistance would be appreciated. Members of the ESM are strongly urged to participate in future events and see first hand the excitement and enthusiasm students have for insects. In 2003, Amazing Grains will be held in Brandon from June 10th to 12th and in Winnipeg from September 16th to 18th, so with this advanced notice, I hope to see a few more ESM members at these events!

Combining school presentations with AG Brandon and Winnipeg more than 3000 students have seen slide shows, posters and display cases featuring insects. However, the live specimens create the most interest and discussion among the students, so additional cultures will be developed in the coming year.

I would like to extend a huge thank you to everyone who participated in YE activities this past year and acknowledge David Wade and Michael Alperyn for their extensive help during the AG events and Tonya Mousseau for responding to calls during the summer months.

Christie Borkowsky
Chair, Youth Encouragement Committee

Monthly Summary

	Presentations		No. of Students	Donations Received
	Requested	Given		
2001				
November	5	5	123	\$50.00
December	0	0	0	
2002				
January	5	5	108	\$20.00
February	1	1	22	
March	4	4	90	\$50.00
April	4	4	113	\$75.00
May	7	3	55	\$25.00
June	3	2	80	
July	5	4	90	\$25.00
August	4	4	98	
September	1	0	0	
October	3	3	80	\$50.00
November	3	3	88	\$25.00
Total	45	38	947	\$320.00

Volunteers

School Presentations

David Wade, Michael Alperyn, Tonya Mousseau, Christie Borkowsky, Heather White, Diana Saunders, Lisa Basplay, Rob Currie, Robyn Underwood, Lisa Capar, Jashim Uddin, Katherine Peech Cherewyk, Nicole Lauro, Stacie Stiege, K.S. Hemachandra, Ayman Mostafa, Ginger Gill, Mark Lowdon, Coral Carvalho and Lori-Ann Kaminski.

Amazing Grains Winnipeg

Colin Demianyk, Noel White, David Wade, Christie Borkowsky, Michael Alperyn, David Ostermann, Tonya Mousseau, Rheal Lafreniere, Mark Lowdon, Diana Saunders, Lisa Basplay, and Lisa Capar, plus 12 volunteers provided by the Amazing Grains program.

Amazing Grains Brandon

Michael Alperyn, David Wade, Robyn Underwood, Sheila Wolfe, Coral Carvalho, Dan Eilers, Lisa Babey and a number of volunteers provided by the Amazing Grains program.

My apologies to those I inadvertently omitted from this list. — CB

Appendix K: Report on the ESM Fundraising Committee for 2002

Fundraising from donors to cover costs such as speakers for the AGM provided revenues of \$1,325.00. The sale of toques, pins, hats, and T-shirts provided revenues of \$222.55. Together, these provided a total revenue of \$1,547.55.

Joel Gosselin
Chair, Fundraising Committee

Appendix L: ESM Membership Committee

For the 2001-2002 year, the ESM has 137 members compared to 2000-01 of 133 members. Of those 137 members, 95 had paid their dues in 01-02 leaving 42 members who did not pay their dues.

T. Mayert
Chair

Appendix M: ESM Internet Site Committee

The main changes to the ESM internet site over the last year have been the web pages covering the ESM-ESC meeting that was held in Winnipeg in October 2002. As the newsletters have become available I have placed them on the internet site. I have been working with Désirée Vanderwel and Terry Galloway, the editors of the *Proceedings*, to make the *Proceedings* also available on the web site.

The web site was unavailable from October 4 until October 19, 2002 due to some problems at the University of Manitoba Computing Centre. However, on the whole I am pleased with the service provided by the University of Manitoba, that is provided free of charge.

Estimating from the University of Manitoba Computing Centre tracking software, the ESM web page was accessed about once a day in September and October 2002. It is easily found using popular search engines.

Occasionally members have requested updates of the pages, as always, I am open to ways we can improve the web site.

The address of the web page is: <http://home.cc.umanitoba.ca/esm/index.html>.

Paul Fields
Chair

