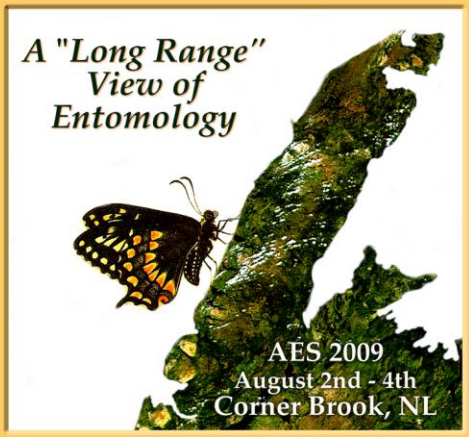

69th Annual Meeting of the Acadian Entomological Society

August 2 - 4th, 2009
Sir Wilfred Grenfell College, Memorial University
Corner Brook, NL

MEMORIAL UNIVERSITY Sir Wilfred Grenfell College

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

President's Welcome

It is my privilege and pleasure to welcome you all to Corner Brook, Newfoundland to the 69th Annual Meeting of the Acadian Entomological Society.

The theme of this years meeting is A "Long Range" View of Entomology. The aim was to not only provide an opportunity to meet and present stimulating entomological research nestled amongst the Long Range Mountains, but to also promote entomology to the general public and to provide students with information on how to pursue a career in this exciting field.

I would like to thank you all for coming and hope that you not only enjoy the meeting but also the chance to explore this beautiful part of the world.

Carolyn Parsons
President
Acadian Entomological Society

AGENDA

Sunday, August 2, 2009

2:30 – 4:30/5:00	Collecting Trip / Hike Bear Head Section of the Humber Valley Trail
5:00 – 6:00	Rendezvous at the Newfoundland Insectarium Free admission for Conference attendees. Browse Insectarium on your own or continue collecting along the Insectarium Trails
6:00 – 7:00	Reception/ Refreshments at the Insectarium
8:00 – 9:30	Registration / meet and greet at Host Chalet, # 2102, SWGC.

Monday, August 3, 2009 – Arts & Sciences Building AS375

8:30 – 9:30	Registration Arts & Sciences Building, AS375
9:30 – 9:35	Welcome
	Student papers: Moderator - Sheena E. Fry
9:35 – 9:50	Influence of balsam fir (*Abies balsamea* L. Mill.) budburst phenology on hemlock looper (*Lambdina fiscellaria* Guen.) Cheryl Butt Population Ecology Group, Faculty of Forestry and Environmental Management, University of New Brunswick

9:50 – 10:05 Host tracking and Co speciation strategies of the Australian Koptothrips
Glean Gonsalves
Department of Biology, Memorial University, St. John's, A1B3X9, NL

10:05 – 10:20 Impact of thinning and previous damage by Balsam Woolly Adelgid on the performance of spruce budworm and balsam fir sawfly
Dorthea Grégoire
Faculty of Forestry and Environmental Management, University of New Brunswick

10:20 – 10:50 Refreshment Break

Monday, August 3, 2009 – Arts & Sciences Building AS375

Student papers: Moderator - Glean Gonsalves

10:50 – 11:05 A comparative study of soldiering behavior in eusocial thrips
Holly Caravan
Department of Biology, Memorial University

11:05 – 11:20 Small collections add value to big picture
Meghan Marriott[1], David McCorquodale[2], Donna Giberson[1]
[1]Department of Biology, University of PEI, [2]Department of Biology, Cape Breton University

11:20 – 11:45 Fight or Flee: caste decisions during an invasion
Sheena E. Fry
Department of Biology, Memorial University

11:45 – 12:05 Laboratory evaluation of the fungus *Beauveria bassiana* as a biological control agent against the eastern spruce budworm, *Choristoneura fumiferana.*
Sheila White[12], Doug Strongman[1] and Barry Hicks[2]
[1] Biology Department, Saint Mary's University
[2] College of the North Atlantic

12:05 – 1:00 Lunch

1:00 – 1:30 **Poster Session**

Contributed papers: Moderator – Tom Chapman

1:30 – 1:45 Non-marine Arthropods of Madagascar
Allen Crooker
Biology Department, Hartwick College, Oneonta, NY, 13815, USA

1:45 – 2:00 Non-marine Arthropods of Lokaro, Southeastern Madagascar
Allen Crooker
Biology Department, Hartwick College, Oneonta, NY, 13815, USA

2:00 – 2:15 The combined effect of photoperiod and temperature on the embryonic dormancy of two ecotypes of the hemlock looper, *Lambdina fiscellaria*
Johanne Delisle[1], Lucie Royer[2], Michèle Bernier-Cardou[1], Eric Bauce[3] and Alain Labrecque[1]
[1]Natural Resources Canada, Canadian Forest Service, Sainte Foy, Québec,
[2]Natural Resources Canada, Canadian Forest Service, Corner Brook,
[3]Département des sciences du bois et de la forêt, Université Laval

2:15 – 2:30 Improved detection of incipient insect outbreaks using a purposely biased sampling method within the zone of risk predicted by an initial susceptibility model
Lucie Royer[1], Joan E. Luther[1], Doug Piercey[1], Hubert Crummey[2]
[1]Natural Resources Canada, Canadian Forest Service, Corner Brook,
[2]Fortis Building, Forestry Services, Department of Natural Resources of Newfoundland and Labrador, Corner Brook

Monday, August 3, 2009 – Arts & Sciences Building AS375

2:30 – 2:45 Development of a hazard rating for balsam woolly adelgid
Dan Quiring[1], Don Ostaff[2], Andrew Morrison[1], Dan Lavigne[3], Lester Hartling[3], Hubert Crummey[4], Nelson Carter[3], Ian DeMerchant[2] and Keith Moore[5].
[1] Faculty of Forestry and Environmental Management, University of New Brunswick, Fredericton, NB, [2]Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre, Fredericton, NB, [3]New Brunswick Department of Natural Resources, Fredericton, NB, [4]Newfoundland Department of Natural Resources, Corner Brook, NF, [5]Nova Scotia Department of Natural Resources, Shubenacadie, NS

2:45 – 3:00 Refreshment Break

3:00 – 4:00 Public Session: Entomological inquiries from the Corner Brook community

Monday, August 3, 2009 – Banquet

6:00 Cash Bar, Sorrento's on the Rocks

6:30 – 8:00 Banquet

Tuesday, August 4, 2009 – Arts & Sciences Building Rm AS375

Contributed papers: Moderator – Allan Crooker

9:30 – 9:45 Pollination of Lowbush Blueberry by native and non-native bees in Eastern Newfoundland
Barry Hicks
College of the North Atlantic

9:45 – 10:00	Monitoring for Root Weevils (Curculionidae, Entiminae) in Atlantic Canadian Strawberry Kenna MacKenzie[1] and Pat Bouchard[2] [1]AAFC, Kentville, [2] AAFC, Ottawa
10:00 – 10:15	Stimulatory effects of insecticides on insects. G. Christopher Cutler Department of Environmental Sciences, Nova Scotia Agricultural College
10:15 – 10:30	Serving Entomology to the Community Tom Chapman Department of Biology, Memorial University
10:30 – 11:00	Refreshment Break
11:00 – 12:00	Moderated Forum: "I want a job where I use my entomology training!"
12:00 – 1:00	AES Business Meeting

Round Table Discussion : "I want a job where I use my entomology training!"

Tom Chapman will be moderating a round table discussion focused on providing employment career advice for our student conference participants. A panel has been assembled and each panel member will briefly present their personal-professional story of carving out an entomological career. The panel will be available to respond to questions from students. All conference participants (not just students) are welcome as there will be an opportunity to offer your own anecdotes and thoughts on this important issue.

Public Drop-in Session: Entomological inquiries from the Corner Brook community

We ask that all conference participants make themselves available for a public drop-in session. We have encouraged the people of Corner Brook to bring their specimens and queries to our poster session. There will be microscopes and some specimen handling equipment on site. With the combined experiences of all conference participants we stand a good chance of having the information needed on hand. And who knows, you might learn something too."

Abstracts, Oral Presentations

Influence of balsam fir (*Abies balsamea* L. Mill.) budburst phenology on hemlock looper (*Lambdina fiscellaria* Guen.)

Cheryl Butt
Population Ecology Group, Faculty of Forestry and Environmental Management, University of New Brunswick, Fredericton, NB, E3B 6C2

For many spring feeding insects, first instar emergence is synchronous with the timing of host tree budburst. Natural selection has favoured egg hatch-budburst synchrony because the nutritional quality of new foliage decreases rapidly following budburst, due to the decrease in essential nutrients and increase in secondary metabolites. This study evaluates the performance of the hemlock looper (*Lambdina fiscellaria* Guen.) when first instar larvae were allowed to

colonize unburst and newly burst buds and developing shoots of balsam fir (*Abies balsamea* L. Mill.). Adults were subsequently mated in the laboratory to determine the daily fecundity. In contrast to most defoliators, the overall fitness, which takes into account survival, pupal weight and fecundity, of hemlock looper was highest when larvae emerged and fed on buds approximately one week after budburst and decreased as foliage aged. Hemlock looper females laid the majority of their eggs during the first few days following mating, and daily fecundity decreased exponentially thereafter. Therefore, hemlock looper only have a narrow phenological window in which to emerge and feed, if they emerge before or after the optimal phenological stage they are less likely to survive and will have reduced levels of fecundity.

A comparative study of soldiering behavior in eusocial thrips.
Holly Caravan
Department of Biology, Memorial University, St. John's, NL, A1B 3X9

The presence in some insects of altruistic behavior has remained one of the outstanding questions in evolutionary biology since Darwin acknowledged this observation as a potential flaw in his theory. Darwin specifically referred to ants, but in recent decades more examples of highly social insect groups have been discovered. One of these groups has quickly become an important model for the study of social evolution: the gall-inducing thrips. Some of these species have a sub-fertile defensive caste (soldiers) that varies between species in number of soldiers, sex ratio, reproductive output and fighting ability. All the work to date has been focused on behavior of individual soldiers, while my study is the first to consider cooperation within this caste. I have examined the possibility of increased defensive ability through coordination in fighting an invertebrate enemy in two species of the Australian gall-inducing thrips with sharply contrasting soldier castes – *Kladothrips intermedius*, in which cooperation was expected, and *K. morrisi*, in which cooperation was not expected. However, there was no evidence for cooperation in either species. I will discuss the implications of this unexpected outcome and how it may suggest a possible alternative "selfish" strategy for the male soldiers of *K. intermedius*.

Serving Entomology to the Community
Tom Chapman
Department of Biology, Memorial University, St. John's, NL, A1B 3X9

Undergraduate Entomology is taught at Memorial University in one course at the third year level. This course covers broadly, therefore thinly, many aspects of insect taxonomy and biology. More students then our teaching-laboratory facilities can accommodate have been allowed to participate in the course through the development of a service-learning component. Students are given the option to trade credit in the practical 'insect collection' for participation in another self-directed study with practical learning outcomes: the development of a web-based portal that functions in funneling community inquiries to us regarding insects and to provide regionally important information to the people of NL (access portal here: http://www.mun.ca/biology/bpromoters/index.php). In this presentation I will describe the development of this course component, including the bumps along the way, and I will be reflecting on what I perceive is the most important learning outcome for these students – the realization of a connection between academic study and real world issues (promotional article initiated by some of these students: http://www.mun.ca/cdel/career_faculty/biology.php

Stimulatory effects of insecticides on insects.
G. Christopher Cutler

Department Environmental Sciences, Nova Scotia Agricultural College, P.O. 550, Truro, NS, B2N 5E3

Toxicologists have traditionally assumed that there is a dose-response threshold above which chemical exposures induce a biological effect, and below which none occurs. However, there is now very strong support for the occurrence of hormesis, a chemical response characterized by low-dose stimulation and high-dose inhibition of biological effects. This paper will discuss the ramifications of hormesis in insect pest management, particularly in terms of pest population resurgences. While the reduction of natural enemies following insecticide treatment is the most commonly cited explanation for such resurgence, hormetic responses in the target pests may be an additional and often ignored mechanism. Examples of stimulated biological response in insects exposed to sublethal doses of insecticide will be discussed.

Non-marine Arthropods of Madagascar

Allen Crooker
Biology Department, Hartwick College, Oneonta, NY 13815, USA

Madagascar, the world's fourth largest island, is a living laboratory of extraordinary natural environments with 80% of its plants and animals found nowhere else in the world. The island is probably best known for its lemurs, chameleons, medicinal plants, and for being a biodiversity hotspot with significant conservation needs. The island also has a rich and unique arthropod fauna comprising over 100,000 species. There is an interesting mix of pre-Gondwanan, Indo-Madagascan, Madagascan, and introduced species. There are some surprising insect absences: there are no doryline ants, no large-mound fungus-growing termites like those in Africa, and no hepialids. Unlike some groups of animals and plants, there are no endemic families of arthropods; however, endemism is very high at the genus and species level.

Non-marine Arthropods of Lokaro, Southeastern Madagascar

Allen Crooker
Biology Department, Hartwick College, Oneonta, NY, 13815, USA

A preliminary assessment of the non-marine arthropod fauna was conducted in a littoral forest adjacent to the Bay of Lokaro in the Indian Ocean in southeastern Madagascar. The shore adjacent to the bay is dominated by a rolling plain of unconsolidated sand that extends several kilometers to the Vohimena Mountains. The littoral forest ecosystem where the survey was conducted is restricted to the sand and is subject to natural disturbances such as cyclones as well as human disturbances including deforestation and urban expansion that have resulted in habitat fragmentation and degradation. The arthropod survey was part of the larger process of establishing a protected reserve to ensure long-term conservation of the threatened biological diversity of the littoral forest, a habitat that is severely threatened worldwide and in Madagascar. Lokaro possesses a rich and spectacular arthropod fauna that comprises over 100 families of insects, spiders, centipedes, millipedes, and land crabs. Highlights of the arthropod inventory include 1) the high diversity of arthropod life, 2) the presence of *Phrynarachne*, an unusual bird drop spider, and 3) numerous gasteracanthines, spiny orb-weaver spiders that attract attention due to their unusual appearance.

The combined effect of photoperiod and temperature on the embryonic dormancy of two ecotypes of the hemlock looper, *Lambdina fiscellaria*

Johanne Delisle[1], Lucie Royer[2], Michèle Bernier-Cardou[1], Eric Bauce[3] and Alain Labrecque[1]

[1]Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre, 1055 du P.E.P.S., P.O. Box 10380, Stn. Sainte Foy, Québec, QC G1V 4C7, Canada, [2]Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre, University Drive, P.O. Box 960, Corner Brook, NL A2H 6J3, Canada,[3]Département des sciences du bois et de la forêt, Université Laval, Pavillon Abitibi-Price, 2405 de la Terrasse, Québec, QC G1V 0A6, Canada

Embryonic dormancy of the hemlock looper (HL), originating from an island (Newfoundland) and a mainland (Quebec) population, was studied by comparing the percent hatch and time to hatch of early-diapausing eggs that were either: (i) incubated under each combination of three photoperiods (16L:8D, 12L:12D or 8L:16D) and three temperatures (15, 20 or 25 ºC) or (ii) stored outdoors prior to their monthly incubation under the same treatments. Regardless of photoperiod and ecotype, only eggs incubated at 15 ºC hatched successfully after ~ 120 days. Temperature was also the most important factor regulating dormancy of eggs acclimated outdoors, in both ecotypes. From October to December (diapause phase), percent egg hatch at 20 and 25 °C increased from low (<20%) to levels similar to those obtained at 15 °C (70%). These percentages remained stable throughout the postdiapause phase (January to May). Time to hatch, shorter at warmer temperatures, decreased from October to December at all temperatures. It remained stable from January to March (quiescence), however, and declined after incubation in April and May. Eggs from the island were heavier than those from the mainland and their odds of hatching were 2.4 times higher. Our findings indicate that the two HL ecotypes respond similarly to the combined action of photoperiod and temperature on egg dormancy and both terminate diapause prior to winter.

Fight or Flee: caste decisions during an invasion

Sheena E. Fry
Department of Biology, Memorial University, St. John's, NL, A1B 3X9

Many species of gall-inducing Acacia thrips are parasitized by species of Koptothrips, kleptoparasites, that invade the galls of Acacia thrips, killing the inhabitants, and breeding within the gall. As a result, seven described species of gall-inducing thrips have evolved a ‘helper’ caste with behavioral and morphological specializations used for gall defense. The ‘helper’ morph, called a soldier, is characterized by enlarged forelimbs and reduced wings and antennae, while the‘reproductive’ morph, called a disperser, has fully developed wings. Dispersers typically leave the gall as second instar larvae and eclose within the soil, with the exception of one species, Kladothrips intermedius, where dispersers fully develop within the gall. The purpose of this study was to determine the rate at which the two castes, soldiers and dispersers, and larvae flee after a gall breech. Soldiers are predicted to have the slowest speed and the most indirect movement, since they typically remain in their natal gall and, when invaded, protect the gall and its inhabitants. Dispersers and larvae should move more swiftly away from the breeched gall since they can produce their own gall and thus should not risk death by the invader.

Villains in the Outback!
Host tracking and Co speciation strategies of the Australian Koptothrips

Glean Gonsalves
Department of Biology, Memorial University, St. John’s, A1B3X9, NL

The evolution of sociality in insects is often credited to the selection pressures of parasites and predators. Seven described species of the gall inducing thrips genus Kladothrips have “soldiers” – individuals specializing in defending the gall from kleptoparasitic thrips species in the genus

Koptothrips (the villains). Koptothrips are known to either kill or drive out the inhabitants of the gall and thus, are thought to be a major selective force that has led to the evolution of soldiers. A phylogenetic study indicates that Koptothrips have tracked the evolution of their hosts to some extent and that they could be specializing in parasitizing a specific host species. I will be investigating differences in the natural history and genetic data of different populations of similar Koptothrips species that parasitize different Kladothrips species (hosts). The aim of this project is to determine what types of social organization are the Koptothrips driving within their hosts? This will help elucidate the role of parasites in the development of social behaviour in insects.

Impact of thinning and previous damage by Balsam Woolly Adelgid on the performance of spruce budworm and balsam fir sawfly

Dorthea Grégoire
Faculty of Forestry and Environmental Management, University of New Brunswick, 20 Dineen Drive, Fredericton, NB

The balsam fir forests of Eastern Canada are a valuable natural resource sought after by humans and insects alike. Current forest management practices are limited by a general lack of understanding of the effects that previous herbivory by one insect have on the susceptibility of a tree to subsequent attacks by different insects. The objectives of this study are: 1) to identify the effects of host-plant mediated herbivore-herbivore interactions by using the balsam woolly adelgid (BWA) and the spruce budworm / balsam fir sawfly as study species, and 2) to examine the effect that pre-commercial thinning has on these insect interactions. Manipulative experiments were set up in thinned and adjacent unthinned stands of balsam fir in Western Newfoundland. Within these stands, trees with varying levels of BWA damage were selected. Newly emerged larvae of spruce budworm or balsam fir sawfly were reared on study trees inside sleeve cages to evaluate the influence of host plant quality on larval development in the absence of natural enemies. My results indicate that both gouting by the BWA as well as thinning practices are differentially affecting budworm and sawfly survival, thus making them important factors to be considered in management plans involving these two defoliators

Pollination of Lowbush Blueberry by native and non-native bees in Eastern Newfoundland

Barry Hicks
College of the North Atlantic, 4 Pike's Lane, Carbonear, NL

The importance of native bee species to lowbush blueberry (*Vaccininum angustifolium*) pollination was investigated. Data will be presented showing comparisons of pollination between natural sites, managed fields that had no bee supplementation with fields supplemented with *Bombus impatiens* and *Apis mellifera.*

Small collections add value to big picture

Meghan Marriott[1], David McCorquodale[2], Donna Giberson[1]
[1]Department of Biology,University of PEI[2], Department of Biology Cape Breton University

Small regional insect collections are often overlooked because they can be difficult to access, contain specimens that have not been identified (or identified incorrectly) or are degraded from lack of care. Because they represent the collecting efforts of amateurs and students, they may provide insights that are not available from larger national collections. We databased Coccinellidae specimens from eastern Canadian collections (Newfoundland to Ontario),

including large and small university, government lab, and provincial and national museum collections. In this presentation, we compare collections to assess the influence of collection type on reported diversity patterns and the arrival and spread of non-native species through eastern Canada. Each type of collection shows regional biases, including the large "national" collections, and many collections have temporal biases, caused by not retaining new specimens of species already well represented in the collection. Other biases included forestry or agricultural habitats in government labs, and a bias towards large colourful species in small university collections. All of these collections give different information, so it is important to include all collections in a broad survey such as ours. In particular, it is critical to locate and consult the many small regional collections to adequately assess coccinellid distribution patterns.

Monitoring for Root Weevils (Curculionidae, Entiminae) in Atlantic Canadian Strawberry

Kenna MacKenzie[1] and Pat Bouchard[2]
[1]AAFC, 32 Main St., Kentville, NS B4N 1J5 and [2]AAFC, K. W. Neatby Building, Floor 3, Room 3077, 960 Carling Ave., Ottawa, ON K1A 0C6

Root Weevils have been a growing concern in strawberry production over the past years. Weevils were monitored in 2004 and 2005 in producing strawberry fields in Atlantic Canada using three methods: pit fall traps, grooved board traps and visual observations. Ten introduced species of root weevils were collected with black vine weevil (*Otiorhynchus sulcatus*), strawberry root weevil (*O. ovatus*) and juniper weevil (*Barypeithes pellucidus*) predominating. New Brunswick only collected these three species, while Nova Scotia, Newfoundland and Prince Edward Island collected eight, seven and five species respectively. Two species, *Sitona flavescens* and *O. porcatus* were found only in Newfoundland, one species, *Trachyphloeus bifoveolatus*, only in Nova Scotia, and two species, *Barynotus obscurus* and *Strophosoma melanogrammus*, in Nova Scotia and Newfoundland. No monitoring method worked for all species with pit falls best for *B. pellucides*, a small species, and visual observations for *O. sulcatus*. However, visual observations are very tedious in areas where straw mulch is used for winter protection and not recommended for pest monitoring. Other monitoring methods such as night sweeping may be a better method to monitor root weevils in strawberry.

Development of a hazard rating for balsam woolly adelgid

Dan Quiring[1], Don Ostaff[2], Andrew Morrison[1], Dan Lavigne[3], Lester Hartling[3], Hubert Crummey[4], Nelson Carter[3], Ian DeMerchant[2] and Keith Moore[5].
[1] Faculty of Forestry and Environmental Management, University of New Brunswick, Fredericton, NB, [2]Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre, Fredericton, NB, [3]New Brunswick Department of Natural Resources, Fredericton, NB, [4]Newfoundland Department of Natural Resources, Corner Brook, NF, [5]Nova Scotia Department of Natural Resources, Shubenacadie, NS

Balsam woolly adelgid (BWA) was introduced into Canada from Europe early in the last century, occurs on both coasts, and has caused extensive tree damage. Affected trees are unsuitable for lumber due to uneven shrinkage causing warping and splitting, and pulp is of inferior quality to that from normal wood. Stem attack can result in growth reductions in excess of 50%, with high populations killing trees of merchantable size within three years. Chronic crown infestation can cause a tree to succumb in 10 to 20 years. Damage also predisposes trees to infection by *Armillaria* root-rot. We have carried out field surveys of damage by BWA in pairs of adjacent precommercially thinned and unthinned balsam fir stands in New Brunswick and Newfoundland and in commercially versus precommercially thinned stands in Nova Scotia. Presence of BWA damage was best explained by overwintering temperatures, commercial (but not precommercial)

thinning and tree growth rate. We will discuss the potential to use these results to establish a hazard rating for BWA.

Improved detection of incipient insect outbreaks using a purposely biased sampling method within the zone of risk predicted by an initial susceptibility model

Lucie Royer[1], Joan E. Luther[1], Doug Piercey[1], Hubert Crummey[2]
[1]Natural Resources Canada, Canadian Forest Service – Atlantic Forestry Centre, Corner Brook, NL, Canada, A2H 6J3, [2] Fortis Building, Forestry Services, Department of Natural Resources of Newfoundland and Labrador, Corner Brook, NL, Canada, A2H 6J8

In this study, we tested a forest monitoring strategy that relies on the detection of incipient insect outbreaks within the zone of risk predicted by an initial susceptibility model, and suggests allocating sampling efforts where the chances of detecting the onset of an outbreak are highest. We used historical aerial survey data of defoliation caused by hemlock looper (*Lambdina fiscellaria* Guen.) combined with forest inventory data in a geographical information system database to characterize forest stands that were most at risk during the initial stage of an outbreak for a study area in western Newfoundland. Using binary logistic regression analysis, we developed an initial susceptibility model of defoliation risk, which correctly classified 70% of the stands. The model was validated inside and outside the area used for model development. We also tested the hypothesis that purposely biased sampling would improve the chances of detecting an impending outbreak compared with a random sampling design. We found that sampling within the predicted susceptible zone systematically increased the proportion of defoliated stands detected compared with a complete random sampling. Results of this study provide the ability to optimize the number and location of sampling sites for monitoring populations.

Laboratory evaluation of the fungus *Beauveria bassiana* as a biological control agent against the eastern spruce budworm, *Choristoneura fumiferana*.

Sheila White[12], Doug Strongman[1] and Barry Hicks[2]
[1] Biology Department, Saint Mary's University, 923 Robie Street, Halifax, NS.
[2] College of the North Atlantic, 4 Pike's Lane, Carbonear, NL

Three isolates of *Beauveria bassiana* (Balsamo) Vuillemin, obtained from three different host insects, were tested in laboratory bioassays against the larvae of the eastern spruce budworm, *Choristoneura fumiferana* (Clemens)(Lepidoptera: Torticidae). An isolate originally taken from a noctuid moth larvae was effective against the larvae of the budworm but the profuse sporulation that is characteristic of this fungus was not evident. Meanwhile, two other isolates taken from two different species of tortricid caterpillars, were very effective against budworm larvae and showed more promise because both caused profuse sporulation in the budworm cadavers. One of the strains of *B. bassiana* had low impact on selected non-target organisms.

Abstracts, Poster presentations

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

Drew Carleton[1], Lucie Royer[2], Christian Hébert[3], Johanne Delisle[3], Eric Bauce[4], Dan Quiring[1]

[1] Population Ecology Group, Department of Biology, University of New Brunswick, Fredericton, New Brunswick, E3B 6E1, Canada

[2] Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Center, PO Box 960, 20 University Drive, Corner Brook, Newfoundland and Labrador, A2H 6P9, Canada
[3] Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Center, PO Box 10380, 1055 du P.E.P.S., Sainte-Foy Quebec, Quebec, G1V 4C7, Canada
4 Faculté de foresterie et géodésie, Université Laval, Cité Universitaire 2320 rue des Bibliothèques, bureau 1634, Sainte-Foy Québec, Québec, G1V 0A6, Canada

The seasonal biology of parasitoids of eggs of hemlock looper, *Lambdina fiscellaria* (Guenée), and their response to variations in host egg density were examined using branch samples and sentinel traps containing host eggs in eastern Quebec and western Newfoundland. *Trichogramma* spp. and four species of *Telenomus* (Hymenoptera: Scelionidae) were collected from host eggs. *Telenomus flavotibiae*, *Telenomus sp. nov.* and *Trichogramma* spp. were found only in fall sentinel traps. *Telenomus droozi* only parasitized spring sentinel traps but *T. coloradensis* parasitized both fall and spring traps. *Telenomus coloradensis* parasitized mostly during the spring, and was responsible for the vast majority of hemlock looper egg parasitism. Only *Telenomus coloradensis* displayed a strong and positive response to host egg density. The results suggest that *T. coloradensis* might be able to regulate hemlock looper populations. This study also suggests that the sentinel trap methods used here would be better utilized in the collection and maintenance of parasitoid colonies and for determining the biodiversity of egg parasitoid species of the hemlock looper.

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

Pamela Craig[1], Christopher Cutler[1], Vilis Nams[1], Kenna MacKenzie[2]
[1]Department of Environmental Sciences, Nova Scotia Agricultural College, PO Box 550, Truro, NS, B2N 5E3, [2]Agriculture and Agri-Food Canada, 32 Main Street, Kentville, NS, B4N 1J5

Wild (syn. "lowbush") blueberry (*Vaccinium angustifolium* Ait.) producers predominantly rely upon honey bees (*Apis mellifera* L.) to ensure successful pollination. However, the increasingly precarious state of the beekeeping industry and the sub-optimal pollination of wild blueberry by honey bees necessitate increased research into pollination alternatives for this crop. Indigenous bees that have co-evolved with the plant are very efficient pollinators of wild blueberries, and promotion of their populations could reduce reliance on managed bees. This research aims to identify native bee species currently present in wild blueberry fields in Nova Scotia and to determine some ecological factors associated with their diversity and abundance. In ten fields, native bees are being collected by pan trapping along transects to assess changes in wild bee population structure from field edges, into field interiors. Bee population data will be analyzed in relation to non-crop vegetation quantified in fields, plant communities along field edges and macro-scale landscape structure. Additionally, stigma-pollen deposition rates will be determined along the transects in an attempt to correlate pollination success with wild bee diversity and/or abundance. It is hoped that this work will produce useful decision tools for wild blueberry producers to increase native pollinators in and around their fields.

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

Krilen Ramanaidu[1], Angela Gradish[2], Cynthia Scott-Dupree[2] and Chris Cutler[1]
[1] Dept. Environmental Sciences, Nova Scotia Agricultural College, P.O. 550, Truro, NS B2N 5E3, [2] School of Environmental Sciences, University of Guelph, Guelph, ON N1G 2W1

Continued competitiveness of the Atlantic Canada wild (syn. "lowbush") blueberry industry is contingent upon satisfying modern consumers who are increasingly concerned with health and environmental issues surrounding use of broad-spectrum pesticides. The industry thus requires new "biorational" insecticide alternatives designed to target pest insects and spare beneficial species, while providing an increased margin of safety to applicators, the public and wildlife. Here we evaluate the efficacy of several new products to blueberry spanworm and blueberry flea beetle, key defoliators of wild blueberry, and assess their safety to the bumble bee, *Bombus impatiens*, and the alfalfa leafcutting bee, *Megachile rotundata*, which are used to pollinate wild blueberry. Field trials demonstrate that Belt (flubendiamide), Delegate (spinetoram), Success (spinosad), Entrust (spinosad) and Cyazypyr (cyantraniliprole) have excellent potential for pest management, with single applications at low rates providing economical control. Laboratory bioassays with blueberry spanworm indicate that the new alternatives are as potent to the pest as conventional insecticides. Bee susceptibility in the laboratory depended greatly on not only the active ingredient to which bees were exposed, but also the bee species, with *B. impatiens* usually being less susceptible than *M. rotundata* to insecticides via direct contact exposure.

Potential effect of *Beauveria bassiana* (Hypocreales: Clavicipitaceae) on Anthonomus signatus (Coleoptera: Curculionidae) in strawberries

Rachid Sabbahi[a]*, Abderrazzak Merzouki[b] and Claude Guertin[b]
[a]Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre, Corner Brook, NL, Canada; [b]Institut National de la Recherche Scientifique, Institut Armand Frappier, Laval, QC, Canada

The strawberry bud weevil, *Anthonomus signatus* (Say) (Coleoptera: Curculionidae) is a serious pest of strawberry crops in Canada. The results of previous laboratory screening and bioassay experiments showed that *A. signatus* adults were susceptible to several isolates of *Beauveria bassiana* (Balsmo) Vuillemin. Based on these results, the INRS-IP and INRS-CFL isolates were selected for field trails. Using a randomized block design with four replicates, three applications of the INRS-IP and INRS-CFL isolates were applied at a rate of $1x10^{13}$ conidia/ha at 7 day intervals. The multiple applications of *B. bassiana* triggered a significant reduction of *A. signatus* adult populations in strawberries. Twenty-four days after the first application, a significant difference was observed between the mean numbers of surviving adults in all *B. bassiana*-treated plots compared to control plots. During the field experiment, the persistence of insecticidal activity and the viability of *B. bassiana* conidia were also monitored. Results showed the presence of viable and infective conidia on strawberry foliage up to 6 days after each application. Moreover, the multiple applications of *B. bassiana* at a rate of $1x10^{13}$ conidia/ha resulted in a significant reduction of damaged strawberry fruits compared with control plots, where fruit loss was caused by *A. signatus* feeding and egg laying.

Acadian Entomological Society
69th Annual Business Meeting
Minutes: Tuesday, August 4th, Sir Wilfred Grenfell College, Corner Brook, NL

1. Call to order.
The 69th Annual Business meeting of the Acadian Entomological Society was called to order by President, Carolyn Parsons at 12:00 on Tuesday, Aug. 4th.
Approximately 16 members were present.

2. Approval of the Agenda. Carolyn Parsons moved that there be an amendment to the Agenda to include a discussion of the proposed by-law changes discussed in the Restructuring proposal, seconded by Dan Quiring.

3. Approval of the Minutes from 2008.
Lucie Royer moved to approve the Minutes from 2008, seconded by Peggy Dixon.

4. Business arising from the Minutes:

a) Sponsorship of Student awards: Peggy Dixon addressed this issue. Kenna said Dick Rogers was no longer able to do this. Sponsorship will be revisited later.

b) "Checklist of Maritime Insects": Carolyn Parsons contacted David McCorquodale to see what progress has been made with this. This was not started and will be shelved for now.

c) Kirk asked last year about AES pins. Janet inquired of a number of members about these and the consensus was that the last person to order pins was Rob Smith who is retired. Kenna thinks there may be some in some AES boxes which Susie had in 2007. She will look into this.

b) The Webmaster and Journal editor were made trustee positions, and an Honoraria of $200 each granted for these positions, held by Rick West and Don Ostaff respectively. This was decided as items in "New Business" agreed upon at the 2008 meeting

d) 2011 JAM was approved last year. Kenna agreed to act as Chair for the meeting and will solicit an organize committee for this event.

e) AES organization: Kenna MacKenzie and Donna Giberson put forth a proposal for certain changes to the AES structure. The restructuring amendment is attached, following the Minutes. There was some discussion around and amendments to the proposed changes and it was agreed that the new structure as outlined below will come into effect following the 2011 JAM. Kenna moved to accept the recommended changes, seconded by Peggy Dixon.

5. President's Report:
Carolyn thanked Tom Chapman and the organizing committee and sponsors.

6. Journal Editor's Report:
Don Ostaff reported through Janet Coombes:
Publications for 2008 - 10 manuscripts were submitted with 8 published and 2 withdrawals

Publications for 2009 (to AGM) - 5 manuscripts submitted with 3 published and 2 in the review process.

Peggy Dixon suggested that a letter of appreciation should be sent to Don Ostaff and Rick West for their work on the journal and website. Tom Chapman wondered whether we could get our journal registered with Web of science or some other science database. Dan Quiring moved that the executive select an ad-hoc committee to investigate database accessability. Kenna MacKenzie seconded the motion.

7. Treasurer's Report: Janet Coombes read the Financial Statement (see attached) Balance in current account as of July 31, 2009 was $9906.02 and amount in GICs is $5,595.49. Outstanding

AGM expenses and revenue will be accounted for at year end. Janet moved to accept Treasurer's report, seconded by Tom Chapman.

8. New Business:

a) New ESC rep: Carolyn Parsons, as outgoing President, was deemed the logical appointee to this position. Kenna MacKenzie moved Carolyn be the next ESC rep. seconded by Lucie Royer.

9. Report from the ESC:

AES Representative to ESC Board Report 2009

Over the past year a number of issues have arisen with the Entomological Society of Canada that are of interest to the AES.

1. Publications:

a. Scanning of back issues of The Canadian Entomologist and the Memoirs has been completed. All issues of TCE are available to members through the society website and the Memoirs are coming. While expensive, it was worthwhile undertaking this project.

b. TCE - the number of submissions continues to be of concern and sometimes it is difficult to fill issues. While this has saved money, it is not good for the health of our journal. We encourage members to publish in TCE. Currently, submission and review is done electronically and this is working well. We will be looking for a new Scientific Editor in a couple years as Robb Bennett will have completed his term. Negotiations are underway to renew our contract with NRC Press.

c. Bulletin - a new editor has been identified to take over when Kevin Floate finishes at the end of the year.

d. Pro Quest lawsuit - A class action lawsuit was launched on behalf of authors who did work for journals that contracted with ProQuest to provide 'electronic' versions of their journals. This is primarily to deal with paid authors who did not receive royalties for the publication of their work through digital means. ESC had a contract with ProQuest for five years (2003-2007) and part of that contract stipulated that when ProQuest was sued, their clients were also responsible. ESC is being represented by Davis LLP, a Toronto lawfirm, who is working with societies that used non-paid authors in their journals. They are trying to remove these societies from the lawsuit. A court date is set in September.

2. ESC is investigating moving to electronic voting in the next year. This will save money through reduction in postage.

3. Annual Meetings

a. Standardized forms for judging student competitions have been developed. These are to be put on the ESC website,

b. The 2009 JAM is scheduled for Oct. 18-22 in Winnipeg. 2010 will be in Vancouver and 2011 in Halifax. There is a lot of work to be done for the 2011 meeting and hopefully all members will get involved in making this event a success.

This will be my last AES meeting as Representative to the Board. I've enjoyed my five years in this role and thank you all for your support.

Respectfully submitted,
Kenna MacKenzie
Aug. 4, 2009

10. Carolyn thanked the organizing committee and moved to adjourn at 1:30 p.m., Seconded Tom Chapman.

Restructuring proposal
Acadian Entomological Society

Proposal for changing the structure of our meetings and executive make-up for the society, respectfully submitted by the AES restructuring subcommittee (Kenna MacKenzie and Donna Giberson)

Preamble:
Although our by-laws do not specify where meetings be held or that the executive be chosen from the jurisdictions represented by current meetings, we have a long tradition of rotating the meetings between the four Atlantic provinces and Maine with the executive specifically chosen to represent that jurisdiction for a two year period. In other words, when Nova Scotia (or other region) was tapped to hold the meetings for 2 consecutive years, the executive would also be from Nova Scotia (or the other region).

At the Halifax meeting in 2007, there was general consensus that this format led to a lack of continuity in the executive and the membership, and made it difficult to maintain the records and finances of the society. It was also felt that some locations were difficult to organize back-to-back meetings in, since it was hard to get enough numbers to come out to attend two consecutive meetings in outlying locations. With the emergence of a very active web page and an on-line journal, it seemed a very good time to also give more stability to the society structure.

We propose that we move to a structure where the executive is elected from the general membership including provincial/state representation, and annual meetings be chosen based on bids submitted from local groups that would like to hold the meetings or could be solicited to hold the meetings. Specifically, we propose that the executive and meeting structure follow the pattern shown below. Note that the proposed changes to decouple the meetings and executive from rotating locations will not require changes to the by-laws but the changes to the executive structure will.

Executive:

7. Executive
The affairs of the Society shall be managed by an executive consisting of the President, Vice-President, Secretary-Treasurer, regional representatives (one of whom will be the immediate past-president) and the Acadian Entomological Society representative to the Board of Directors of the Entomological Society of Canada.

7.1 The Vice-President shall be from a jurisdiction not represented by the president, and be elected in odd numbered years and shall hold office for two years. Following the two years as Vice President, the Vice President will assume the duties of President for a further two years. The newly elected officers shall take office following the completion of business at the annual meeting.

7.2 The representative to the Board of Directors of the incorporated Entomological Society of Canada shall be nominated in an election year at a meeting of the Society or by mail ballot. The term will be for three years.

7.3 The Secretary-Treasurer shall be elected by the membership for a two year term, with an option for renewing for a further two years without election. After four years, a new election for secretary-treasurer must be held.

7.4 Regional representatives will be elected from each of the jurisdictions (Atlantic Provinces and neighbouring states) not represented by the Vice President and President, ensuring representation on the executive of all Acadian jurisdictions.

Process for nominating officers:
The by-laws already specify a process for nominating members for office, and we believe that these will not need to be changed:

8. Election

Elections shall be held every odd numbered year at a meeting of the membership. Every odd numbered year shall be termed the election.

8.1 The president shall appoint a nominating committee of three members two months before the meeting of the election year. This committee shall secure a member's permission before proposing his name for office, and shall submit one or more names for each office. The retiring President shall be a nominee for the office of Representative on the Board of Directors of the incorporated Entomological Society of Canada, providing he or she is a member of good standing of the latter Society and is able to act.

8.2 The nominating committee shall transmit information on a slate of officers prior to the meeting of the election year, to be voted on at the meeting.

Annual meetings:
Our current by-laws specify that a meeting need not be held each year, but must be held in the election year. The current wording is as follows:

9. Meeting of the Membership
The executive may call annual meetings of the membership but shall always hold a meeting of the membership during the election year. The annual meeting of the Society shall normally be held during the month of April, but may be changed for any year at the discretion of the Executive.
9.1 Ten paid up members at a duly called meeting shall constitute a quorum.
9.2 A report on the meeting of the membership shall be prepared by and retained in the files of the Secretary/Treasurer. A copy shall be sent to each member.

We propose the following changes
9. Meeting of the Membership
The executive will call annual meetings of the membership. The annual meeting of the Society shall normally be held during summer, but may be changed for any year at the discretion of the Executive.
9.1 Ten paid up members at a duly called meeting shall constitute a quorum.

9.2 A report on the meeting of the membership shall be prepared by and retained in the files of the Secretary/Treasurer. A copy shall be posted on the website.

9.3. The Executive will solicit bids for a location of the next annual meeting at least three months prior to the annual meeting (i.e. 15 months before the proposed meeting), and present these to the membership at the annual meeting of the current year for ratification.

We also propose a new standing committee and a new annual committee of the society:
Local Arrangements Committee (Annual)
This committee will consist of the local group that is organizing the meeting. There will be a chair appointed by the President, and such other members as the Chair would like to appoint, to assure a smooth running meeting.

We also propose that in addition to these changes, the society by-laws should be further reviewed and in particular, the standing committees, to determine whether some should be dropped or renewed.

Implementation of the proposal:

Executive:
Following acceptance by the membership of the society at the meeting to be held in Corner Brook NL (2009), we recommend the following sequence:

1. The nominating committee be prepared with a list of candidates for Vice President (willing to serve for 2 years as VP and 2 years as President), for President (willing to serve for two years, and preferably from a different jurisdiction than the Vice President) and for Secretary-Treasurer (willing to serve for at least two years. Nominations for regional reps can be solicited from the floor once the VP and President are elected. (Our suggestion for this year is the outgoing executive form the nominating committee for this year.)

2. Voting should be by secret ballot by the membership in attendance at the meeting.

3. The newly elected executive will appoint a nominating committee and an annual meeting committee as needed during their terms of office.

Upcoming Meetings
The membership at the St. John's meeting voted to hold a joint meeting with the ESC in 2011 in Halifax. We propose that no annual meeting be held in 2010 to give the local organizing committee time to organize the national meeting and to give the new annual meeting committee time to solicit bids to hold the next meeting. This would result in the following:

2010: no meeting
2011: Halifax as a JAM with ESC. At this meeting members will ratify the meeting location for the 2012 meeting
2012: to be held in the location determined in 2011 and will determine the location for the 2013 meeting.

Financial Statement, Acadian Entomological Society (as of July 31, 2009)

Chequing Account:

Balance as of 2008 AGM, June 17, 2008		**10,292.64**
Additional Expenses, 2008		
Outstanding expenses, 2008 AGM	3,011.39	
Bank charges, June - Dec 2008, SC	23.80	
Bank charges, June - Dec 2008, PAYG	55.65	
Total additional 2008 expenses	3,090.84	
Additional Revenue, 2008		
Memberships		82.00
JAES fees		125.00
AGM income (Reg, meals and t-shirt)		404.91
Total additional 2008 Revenue		611.91
Balance, Dec 31, 2008		7,813.71
2009 expenses to date:		
Honoraria	400.00	
Bank charges, SC	47.70	
Bank charges, PAYG	8.07	
Total 2009 expenses to date	455.77	
2009 revenue to date:		
membership		$288.36
JAES fees		$90.00
AGM Registration fees		$2,169.72
Total 2009 revenue to date		2,548.08
Balance, July 31, 2009		**9,906.02**

GICs:

TRIPLE VALUE GIC - 2008 - 5680 8083716-17	$1,864.51
TRIPLE VALUE GIC - 2008 - 5680 8083716-18	$1,865.54
TRIPLE VALUE GIC - 2008 - 5680 8083716-19	$1,865.44
Total in GICs	**$5,595.49**

Janet Coombes
Secretary/Treasurer
August 4, 2009